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This Certificate is presented to Dr. S. Sasikala from VELAMMAL COLLEGE OF ENGINEERING AND TECHNOLOGY, MADURAI for presenting a paper entitled REIMAGINED:ADVANCEMENTS IN IMAGE PROCESSING THROUGH DEEP LEARNING in the International Conference on Emerging Innovative Research with Industry 5.0 in Technology, Engineering, Management and Social Sciences (ICE 5.0 TEMS), in association with AIMST University, Malaysia and Computer Society of India, Chennai Chapter, held on **27th March 2024** organized by Department of Computer Science and Applications, FSH, SRM Institute of Science and Technology, Chennai-600 089, Tamil Nadu, India.

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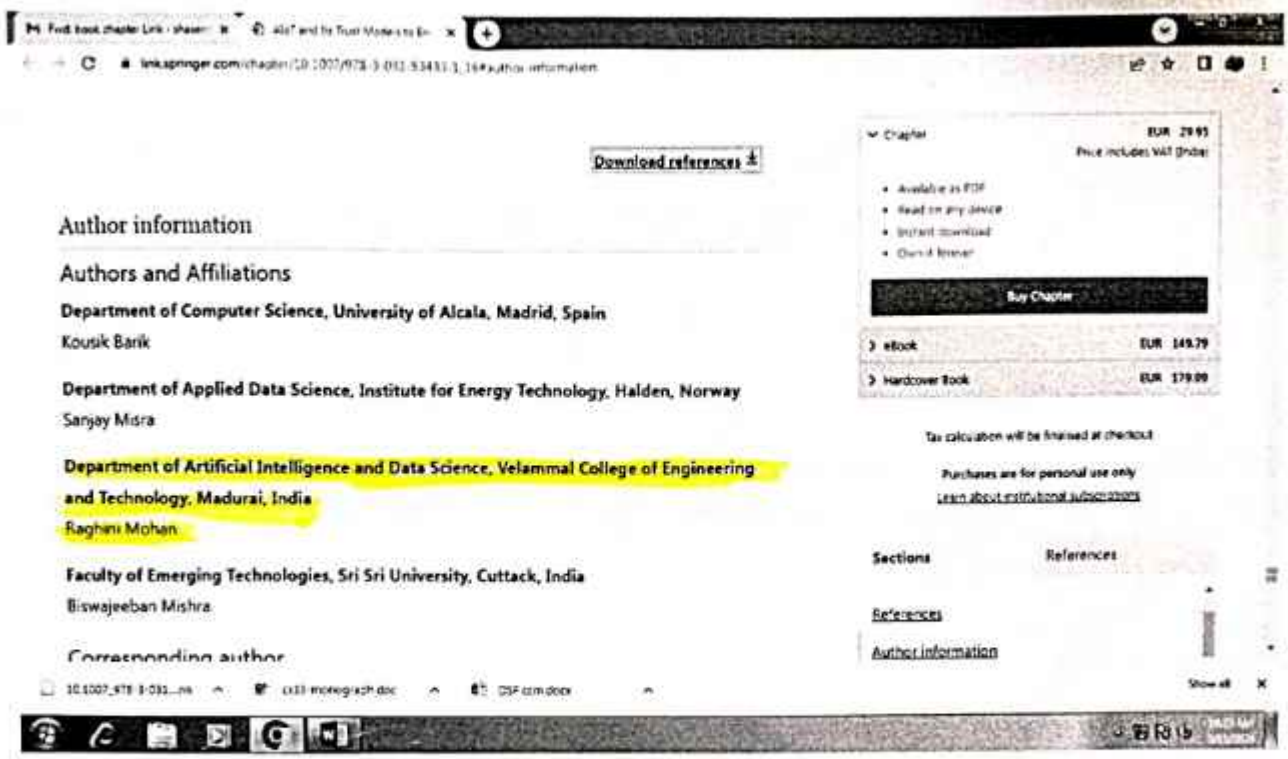

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Author information

Authors and Affiliations

Department of Computer Science, University of Alcala, Madrid, Spain
Kousik Barik

Department of Applied Data Science, Institute for Energy Technology, Halden, Norway
Sanjay Misra

Department of Artificial Intelligence and Data Science, Velammal College of Engineering and Technology, Madurai, India
Raghini Mohan

Faculty of Emerging Technologies, Sri Sri University, Cuttack, India
Biswajeeban Mishra

Corresponding author

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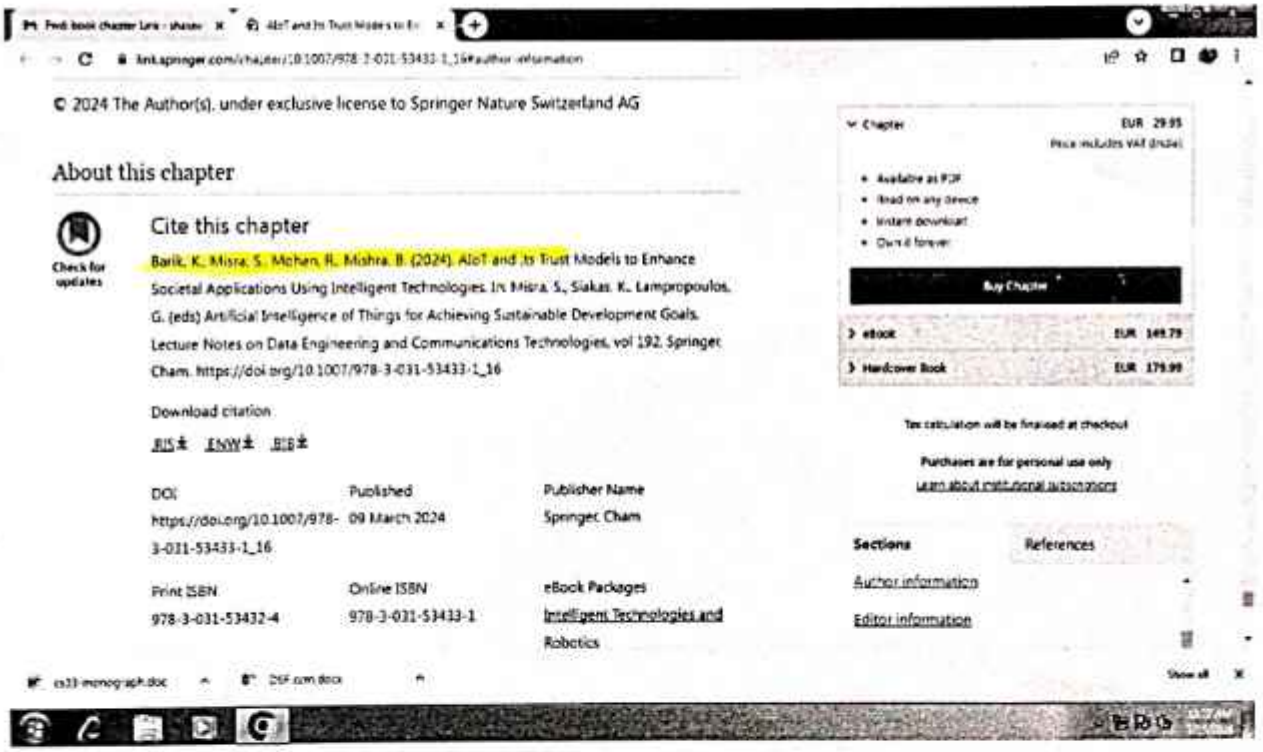

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International Conference on

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Co-authors: S. Sasikala, V.Selvalakshmi, Madhu Nisha. R, Praveena. K

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Dr. N.M.K Bhatta
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Chapter 5

Gamma Radiation Shielding Properties of Steel, Basalt, and Steel-Basalt Hybrid Fiber Reinforced Copper Slag Concrete

Vinotha Jenifer John[1,*]
Brindha Dharmar[2]
and Divyah Nagarajan[3]

[1]Civil Department, Velammal College of Engineering and Technology, Madurai, India
[2]Civil Department, Thiagarajar College of Engineering, Madurai, India
[3]Civil Department, PSG Institute of Technology and Applied Research, Coimbatore, India

Abstract

The proposed study summarizes the results from the investigation carried out on fiber reinforced copper slag concrete with steel, basalt fibers, and in hybrid form subjected to gamma radiation shielding. The part of the research work has been previously published in which the detailed mechanical investigations of the proposed concrete were carried out. From the previous investigations, the optimum volume fraction of the fibers was identified and fused in concrete to analyze the gamma radiation shielding parameters. Due to the increased density and the spiked vital elemental composition in concrete made it reliable to study the gamma radiation properties. The present study focuses on parameters such as linear attenuation coefficient, mass attenuation coefficient, half value layer, tenth value layer, and mean free path. The hybrid and mono fiber concrete was subjected to the gamma source Iridium (192Ir), and it was observed that basalt as mono fibers in concrete established greater

* Corresponding Author's E-mail: jvj@vcet.ac.in.

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shielding properties followed by the steel and basalt fibers in hybrid form.

Keywords: steel fibers, basalt fibers, hybrid fiber reinforced concrete, copper slag

Introduction

Being a customary construction material, concrete has a wide range of applicability with several advantages. For decades, the construction sector has fostered sustainability by employing contemporary yet natural materials. Among the techniques adopted to counterbalance the identified setbacks in plain cement concrete, fiber reinforced concrete is considered one of the sustainable choices. The construction industry is already involved in the magnificent production of fibers for applicability in various parts of the industry. The development of fiber manufacturing depends on the real demand for materials that meet both technical and environmental criteria. Every fiber, whether organic, metallic, or mineral has its own distinctive primary property. Fiber is commonly accessible in a variety of forms, including textiles, laminates, and fibrillated, either in discrete or continuous shape, monofilament, etc.

Multi-degree reinforcement with an indefinite range of strains is required for the concrete to resist crack formation. Concrete made of only one type of fiber is unlikely to resist cracks. To meet the multi-degree fracture characteristics in concrete different fibers with different intrinsic responses, sizes, shapes, and behaviors are required. Therefore, the fibers must be selected depending on the key aspects of hybridization. If the combination contains two fibers, the properties of each fiber must complement one another. During the initial crack stress, strong and rigid micro fibers operate while the macro fiber is selected to be ductile and flexible to improve the toughness quality. Generally, the characteristics of mono fiber and hybrid fiber reinforced concrete are determined by the physical, chemical, and mechanical properties of the fibers. Based on each fiber's unique characteristics, the variety of fibers rationally bonded in concrete can provide various levels of crack resistance.

The provision of proper protection from radiation is still a major issue, and not just in relation to nuclear facilities (such as nuclear reactors and particle accelerators). Concrete is an excellent material for building radiation

shielding. However, other materials could be used for radiation shielding. Concrete is not only inexpensive, but it can also be cast into any required homogeneous structural shape. Concrete is currently widely utilized to shield atomic research centers, nuclear power plants, and radiation medical and research units or equipment. A suitable thickness of conventional concrete is utilized for such reasons. However, where usable space is a major consideration, the thickness of the shield is reduced by the use of fiber reinforced concrete. Attenuation qualities are known to be affected by the components, thickness, and density of concrete, as well as gamma ray energy.

Fibers in Concrete

To comprehend the selection of fibers to be used in concrete, it is vital to examine the stages of crack formation. Cracking is a multiscale phenomenon that begins at the micro level as micro cracks under applied stress in the matrix-aggregate interface transition zone. The tiny cracks propagate until they meet another micro fracture, which finally evolves into a macro crack (Lawler et al., 2003). Following the initiation of a macro crack, the load-bearing capability of the concrete will be diminished.

Utilizing fibers in cement composites has been a standard improvement in the construction business for centuries. Given that concrete is a semi-brittle material with a low strain capacity under principally tensile pressures, the fractures appear mostly in the interfacial transition zone and matrix. Adopting discrete fibers in concrete is intended to convey internal tensile stresses to randomly scattered fibers, while the concrete matrix absorbs internal compressive pressures, resulting in an increase in concrete's straining capacity after the first crack strength (Chanh and Van Chanh, 2004). The composite strength tends to improve with increase in aspect ratio, modular ratio, fiber content, and degree of alignment of the fiber based on the governing property of individual fibers (Aydın, 2013). (Kayali, 2016) compiled Table 1, the properties of various fibers based on numerous published studies of FRC.

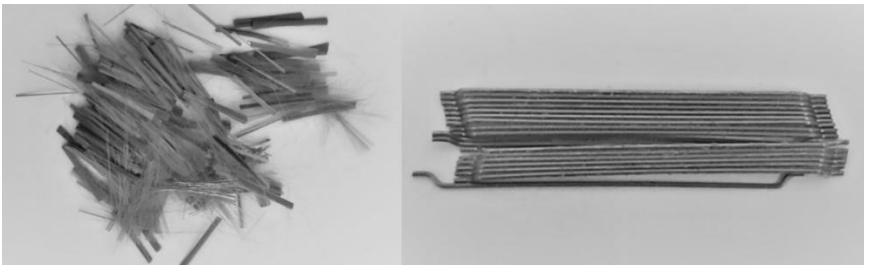
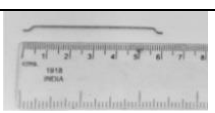
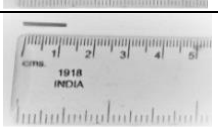


Figure 1. (a) Basalt fibers (b) Steel fibers used in the study.

Table 1. Properties of different fibers (Kayali, 2016)

Fiber	Length (mm)	Diameter (mm)	Specific gravity	Modulus of Elasticity (GPa)	Tensile strength (MPa)	Strain at failure %
Steel	10-60	0.1-0.6	7.86	200	280-2800	0.5-35
AR-glass	10-50	0.0125	2.68	74	3600	2.5
E-glass	10-50	0.0125	2.57	72.5	3400	2.5
Carbon (Standard, high strength, high modulus, ultra- high modulus)	3-conti-nuous	0.005-0.01	1.7 - 2.1	250-800	2400-4800	0.2-1.4
Polypropylene	5-20	0.02-0.1	0.91	1-8	400	25
Polyethylene	5-50	0.02-0.2	0.95	117	2588	10
Cellulose	0.5-5	0.02-0.12	1.5	10-50	300-1000	20
Basalt	0.005-continous	0.011	2.6	7.6	1000	2.6

Table 2. Properties of Steel and Basalt fibers used in the study

Fiber	Picture	Type	Length (mm)	Diameter (mm)	Young's Modulus (GPa)	Tensile Strength (MPa)	Density (kg/m^3)	Aspect ratio
Steel		Hooked End	60	0.75	210	1100	7850	80
Basalt		Straight	12-14	0.025	89	4840	2700	480

After detailed investigation of secondary materials by various researchers, steel fibers are chosen as macro fibers, and basalt fibers are chosen as micro fibers for the proposed study shown in Figure 1 a and b, for their dominant properties discussed in Table 2. Both fiber materials meet the technical and environmental requirements.

Steel as Mono Fibers

Among the many potential fibers, steel fibers have garnered significant attention due to their exceptional properties and global availability. Hooked end steel fibers improved their reinforcing and bond strength since straight steel fibers are smooth and have a weak pullout resistance (Nieuwoudt and Boshoff, 2017). Unlike shorter fibers with a lower aspect ratio, long fibers with a hooked end exhibit dominant qualities. Long fibers have a negative impact on concrete's fresh qualities, but they have a positive impact on the hardened properties, particularly the flexural strength, ductility, toughness, and residual strength (Moghadam, 1998; Nataraja, 1999; Fallis, 2013). In general, as the aggregate size increases, the volume of the fluid phase in concrete decreases (Fallis, 2013). The primary problem is determining the influencing volume fraction of fibers and the accompanying effects, mainly under static loading circumstances. Furthermore, due to the higher density of steel fibers, they tend to disperse irregularly in the concrete, resulting in void formation (Neves and Almeida, 2005; Aydın, 2013).

Basalt as Mono Fibers

Basalt fibers are short monofilament fibers obtained from a black fine-grained volcanic basalt available worldwide. Basalt fibers have good energy absorption, matrix bonding, mechanical and chemical resistance, and acoustic and thermal properties. Basalt fibers are a nonpolluting 21st-century green material. Due to basalt's high melting point of 1400°C, it can be reused after being burned and cremated. It's cheaper and stronger than carbon fibers (Taylor and Jamshaid, 2015). Basalt fiber meets technical and environmental requirements for its exceptional quality, as explored in this study.

The basalt fibers are in discrete forms from 9mm to 50mm in length and 9-22m in diameter. Researchers have spent decades studying the behavior of basalt fiber reinforced concrete by altering aspect ratio and volume fraction.

Table 3. Compiled investigations of hybrid fiber reinforced concrete (John and Dharmar, 2021)

Author Reference	Fiber material (optimum length in mm)	Coarse Aggregate size in mm	Findings/Remarks
Banthia et al. (2014)	Steel (30), Cellulose (2.3)	14	Enhanced performance under flexure and toughness
Teng, Afroughsabet & Ostertag (2018)	Steel (60), Polyvinyl alcohol (12)	19	Improvement in flexural properties
Sun et al. (2018)	Steel (13), Polyvinyl alcohol (12)	-	Compressive toughness, ductility, and strain behavior had better development.
Sahoo, Solanki & Kumar (2014)	Steel (50), polypropylene (40)	12.5	Boosted displacement ductility, post-peak residual strength, and strain-hardening response
Li et al. (2018)	Steel (Straight (12), hooked end (30), corrugated (30,45,60)), Polypropylene (13.6)	5 – 20	Positive synergy effect on first cracking properties, post-peak ductility, and at the pre-peak stage. Twisted-hooked end fibers showed better failure behavior.
Correal et al. (2018)	Steel (60,35), polyethylene (55)	12.7	(PF/SF) equals 2.0 had lower residual strengths. The ratio for the application of thin concrete walls for low-rise housing is recommended from 1 to 1.5.
Chun & Yoo (2018)	Steel (Micro (13), Macro, Hooked, Twisted (30))	-	Macro straight and microfibers increased the pullout energy, whereas hooked and twisted hybrid forms enhanced the post cracking tensile strength of concrete.
Bhosale et al. (2019)	Steel (30), Polyolefin (50)	10 and 20	Improvised the residual strength at the smaller crack opening. The fracture process zone is found to be less distributed in polyolefin FRC.
Koniki & Prasad (2019)	Steel (25), Polyester (12), Polypropylene (6)	Well graded of different sizes	Non-metallic hybrid fibers showcased heightened mechanical properties. Positive synergy effect observed in metallic and non-metallic fibers during crack control stages.

Author Reference	Fiber material (optimum length in mm)	Coarse Aggregate size in mm	Findings/Remarks
Zhang et al. (2019)	Steel (15), Basalt (12)	5-10	A 35% strength increment was observed under static loading conditions. The hybrid effect boosted toughness and impact strength. The concrete was claimed as strain-rate sensitive.
Qian & Stroeven (2000)	Steel (Hooked end (40, 30), straight (6)), Polypropylene (12)	Up to 16	Influences load bearing capacity in small displacement range with the larger length of steel fibers. Positive effect on fracture toughness.
Cao, Xie & Guan (2019)	Polyvinyl alcohol(6), Steel (13), $CaCO_3$ whiskers (0.02-0.03)	-	$CaCO_3$ whiskers arrested cracks, enhancing fracture toughness. Adopted hybridization ensured multiscale resistance to cracking.
Cattaneo & Biolzi (2010)	Carbon(6), Polypropylene(6), Steel	3	Polypropylene fibers with other fibers created a negative effect on the performance of concrete under elevated temperatures.
Dawood et al. (2018)	Carbon(8), Polypropylene(12)	-	Hybridization enhanced flexural toughness.
Afroughsabet et al. (2018)	Steel (60,35), Polyvinyl alcohol (12)	19	A positive synergy effect was observed in deflection hardening. A reduction in shrinkage deformation was noticed.
Engineering and Planning (2012)	Wire fiber (50,30), Mill cut fiber (32), Polypropylene (10)	5-20	Improvement in bending and tensile strength with resistance to impact.
(Building 1975)	Nylon, Polypropylene, Glass, Asbestos, Carbon	-	Capable of augmenting the tensile and bending properties.
Yurtseven, Yaman & Tokyay (2006)	Steel (60,30), Polypropylene (20)	5,12	The combination enhanced the ultimate failure strength, but the synergetic response was not observed in flexural toughness or ductility.
(Guler 2019)	Steel, Polyamide	4,19	Notable tensile and flexural strength was observed
Mobasher, Yao & Soranakom (2015)	Alumina, Carbon, Polypropylene	-	Enhancement in peak load up to 75% was established.
Wang et al. (2019)	Steel, Basalt, Polypropylene	-	Positive results were observed under mechanical properties.

Incorporating dispersive basalt fibers in concrete, fibers of length between 12-36mm provided satisfactory results when compared to fibers with length greater than 36mm with maximum volume fraction (Ayub, Shafiq and Nuruddin, 2014; Kabay, 2014; Sahoo, Solanki and Kumar, 2014; Kizilkanat et al., 2015; Girgin and Yıldırım, 2016; Hannawi et al., 2016; Sruthi Jalasutram, Dipti Ranjan Sahoo, 2016; Katkhuda and Shatarat, 2017; Sadrmomtazi, Tahmouresi and Saradar, 2018). Microfibers can be added to concrete at a volume fraction of around 2%, after which the performance of the concrete is negatively affected (Shafiq, Ayub and Ullah, 2016). Similarly, when adding macro fibers to concrete, the lowest volume percentage is adequate to improve the properties of the concrete (Branston et al., 2016); increasing the volume fraction may result in low workability and bigger void formation, followed by low stress transmission and strain capacity. Micro and macro fibers each offer their own set of advantages. When stresses are applied to concrete, either internally or externally, the micro dispersive fibers will be able to stop the propagation and start of cracks, resulting in increased strain capacity.

Hybrid Fibers in Concrete

Diverse fibers, rationally fused in concrete, are capable of providing crack resistance at many scales, depending on the unique quality of the fiber (Banthia et al., 2014). The compilation of several researchers in Table 3 demonstrates the need for multi-level reinforcement to overcome the setbacks of concrete.

There is a lack of comprehensive knowledge on the process of selecting the optimal combination of fibers that will result in a beneficial synergy effect in the performance of concrete. Due to the dominating property of steel fibers, the majority of studies incorporated steel as micro or macro fibers with non-metallic fibers (Qian and Stroeven, 2000; Banthia et al., 2014; Sahoo, Solanki and Kumar, 2014; Chun and Yoo, 2018; Li et al., 2018; Guler, 2019; Koniki srikanth 2021; Teja prathipathi 2020).

Based on the compiled literature, it was evident that there is no substitute for the performance of steel fibers (Nataraja, 1999; Holschemacher, Mueller and Ribakov, 2010; Yap, Alengaram and Jumaat, 2015; Saidani, Saraireh and Gerges, 2016; Abbass, Khan and Mourad, 2018). In addition to steel fibers, interest is currently focused on natural fibers. The manufacture of synthetic fibers requires a great deal of energy and comes at a high cost. In the case of

high-performance fiber-reinforced composites (HFRC), natural mineral fibers with a low modulus can be more advantageous from the perspective of using globally accessible materials. The scant research on natural mineral fibers in hybrid combination with metallic fibers demands a great deal of attention in order to evaluate the performance of HFRC for its distinctive qualities. Basalt microfibers have their potential benefits that can complement steel fibers in hybrid form. Zhang et al. (Zhang et al., 2019) analyzed the mechanical characteristics of micro hybrid fibers (steel and basalt) employing detritus as coarse aggregate and found that they exhibited significant strength under static and dynamic loading situations.

The selected fibers satisfy the essential hybridization criteria. Individually noteworthy features of one fiber complement those of another. Thus, micro fibers (Basalt fibers) are chosen for their strength and stiffness to operate at early crack stress, and macro fibers (Steel fibers) are chosen to be flexible and ductile for their toughness.

Effect of Matrix in Fiber Reinforced Concrete

Reinforcing material in concrete emphasizes strength and ductility, but matrix transfers tensile stresses to fibers. Unless a crack appears in concrete, its mechanical behavior is mostly determined by its matrix. The matrix must be strong enough to sustain external or internal forces conveyed by individual fibers. To improve the matrix strength of the fiber reinforced concrete, detailed investigations were carried out to analyze the secondary materials in concrete.

Every year, the country generates solid waste, the majority of which is inorganic waste from the mining and industrial sectors as of 2020. Among the wastes produced, coal bottom ash, fly ash, copper slag, and waste foundry sand require a significant amount of disposal. Based on the notion of global availability, (Kumar, Kumar and Kumar, 2016) conducted a detailed review of secondary materials taking into account the following physical and chemical properties in Table 4.

Based on the review of the selected industrial wastes from various researchers, copper slag was chosen as the replacement material for the following reasons:

- When incorporating fibers into the mixture, the materials in the concrete had to be impermeable, considering the water demand. Copper slag has higher specific gravity. The higher the specific

gravity, the higher the density of the mixture, resulting in less porosity.

Table 4. Physical and chemical properties of industrial wasters (Kumar, Kumar and Kumar, 2016)

Waste material	Specific gravity	Shape and texture	Water absorption %	Slump as of % of replacement	Dominant chemical composition
Waste foundry sand	2.18-2.61	Rounded, Dark/grey	0.33-7.67	Medium workability @ w/c 0.44	SiO_2, Al_2O_3
Copper slag	3.4-3.91	Granular, Dark, polished	0.3-0.4	High workability @ w/c 0.35	SiO_2, Al_2O_3, Fe_2O_3, CaO
Fly ash – class F	2.3-2.6	Spherical, glass like, Tan to dark grey	2.0	Low workability @ w/c 0.47-0.5	SiO_2, Al_2O_3, Fe_2O_3,CaO
Coal bottom ash	1.39-1.93	Rough, irregular, permeable	5.4-32.2	Low workability @ w/c 0.477	SiO_2, Al_2O_3, Fe_2O_3

- When combined with clustered fibers, the granular, polished surface as spherical particles improves mixing. The texture of copper slag enhances the ease of mixing.
- A higher-quality concrete mixture ensures a low water-to-cement ratio. Copper slag absorbs a significant quantity of water, allowing it to push excess water out and aiding in improved workability under regulated water content with mono fibers or clustered fibers.
- The presence of chemical composition in copper slag is required for the establishment of a stronger link between the matrix, fibers, and the interfacial transition zone, and the selection is deemed acceptable.

Copper slag, a byproduct of the copper smelting process, is a non-hazardous residue that can be reused indefinitely. The chemical components in copper slag, such as Si, Fe, and Al oxides, can be used as a replacement for fine aggregate in concrete (Tixier, R. Devaguptapu, R. Mobasher, 1997; Shi, Meyer and Behnood, 2008; Murari, Siddique and Jain, 2014). Several authors have reported positive effects when using copper slag to replace fine aggregate in concrete. Lower water absorption capacity due to the slag grain's glassy appearance improves the concrete's workability. When substituted for fine aggregate at a 40% volume fraction, copper slag is preferred over other types of industrial waste in terms of strength and durability (Wu, Zhang and Ma,

2010; Al-Jabri, Al-Saidy and Taha, 2011). When compared to traditional fiber reinforced concrete (FRC), the outcomes of integrating copper slag with mono fibers like steel and polypropylene, steel and basalt fibers are overwhelmingly positive (Chakrawarthi et al., 2016; John and Dharmar, 2019).

Steel and basalt fibers, combined with copper slag, can create synergistic benefits in the matrix when incorporated with copper slag (John and Dharmar, 2021).

Effect of Gamma Radiation on Fiber Concrete

(Sharma et al., 2009) investigated the effectiveness of hybrid fiber reinforced concrete made with lead and steel fibers with regard to its mechanical and radiation shielding qualities. For the purpose of the investigation, a cobalt source was chosen to receive a dosage rate of three kilogram per hour. When compared to individual fibers, the hybrid fibers in concrete were found to possess qualities that are superior to those of the individual fibers. The material's mechanical properties, including its flexural toughness, compressive strength, and tensile strength, were significantly enhanced. The radiation characteristics were approximately fifty percent greater than those of the control concrete.

Experimental Programme

(Gümüs and Gökçe, 2020) conducted research on the mechanical, gamma, and neutron attenuation characteristics of polypropylene fiber induced heavy weight concrete subjected to elevated temperature. For barite concrete with a fiber dosage of 3 kg/m3, the linear attenuation was found to be increased by 9% when subjected to temperatures as high as 600 degrees Celsius. (Mohebbi, Habibi and Sadrmomtazi, 2020) studied the effects of cesium and Cobalt gamma source radiation on heavy weight concrete that was heated to an increased temperature of up to 600 degrees Celsius but did not include any fibers. In order to improve the mechanical and shielding capabilities of heavy weight magnetite concrete, it was suggested that nano bismuth oxide might be used in concentrations of up to 6%.

(Martı, Giraldo and Lo, 2008) employed nylon fibers in polymer concrete irradiated from cobalt sources at 5 to 100 kGy at 6.10 kGy/h. Since mechanical

qualities rely on fiber and gamma ray dosage, they were equivalent to standard polymer concrete. Irradiated samples had better compressive strain and elastic modulus. (Martínez-barrera et al., 2011) studied recycled tire fibers in polymer concrete exposed to 50 and 100 kGy of Cobalt gamma at 3.5 kG/h. When concrete fibers were bombarded with gamma radiation, compression, and flexure performance increased.

When considering the breadth of potential future energy sources, radiation shielding structures were deemed to be among the most important uses of hybrid fiber concrete. Therefore, several isotopes of radiation have been tested against hybrid fibers to determine their effectiveness as a gamma radiation shield. Since there was a dearth of data on the effects of gamma radiation on the proposed hybrid fiber concrete, an investigation was undertaken.

Materials and Methods

Steel fibers with hooked ends, shown in Figure 1, was utilized as macro fibers to offer anchoring for the bridging mechanism and to provide pullout resistance. For the ability of basalt fibers to act at the micro and meso level crack formation, they were adopted as straight microfibers. Steel fibers are hydrophobic and do not absorb water due to their hooked end shape. Basalt fibers stabilize the spaces between the fiber and matrix by absorbing water while mixing and dispersing tiny strands. Copper slag absorbs a small quantity of water when mixing, compensating for the basalt fibers' extra water demand. Pozzolana Portland cement as binder material with a density of 3.05 g/cm^3 per IS 1489.1.2015, river sand with a specific gravity of 2.5, and Copper slag with a specific gravity of 3.5 as fine aggregate per IS 383.2016, 12.5 mm and 20 mm coarse aggregate with a density of 2.7 g/cm^3 was used. Water-to-cement ratio was maintained at 0.35. Superplasticizer Masterglenium sky 8233 with a specific gravity of 1.08 is used to maintain the workability of the concrete.

As per IS 10262-2019, the concrete blend was created for M40 quality. The proposed study's mix design prioritized a lower water-to-cement ratio of 0.35 and the addition of superplasticizer from 0.5% to 2% by volume of concrete based on workability. A total of fifteen different concrete mixtures were cast: five with steel fibers at volume fractions of 0.3%, 0.6%, 0.9%, 1.2%, and 1.5%; six with basalt fibers at volume fractions of 0.3%, 0.6%, 0.9%, 1.3%, 1.5%, and 2%; and two control mixtures. By altering the quantity of coarse aggregate, a major influencing factor, 10 mixes were constructed in

a hybrid combination using the optimum volume fractions from the behavior of steel fiber reinforced concrete and basalt fiber reinforced concrete.

In the concrete mixer, cement, fine aggregate, and coarse aggregate were mixed dry at first. In hybrid mixtures, steel fibers are added and dry-mixed with the raw materials before basalt fibers. This is because steel fibers need more time to spread out evenly. Then water and superplasticizer were added, and the mixture was spread evenly. After that, the mixtures were poured into moulds, vibrated on a vibrating table, and then pressed together. After 24 hours, the pieces were taken out of the mould and cured in a water tank for 28 days.

Based on the preliminary investigations on mechanical properties carried out in steel fiber reinforced concrete, basalt fiber reinforced concrete, and its hybrid combination (John, Vinotha Jenifer, 2019; John and Dharmar, 2020, 2021), the concrete mixes were optimized to ensure the applicability of concrete subject to gamma radiation shielding. The optimized mixes of the fiber reinforced concrete are tabulated in Table 5, where C represents Copper slag content, S represents Steel fibers, and B represents Basalt fibers.

Table 5. Mix ID Variables of mono and hybrid fiber reinforced concrete

Mix ID -Variables	Copper slag (%)	Fiber Volume fraction (%)	Coarse Aggregate (%)	
			12.5 mm	20 mm
C0B	0	0	50	50
C40B	40	0	50	50
C40S15	40	1.5 (Steel)	0	100
C40B6	40	0.6 (Basalt)	0	100
S15B6B	40	1.5 (Steel) +0.6 (Basalt)	50	50

Radiation Shielding Assessment

The gamma radiation assessment was performed on-site using the test set up by BRIGHT INSPECTION SERVICES (BIS) at their radiation facility in Dindigul, Tamil Nadu. The gamma source setup was made for detecting flaws in various steel pipelines which were to be installed by corporate industry.

The aforementioned on-site equipment was used to examine the gamma ray shielding capabilities of concrete mixes. A 192Ir (Iridium) of 1 Ci (Curie) gamma ray source was positioned one meter from the proposed shielding material. Iridium is a radioactive isotope of the iridium metal that is neutron activated and has a half-life of 73.83 days. It is mostly utilized in industrial

applications such as evaluating structural welds on pressurized pipelines, tanks, and containers.

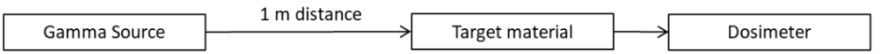


Figure 2. Gamma radiation schematic setup.

The source was contained in sealed sources, which emitted a focused beam on the target material, and was measured by a dosimeter which was in close contact beneath the specimen. For the purpose of investigating the attenuation range with varying thickness, the cylinder specimens were cast in two distinct sizes: 100 mm diameter x 100 mm length and 100 mm diameter x 200 mm length. Gamma rays were subjected to each specimen for 60 minutes. The setup is shown in Figure 2.

The testing of specimens was quite challenging since it was an industrial setup from the inspection site. The collection of readings from the dosimeter made it difficult to perform the test. Hence, a camera was fitted inside the setup environment to monitor the dosimeter readings. The site was well shielded and monitored for radiation leakages with proper protection.

The dose rate before and after attenuation was recorded by the dosimeter through one axis of each specimen. The average readings were noted from the two tested samples, and the following parameters were calculated.

- Linear attenuation coefficient: It is a constant that expresses the proportion of incident photons that are attenuated per unit thickness of a material in a monoenergetic beam. The examined material's density and effective atomic number determine the linear attenuation coefficient of the specimen tested.

$$I = I_0 e^{(-\mu x)}$$

- Mass attenuation coefficient: The mass attenuation coefficient of a substance is the attenuation coefficient normalized by the substance's density or the attenuation per unit mass. Hence, it describes the ease with which a beam of light, sound, particles, or other energy or matter can penetrate a mass of material.

$$\mu_m = \frac{\mu}{\rho}$$

- Half Value Layer: It is the thickness at which the intensity of radiation entering the substance is reduced by half.

$$HVL = x_{1/2} = \frac{ln2}{\mu}$$

- Tenth value Layer: It is the thickness at which the intensity of radiation entering the substance is reduced by one-tenth.
- Mean free path: The mean free path is the average distance a gamma ray travels before interacting with an absorber.

where x = thickness of the specimen,
I_0 = intensity of radiation before absorption,
I = intensity of radiation after passing the absorption,
μ = Linear co-efficient of attenuation of the gamma radiation beam,
ρ = density of the specimen.

Table 6. Gamma radiation shielding parameters for 10 cm thickness

Sample ID	Thickness	Initial Dosimeter reading	Attenuated dosimeter reading	% Reduction	Linear attenuation coefficient (μ)	Mass attenuation coefficient (μ_m)	Mean free path (MFP)	Half value Layer (HVL)	Tenth value Layer (TVL)
	cm	mR/hr	mR/hr		cm^{-1}	cm^2/g	cm	cm	cm
C0	10	500	222	55.6	0.08	0.033	12.32	8.54	28.36
C40	10	500	173	65.4	0.11	0.042	9.42	6.53	21.70
C40B6	10	500	60	88	0.21	0.083	4.72	3.27	10.86
C40S15	10	500	138	72.4	0.13	0.048	7.77	5.38	17.89
S15B6B	10	500	113	77.4	0.15	0.055	6.72	4.66	15.48

Table 7. Gamma radiation shielding parameters for 20 cm thickness

Sample ID	Thickness	Initial Dosimeter reading	Attenuated dosimeter reading	% Reduction	Linear attenuation coefficient (μ)	Mass attenuation coefficient (μ_m)	Mean free path (MFP)	Half value Layer (HVL)	Tenth value Layer (TVL)
	cm	mR/hr	mR/hr		cm^{-1}	cm^2/g	cm	cm	cm
C0	20	500	110	78	0.08	0.057	13.21	9.16	30.41
C40	20	500	85	83	0.09	0.054	11.29	7.82	25.99
C40B6	20	500	27	94.6	0.15	0.054	6.86	4.75	15.78
C40S15	20	500	58	88.4	0.11	0.052	9.28	6.44	21.38
S15B6B	20	500	49	90.2	0.12	0.052	8.61	5.97	19.83

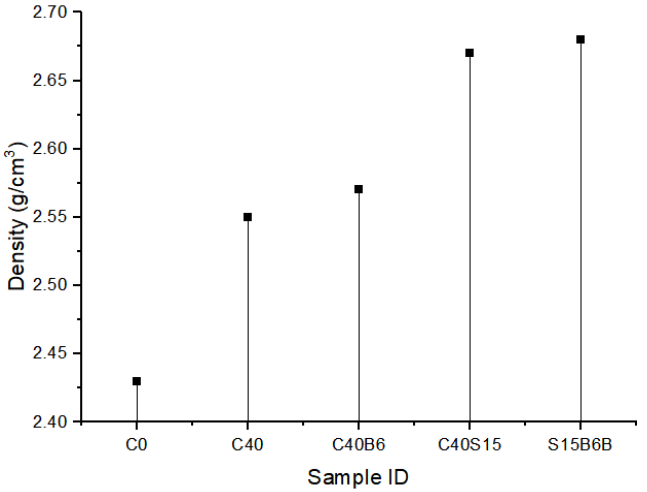


Figure 3. Density of the samples subjected to gamma radiation.

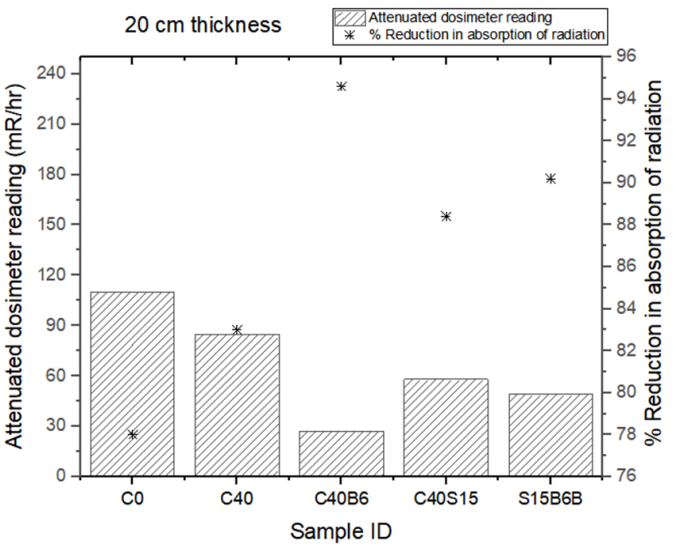


Figure 4. Attenuated dosimeter reading and percentage reduction of the samples for 20cm thickness.

Concrete specimens C0, C40, C40S15, C40B6, and S15B6 are tested for radiation shielding properties subjected to an Iridium source. The specimens had different densities, shown in Figure 3, due to the presence of copper slag

and fibers. Some of the shielding parameters assessed from the experiment discussed are presented in Table 6 and Table 7.

Attenuation of Gamma Rays

The dosimeter measurement that was taken on the other side of the source that is depicted in Figure 2, is shown in Figure 4 and Figure 5. Prior to the study, the dosimeter reading was monitored and consistently found to be 500 mR/h. Table 6 and Table 7 present the results of the actual readings taken. C40B6 had a lower attenuation reading than S15B6B, which is a hybrid fiber copper slag concrete, according to Figure 4 & Figure 5. Also, among the control concrete, the copper slag control C40 had the lowest measurement compared to C0, indicating that copper slag had an effect on the shielding qualities. Specimens with a thickness of 20 cm had a lower attenuation than those with a thickness of 10 cm, which was expected since the greater the thickness, the greater the shielding capabilities of concrete.

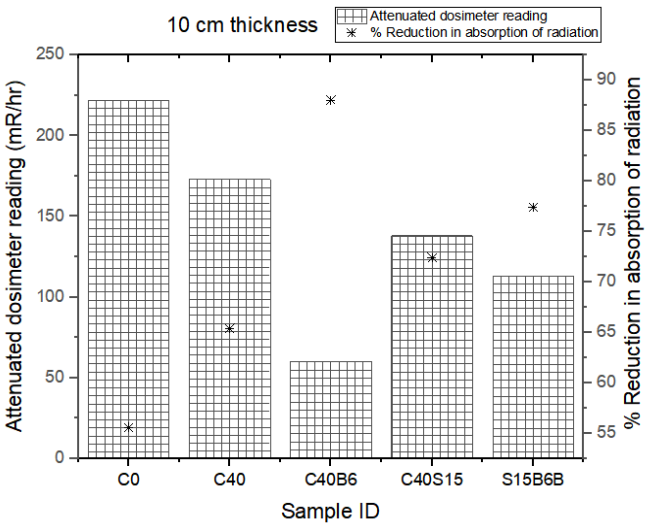


Figure 5. Attenuated dosimeter reading and percentage reduction of the samples for 10cm thickness.

Linear and Mass Attenuation Coefficient

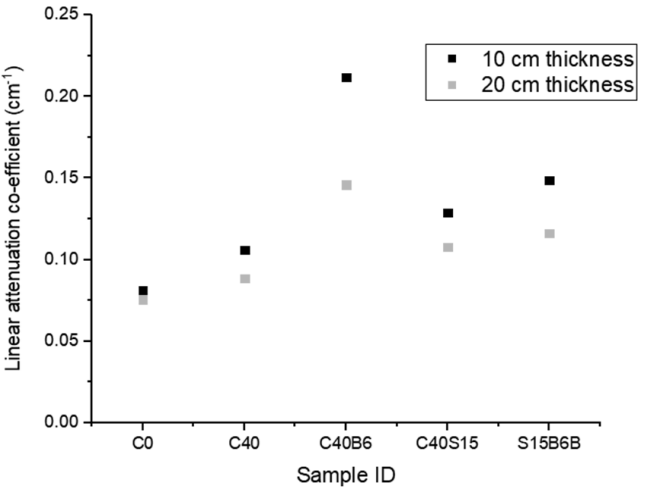


Figure 6. Linear attenuation of co-efficient of specimens for 10 cm and 20 cm thickness.

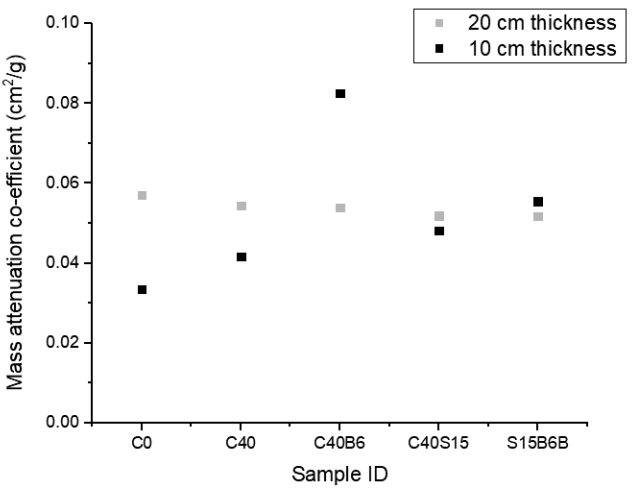


Figure 7. Mass attenuation co-efficient of specimens for 10cm and 20 cm thickness.

Figure 6 provides an interpretation of the coefficient of linear attenuation for two distinct thicknesses, 10 centimeters and 20 centimeters, for five different mixes of control, mono fiber, and hybrid fiber concrete. The C40B6

mix obtained the highest co-efficient, followed by the S15B6 mix and then the C40S15 mix. A similar pattern was observed in the data for the two different specimen thicknesses. The attenuation coefficient was lowest for the specimen with greater thicknesses and vice versa.

Figure 7 displays a plot of the mass attenuation coefficient, which revealed values that were roughly equivalent at a thickness of 20 centimeters. Even though C40B6 had a lower density than C40S15 and S15B6, the greater value of linear attenuation coefficient increased the mass attenuation coefficient regardless of the density of the material at 10 cm thickness. This was the case even if C40B6 had a lower value than S15B6.

Mean Free Path

The value of the mean free path is reduced for C40B6, followed by S15B6, C40S15, C40, and C0, as depicted in Figure 8. For the proposed specimens, the average distance traveled by gamma rays in the target material is lowered. Similar results were reported for the two different thicknesses, with the 10 cm thickness having the lowest mean free path. Regardless of the material's density, the basalt fibers contributed to the lowest mean free path.

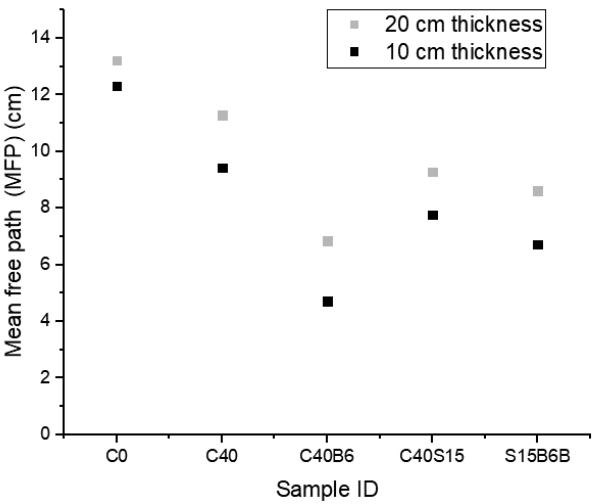


Figure 8. Mean free path of specimens for 10cm and 20cm thickness.

Half Value and Tenth Value Layer

Half value layer is the thickness of the target material necessary for the beam's intensity to be reduced to one-half of its initial value. According to numerous findings, the thickness of the layer of concrete that constitutes half the value should be 44.5 millimeters when exposed to an iridium source. The proposed experiment was to reduce the thickness of the concrete in order to obtain the half value layer, which was carried out and plotted in Figure 9. It was discovered that C40B6 had the lowest value at both 10 cm and 20 cm thickness, coming in at 3.27 cm and 4.75 cm respectively. This was followed by S15B6, which had values of 4.66 cm and 5.97 cm for 10 & 20 cm thickness.

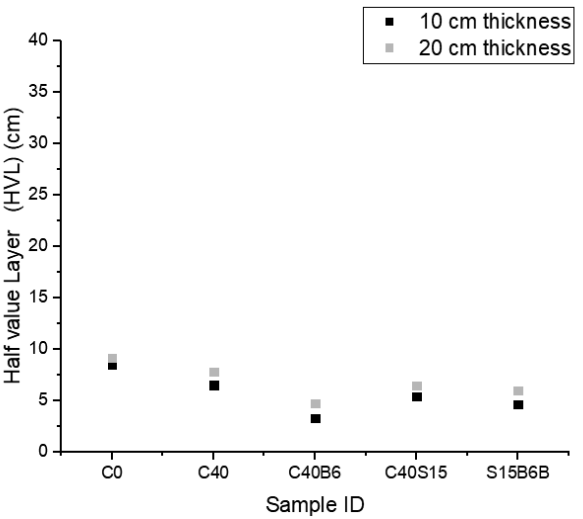


Figure 9. Half value layer of specimens for 10cm and 20cm thickness.

In a similar fashion, the tenth value layer refers to the thickness of the target material that is required to diminish the intensity of a beam by a factor of ten. Figure 10 depicts a trend that was noticed for the tenth value layer that was quite similar to the trend shown for the half value layer. According to the findings of an examination of concrete that was exposed to gamma rays, the mix C40B6 demonstrated improved performance in all of the attributes of shielding, followed by hybrid fibers.

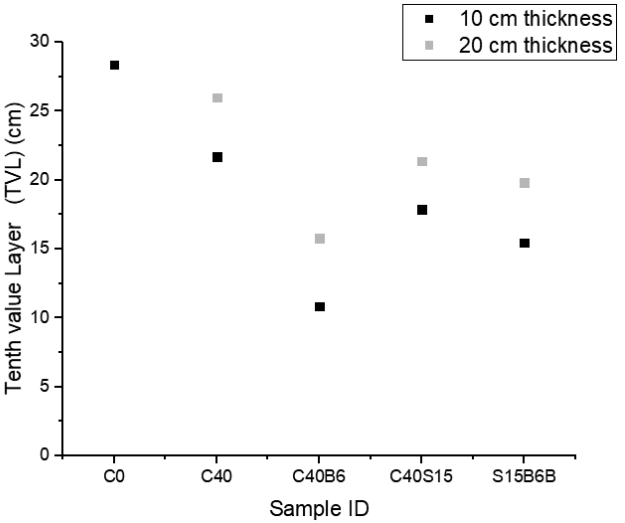


Figure 10. Tenth value layer of the specimens for 10cm and 20cm thickness.

Conclusion

In the proposed research, the density of concrete samples subject to gamma radiation, its linear attenuation coefficient, mass attenuation coefficient, Half value layer, tenth value layer, and the mean free path for Basalt fiber reinforced copper slag concrete, steel fiber reinforced copper slag concrete and the hybrid fiber reinforced copper slag concrete have been determined. All the data from the experimental results demonstrated that the basalt fiber reinforced concrete, being a low dense concrete compared to all the other samples, exhibited effectiveness in shielding gamma radiation.

The outcome of the study is that the fiber reinforced copper slag concrete (Basalt & basalt-steel hybrid fibers) has a high potential to be brought up as a promising FRC used at massive active areas. The concrete mixture possesses increased attenuation combined with moderate mechanical properties, proves to be a versatile structural concrete in the context of radiation shielding property. Thus, basalt fiber reinforced copper slag concrete with moderate density is useful as a shield for building various nuclear testing facilities and related constructions.

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Investigation on Compressive Strength of Fibre-Reinforced Concrete Using Artificial Neural Network

A. Dhanalakshmi, M. Shahul Hameed, K. Valarmathi, and C. Rajendra Prasath

1 Introduction

Building practices that are friendly to the environment are an essential component of human civilization [1–4]. Because of technological advancements and the fast growing need for increasingly complex building structures, there is a need for more durable building materials that are able to survive adverse environmental conditions [5–9]. This is owing to the widespread availability of concrete's basic components, its simple and straightforward manipulation, and its relatively low price. However, in order to satisfy the ongoing and unending demands placed on an infrastructure that is in a state of constant evolution, more robust and long-lasting building materials are required [10–13]. The addition of suitable mineral additives in optimal quantities can improve the performance of concrete by enhancing its durability properties [14–19]. This is one technique to improve the performance of concrete. It may be possible to achieve greater economic viability and sustainability through the utilization of waste marble sludge powder produced by manufacturing facilities such as marble cutting plants [20–23]. This is because it will lessen the burden that is placed on the environment as a result of the manufacture of concrete and garbage [24]. In addition, this will reduce the strain that is placed on the environment. One type of polymers is polypropylene. A structure of molecules known as a polymer is one that is made up of several identical subunits [25, 26]. The primary objective of this investigation is to explore use of MSP in concrete as a partial replacement for cement with the polypropylene fibre addition and to determine the effect that this has on both the mechanical characteristics of concrete and the cement and mortar that are used in

A. Dhanalakshmi (✉) · M. Shahul Hameed · K. Valarmathi
P.S.R. Engineering College, Sivakasi, Tamil Nadu, India
e-mail: dhanalakshmicvl@psr.edu.in

C. Rajendra Prasath
Velammal College of Engineering and Technology, Madurai, Tamil Nadu, India

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the mixture. In addition, this investigation will examine how the addition of marble sediment powder affects these characteristics. Techniques from machine learning are used to make a prediction about the compressive strength of concrete that has when marble sludge powder added to it. Artificial neural network (ANN) does not need such particular equation form. Relatively, it requires enough data about what goes in and what comes out [27]. Also, it can keep retraining itself with fresh data, making it easy for it to adapt to new data. ANN is being looked into to figure out how to fix the issues with missing or wrong details [28, 29]. In this investigation, water cement ratio, cement, MSP, fine aggregate, coarse aggregate, polypropylene fibre, water and superplasticizer are used as input and targeted compressive strength is the output.

2 Materials and Methods

2.1 Materials

53 Grade of Ordinary Portland Cement (OPC) was utilized as the binder material. As an alternative to cement, the powder made from marble sludge was utilized. In this work, M-Sand is used as fine aggregate. The coarse material utilized was 20 mm in size. A combination of fine aggregate (FA) and coarse aggregate (CA) was used. It is necessary to make use of a water-reducing super plasticizer (SP) in order to get the desired level of workability. During this particular study project, Glenium B233 and polypropylene fibre of 12 mm length and 0.02 mm diameter was utilized. For the purposes of mixing and curing, water from the tap was used.

2.2 FRC Mix Proportion

The mix proportion of FRC were calculated as per IS 10262 (2009). For this study, we chose to focus on 0.35 and 0.4 w/c ratios. Table 1 provides the recommended concrete design mix proportions based on the chosen water binder ratios. Cement replacement with marble sludge powder ranged from 0 to 25% by weight.

3 Experimental Investigation

3.1 Compressive Strength

When a load is applied gradually to a solid, the material's compressive strength is the highest compressive stress it can withstand before cracking. The procedures used in this analysis were those outlined in IS 516. The cubes are arranged so that the casting

Table 1 Mix proportions of fibre-reinforced concrete (kg/m^3)

Mix id	w/c ratio	Cement	MSP	FA	CA	Fibre	Water	SP
FRC1	0.35	429	0	1300	700	2.14	150.15	12.87
FRC2	0.35	407.55	21.45	1300	700	2.14	142.64	12.87
FRC3	0.35	386.1	42.9	1300	700	2.14	135.13	12.87
FRC4	0.35	364.65	64.35	1300	700	2.14	127.62	12.87
FRC5	0.35	343.2	85.8	1300	700	2.14	120.12	12.87
FRC6	0.35	321.75	107.25	1300	700	2.14	112.61	12.87
FRC7	0.40	401	0	1300	700	2.01	160.4	12.03
FRC8	0.40	380.95	20.05	1300	700	2.01	152.38	12.03
FRC9	0.40	360.9	40.1	1300	700	2.01	144.36	12.03
FRC10	0.40	340.85	60.15	1300	700	2.01	136.34	12.03
FRC11	0.40	320.8	80.2	1300	700	2.01	128.32	12.03
FRC12	0.40	300.75	100.25	1300	700	2.01	120.3	12.03

face and the testing face are perpendicular to each other, and the weight is gradually applying to the opposing faces of the cube specimen. The stress is applied axially and increased gradually, with no sudden impacts. When calculating compressive strength, the greatest force applied to the specimen is recorded and then divided by the specimen's cross-sectional area. Compressive strength was evaluated using concrete cubes of 150 mm on a side. To determine the optimal dosage, the age of curing 7, 14, 28, and 56 days was followed. Water binder ratios of 0.35 and 0.40, as well as percentage replacements ranging from 0 to 25%, were examined for optimal dosage and long-term efficiency. Compression strength of FRC specimens are shown in Fig. 1.

Fig. 1 Compression testing of a cube specimen

4 Results and Discussion

4.1 Compressive Strength

Figure 2 shows the results on cubes made with varying percentages of marble sludge powder used as a partial replacement for cement. As the graph shows below, the replacement of 10% cement with marble sludge powder boosts the compressive strength, whereas replacement of 20 and 25% of cement with marble sludge powder causes the strength to begin declining. The micro-filler effect of marble sludge powder, which aids in generating a denser mix by filling the spaces, may account for the increased strength.

The characteristics of both the transition zone and the cement matrix are improved as a result of the filler effect. Concrete's compressive strength is mostly attributable to the cementing substance that may have been reduced at 20 and 25% replacement levels, leading to a weakening of the material. At 15% replacement, compressive strength increases for both the 0.35 and 0.40 w/b ratios. Compressive strength increased slightly after 14, 25, and 56 days of cure compared to 7 days of curing for the same amounts of cement substitution by marble sludge powder.

5 Regression Analysis in Concrete

In a typical scenario, if it is possible to maintain the optimal conditions for casting, testing, and curing, the trends for strength ratios should be the same no matter what kind of specimen is being looked at. Even if the same concrete is used to make the samples and tests, it is hard to keep the same conditions when making the samples

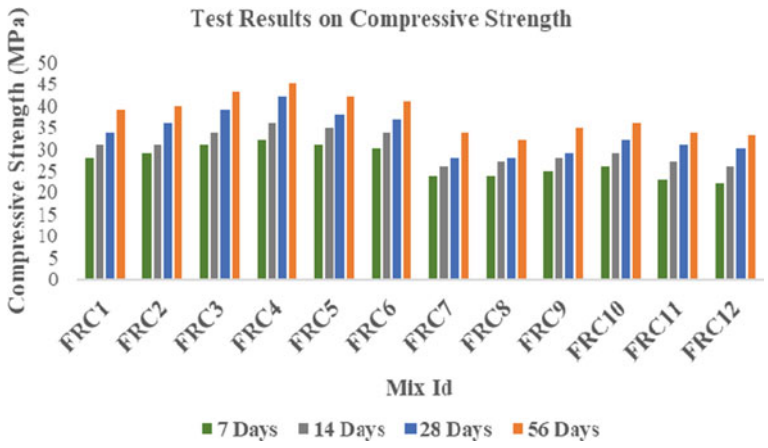

Fig. 2 Test results on compressive strength

and testing them. This is one of the reasons why unique occurrences can happen in the real world. Because of this, it was found that the strength of one type of concrete is not the same as the strength of the other types of concrete samples that were tested. So, the ratios of strengths can be used to make a general formula for the regression analysis of compressive strength for concrete that includes marble sludge powder. Since the strength ratios are being used to figure out the relationship, the type of specimen that is used will not change the relationship.

5.1 Artificial Neural Network Model

This section deals with an artificial neural network (ANN) model is presented in order to conduct a regression analysis of the effect of concrete that will be identified when marble sludge powder is used as a partial cement substitute. Figure 3 refers ANN structure model for FRFC.

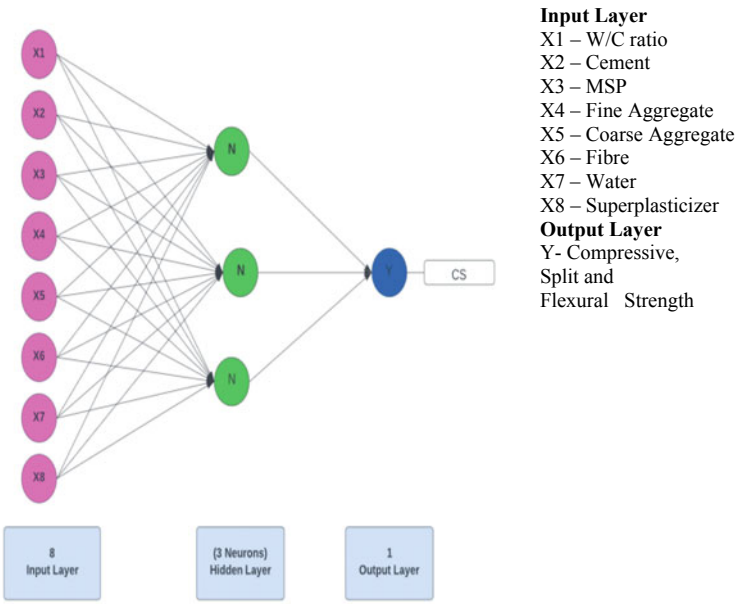

Fig. 3 ANN structure model

5.2 Regression Analysis Model Using ANN

The results of Figs. 4, 5, 6, 7, 8 and 9 were gotten from MATLAB Software. In this investigation, two-layered feed-forward network ANN structure was performed and the structure is shown in Fig. 4. The Table 2 refers the specifications of ANN technical parameters. Figure 5 shows the performance state of mechanical strength parameters. The obtained minimum gradient of 0.26172 is at epoch 8 for compressive strength.

Figure 6 refers the training state of mechanical strength parameters. In this training, validation, testing, and best parameters were analysed and find out the best validation performance ranges. The compressive strength attained MSE in the range of 10^2–10^0, and the best validation is achieved at epoch 9 of 6.4918.

Figure 7 shows the error histogram analysis of concrete mechanical strength. It is the error findings between targeted values and predicted values after training a feed-forward neural network using machine learning techniques. Totally, 12 data

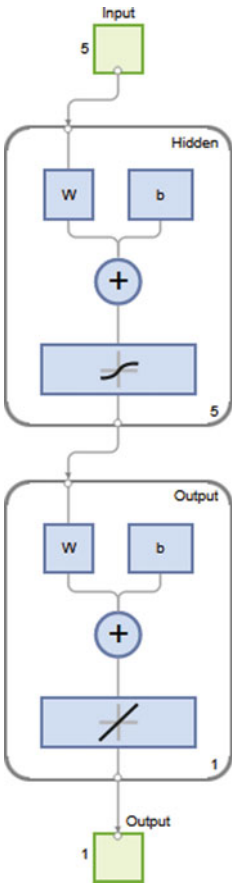

Fig. 4 Feed-forward neural network

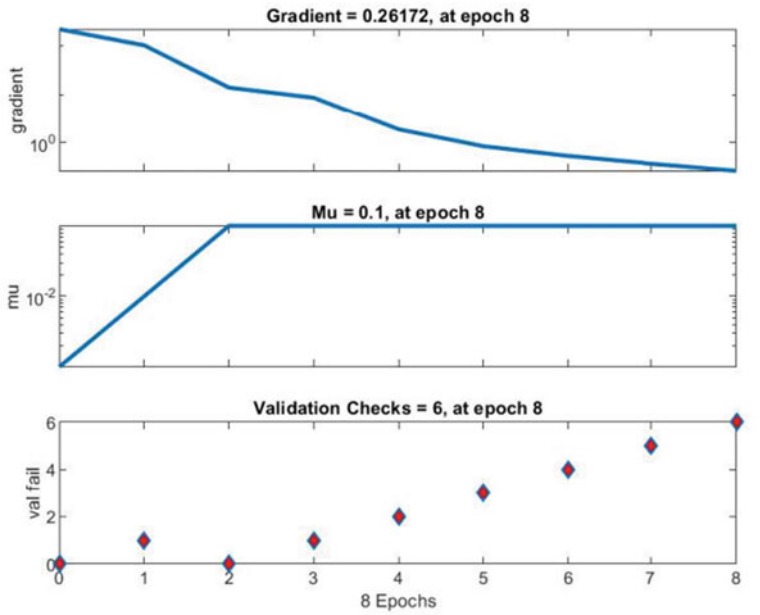

Fig. 5 Performance state of compressive strength at epoch

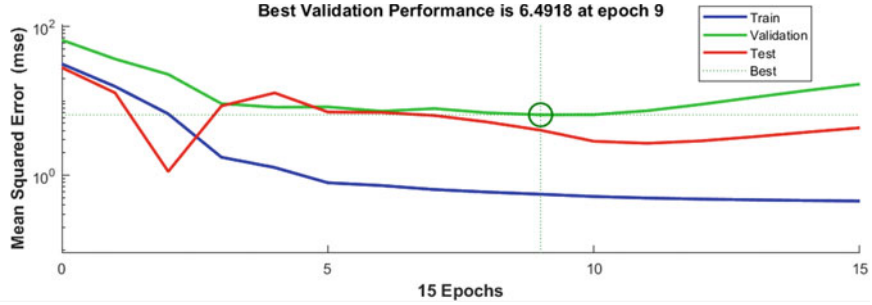

Fig. 6 Training state of compressive strength

were analysed. From the analysis, error values of compressive strength indicate that the error of 0.606 for 3 instances, error of 3.473 for 2 instances, and one instance with an error of − 8.515 was achieved.

The relationship between experimental data and the training, validation, and testing sets of compressive strength of fibre-reinforced concrete employing marble sludge powder is depicted in Fig. 8. The mechanical parameters of the fibre-reinforced concrete are estimated using the suggested ANN model utilizing the experimental database to demonstrate its effectiveness.

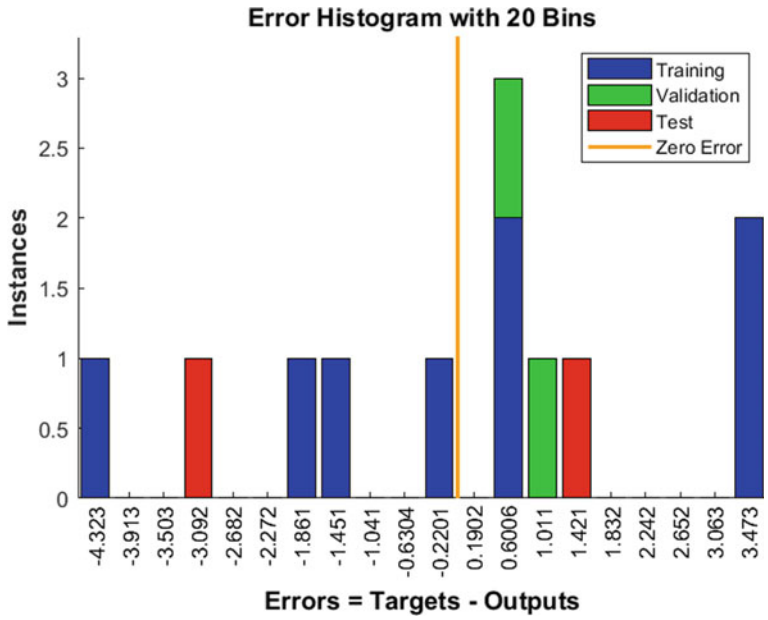

Fig. 7 Compressive strength error histogram

Figure 9 shows that the relationship between the predicted and observed 56 days of compressive strength for fibre-reinforced concrete and the high correlation between all data sets are very clear. The coefficient of correlation for the 56-day compressive strength prediction was 96%.

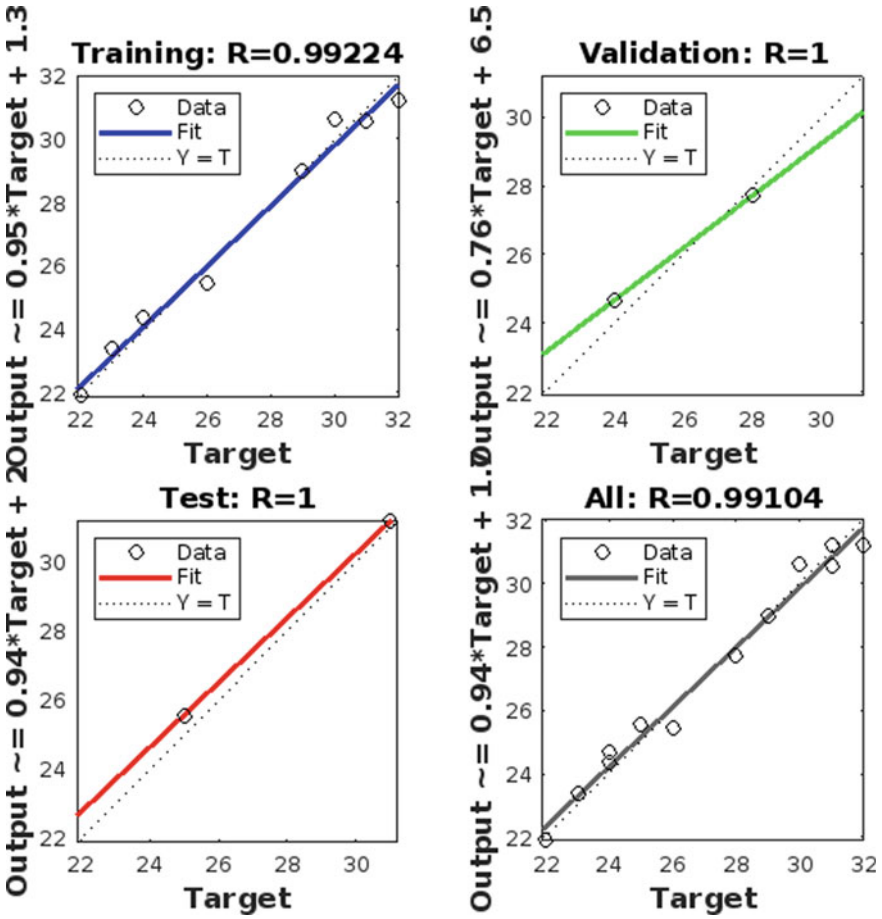

Fig. 8 The regression of compressive strength

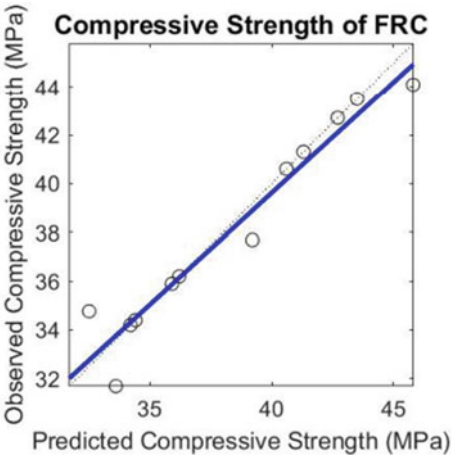

Fig. 9 ANN model fitting of compressive strength

Table 2 ANN technical parameters

Details	Selection
No. of inputs	8
No. of hidden layers	3
No. of outputs	1
No. of iterations	1000
Training gradient	1×10^{-7}
Validation checks	6

6 Conclusion

At 20 and 25% replacement levels, cementing material responsible for concrete's compressive strength may have been reduced, potentially weakening the material. In both the 0.35 and 0.40 w/b ratios, mechanical parameters of compressive strength improve with 15% replacement. Concrete strength prediction quickly and accurately has become a popular field of study due to its importance in engineering practise. This work employs the ANN algorithm, a lifting-based machine learning method, to estimate the compressive strength of concrete materials, filling a gap in the project. The relationship between all the materials and the concrete's compressive strength was studied using data from twelve sets of concrete specimens. The compressive strength of fibre-reinforced concrete is predicted using a MATLAB-based ANN model that considers the factors influencing the properties of concrete, and the obtained R value, which is nearly equal to 1, demonstrates a strong correlation between the predicted and observed values. The compressive strength on-site may be predicted quickly and accurately using ANN approach, which aids in planning the necessary formwork. Earlier and accurate estimation of strength prediction is valuable among the

construction industry. As a result, we will be able to try a smaller number of combinations physically and we will be able to experiment for a shorter period of time. These software's help to know how each raw material affects another's strength and how the raw materials relate to each other. This model aids in quality control and economics by reducing construction time and costs and allowing for the adjustment of mix proportions to prevent either concrete that is too weak to meet its design strength requirements or concrete that is too strong for its intended purpose.

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A study of hybrid fibre reinforced concrete with E-plastic waste

Rajendra Prasath C[1*], *Dhanalakshmi* A[2], Vivek D[3], *Diana Alice Sugunan*[4], *Clara* D[5], *Hari Preeta* C[6]
[1,5,6] Department of Civil Engineering, Velammal College of Engineering and Technology, Madurai
[2]Department of Civil Engineering, P.S.R. Engineering College, Sivakasi
[3]Department of Civil Engineering, KPR Institute of Engineering and Technology, Coimbatore
[4]Department of Civil Engineering, Mar Baselios College of Engineering and Technology, Thiruvananthapuram

Abstract. Electronic waste, also known as electronic and electrical equipment waste, poses significant pollution issues for people and the environment. It's essential to think about new, efficient waste management methods, particularly those that emphasise recycling. Glass fibre and polypropylene fibre have the benefit of being lightweight, lowering the overall cost of building and promoting construction efficiency. The effectiveness of hybrid fibre-reinforced concrete using E plastic waste as coarse aggregate was investigated in the current study. The concept behind the research study is to replace 0% to 30% of the concrete's coarse aggregates with E-waste and 1% glass and 1% polypropylene fibres (each by weight of concrete). The results demonstrated that E-plastic aggregate may be successfully used in fibre-reinforced concrete, up to 20% of the weight of the coarse aggregate with hybrid fibre, leading to resource and waste depletion.

1 Introduction

Concrete is widely used in the construction sector, which is increasing quickly. Utilizing leftovers and by-products is a component of the answer to ecological and environmental issues [1,2]. Using these materials has several indirect benefits, such as lower landfill costs, energy savings, and environmental protection from potential pollution effects, in addition to ensuring that these materials are used in cement, concrete, and other building materials and reducing the cost of cement and concrete production [3-5]. The concrete industry has partially attempted to replace coarse particles with non-biodegradable parts of E-waste [6]. Every year, the world generates an estimated 30–35 tonnes of quarry dust and e-waste. To decrease the environmental impact of processing quarry dust and E-Waste for reuse in the building industry, a different workable solution is required [30,34].

Plain concrete's tensile strength, ductility, and crack resistance are relatively low. The concrete naturally contains internal micro cracks, and as a result of these microcracks spreading, the concrete has a poor tensile strength that finally results in brittle fracture [7]. The most frequently acknowledged solution for concrete's flexural weakness is high-strength steel for conventional reinforcement, despite the fact that these techniques improve the

tensile strength of the material [13,16]. Additionally, if the concrete is of low workability, especially in the case of heavy concrete, the placement of reinforcement and efficient compaction of RCC are both exceedingly challenging [17]. Structure cracks can develop in plain concrete and other brittle materials even before they are loaded due to drying shrinkage or other factors of volume change.

Under loading microcracks spread and widen, and because of the effects of stress concentration, new cracks develop where there are minor flaws. Additional fractures develop with tiny flaws due to the attention of structural stress [19]. Because of several limitations, the structural cracks develop slowly. The growth of such microcracks is the primary factor in the inelastic deformation of concrete. It has long been understood that adding short, uniformly scattered fibres will significantly enhance concrete's static and dynamic properties while acting as crack arresters[20,21]. The term "fibre-reinforced concrete" refers to such concrete. The same result is achieved by glass fibres, which also outperform all other fibres. It has long been understood that adding tiny, uniformly scattered fibres will significantly enhance concrete's static and dynamic properties while acting as crack arresters [24,25].

Synthetic polypropylene fibres are a by-product of the textile industry. These are affordable and come in a variety of aspect ratios. Inexpensive specific gravity and low price are two characteristics of polypropylene fibres[27]. Using it, the material's inherent tensile and flexural strengths may be used effectively and reliably, and thermal cracking and plastic shrinkage cracking is significantly reduced. In the event of a fire, it offers reinforcement, protects against substantial structural damage, and prevents spalling. These dissertations compare the behaviour of reinforced concrete that has been supported using hybrid fibre to plain concrete.

2 Literature Survey

Chandramouli.K. [11] experimentally evaluated the rapid chloride permeability test for durability research on glass fibre reinforced concrete. Concrete cylinders were produced with varying additions of 0.03, 0.06%, and 0.1% glass fibre. The decreasing permeability of GFRC, which contains 0.1% glass fibres, was 17.59% at 90 days and 28.80% when the specimen was evaluated at 720 days. Using E plastic waste as the coarse aggregate, Lakshmi R and Nagan S [18] investigated the strength characteristics of concrete. With appropriate strength development characteristics and no negative long-term impacts, coarse aggregate could be replaced in concrete with 20% E-waste aggregate.

Addition of glass fibres increased the compressive strength, flexural strength, and split tensile strength of concrete of the M20, M30, and M40 grades by 20% to 30%, 25% to 30%, and 25% to 30%, respectively, at 28 days when compared to plain concrete reported by Avinash Gornale and Arabi Nourredine et al. [8, 9]. Deshmukh S.H. and Baaros et al. [10, 12] noted from the experimental findings and their analysis that adding glass fibre increases the concrete's compressive, flexural, and splitting tensile strengths. At the same time, they improved the concrete's mechanical characteristics and durability by 0.1% by adding glass fibre.

The impact of polypropylene fibre in various quantities and fibre lengths has been studied to enhance the concert features of lightweight cement composites recommended by Roohollah Bagherzadeh [26]. The mixture with two different fibre proportions (0.15% and 0.35%) by cement weight and fibres with two different sizes (6mm and 12mm). When compared to unreinforced LWC, Polypropylene (PP) reinforced Lightweight Cement Composites (LWC) with fibre proportioning were 0.35% of 12 mm fibre length had a 27% improvement in splitting tensile strength and a 30.1% increase in flexural strength. According to Yogesh Murthy et al. [29] adding glass fibres to concrete improves its performance and makes it easier to eliminate glass as industrial waste for the environment. According to the

investigation, there is a 30% improvement in the flexural strength of the beam with 1.5% glass fibres. With more glass fibres present, the slump was shown to be reduced.

Gowri et al. [14] have conducted a study to better understand the performance of glass fibre reinforced concrete (GFRC) in both its fresh and hardened states. It has been noted that concrete with a more significant percentage of glass fibre may necessitate using superplasticizers to preserve its workability. Praveen Mathew et al. studied the influence of concrete's strength qualities when coarse aggregate was partially replaced by E plastic waste in 2013. They concluded that the concrete's compressive strength was improved when 22% of the average coarse aggregate was replaced with coarse plastic aggregate.

Milind V. Mohod [23] find the ideal polypropylene fibre content by experimenting with several levels of polypropylene content, such as 0%, 0.5%, 1%, 1.5%, and 2%. The compressive, tensile, and flexural strengths all showed a noticeable improvement. To learn more about the mechanical properties of fibre-reinforced concrete, however, more research was strongly encouraged. They used various percentages of ground glass fibre (GGF) as a pozzolanic (10%, 20%, and 30% by mass) in concrete. 2017 researchers Hassan Rashidian-Dezfouli and Prasad Rao Rangaraju observed the findings [15,25]. Because of this, the resistance of GGF-containing mixes to the alkali-silica reaction, sulphate attack, and drying shrinkage were assessed. The findings were compared to a two-year control combination with portland cement and a mixed variety containing 25% of class F fly ash. The outcome showed that the durability qualities were significantly improved when GGF was used in place of Portland cement.

Manoj Kumar et al. [22] experimentally examined the compressive, tensile, and flexural behaviour of concrete using glass fibres with a diameter of 14 microns, indifference percentages of 0%, 0.4%, 0.8%, 1.2%, and 1.6% by the weight of cement, and a water-cement ratio of 0.45. According to studies, adding 1.2% glass fibre by the weight of cement to concrete can boost its strength up to 17.36% compared to ordinary concrete. It can also raise its flexural strength to% and split tensile strength up to 40%. Teja V. P. et al. [28] investigated the effects of composite cement and glass fibre on concrete's strength and durability in specific applications. When combined with 50% regular Portland cement, 25% fly ash, and 25% ground granulated blast furnace slag, the compressive strength exhibits a specific development. Compared to glass fibre, there is hardly any difference in strength.

In this study is to determine behaviour adding hybrid fibre to concrete and replacing fine particles in different proportions with E-plastic waste affects the final product. The qualities of hardened concrete, including its compressive, split-tensile, and flexural strengths, were examined.

3 Method and Materials

3.1 Cement

The cement is OPC 53 grade was utilized and complies with IS: 8112-1989. The specific gravity, consistency, and setting test results for cement are listed in Table 1 together with information on the cement's physical properties.

Table 1. Characteristics of Cement

S.No	Characteristics	Value
1.	Specific gravity	3.14
2.	Standard consistency	29%
3.	Percentage of fineness	2%
4.	Specific Surface	2.24 m^2/kg
5.	Initial setting time	45 minutes

6.	Final setting time	360 minutes

3.2 Fine aggregate

To screen out any larger than 4.75 mm particles, the sand was first run through that size screen. The fine aggregate was subjected to tests using IS: 383-1970. The physical parameters of the fine aggregate are listed in Table 2.

Table 2. Characteristics of fine aggregate

S.No	Characteristics	Value
1.	Nature	River sand
2.	Specific gravity	2.68
3.	Fineness modulus	2.6
4.	Grading zone	II
5.	Bulk Density	1693 kg/m^3

3.3 Coarse aggregate

According to IS: 383-1970, aggregates passing through a 20-mm sieve and remaining on a 16-mm sieve were sieved. Table 3 lists their physical characteristics.

Table 3. Characteristics of coarse aggregate

S.No	Characteristics	Value
1.	Nature	Crushed
2.	Specific gravity	2.74
3.	Impact value	16.26%
4.	Bulk Density	1527 kg/m^3

3.4 E-Plastic Waste

Utilising some of the current technology, the E-plastic waste that is created needs to be treated in the most efficient way possible. When it comes to planning waste management, having information on the characteristics of E-waste is absolutely necessary. This is because waste management technology is constantly evolving. E-waste from a plastic recycling facility in Madurai was used for the experimental program. Table 4 lists the physical characteristics of E-Plastic waste.

Table 4. Characteristics of E-Plastic Waste

S.No	Description	Value
1.	Specific gravity	1.01
2.	Absorption (%)	0.2%
3.	Colour	Dark
4.	Shape	Angular
5.	Crushing Value	2%
6.	Impact value	1.8%

3.5 Fibres

3.5.1 Glass Fibres

In this experiment, continuous glass fibres were employed to solve the issue of earlyage plastic shrinkage cracks and create suitable mechanical properties in the concrete.

3.5.2 Polypropylene Fibres

In this work, short-cut polypropylene fibres were used to increase concrete's elasticity, control cracks, and reduce water permeability. Table 5 lists their physical characteristics.

Table 5. Characteristics of Glass and Polypropylene fibre

S.No	Description	Glass fibre	Polypropylene fibre
1.	Length (mm)	6	12
2.	Diameter (μm)	0.014	0.05
3.	Aspect ratio	428	240
4.	Density (kg/m^3)	2680	980
5.	Modulus of Elasticity (GPa)	72	3.5
6	Tensile strength (Mpa)	1700	400

3.6 Super Plasticizer

In this study, Master Glenium SKY 8233, a high-performance superplasticizer based on polycarboxylic ether, was used. It has a pH of 6, a relative density of 1.08 at 25°C, and is a free-flowing liquid.

3.7 Mix compositions

Five different ratios for the concrete mixture were used in this investigation. The first mixture was the control mixture, while E-waste and hybrid fibre were included in the other four mixtures. By weight, E Plastic trash was used in place of coarse aggregate (typical sand). 10%, 20%, and 30% of the coarse aggregate were swapped out for other materials. The water cement ratio for the mix is 0.42. Power-driven rotating drum mixers with a 1 m^3 capacity were used to mix concrete. The test specimens were made using the same 1:1.87:3.28 concrete mix designed using IS: 10262:2009 procedures. Table 6 provides the mixture proportions.

Table 6. M30 Mixture proportions in kg/m^3

Mix Designation	Cement	Fine aggregate	Coarse aggregate	E Plastic waste	Fibre (GF + PP)	SP	Water
S1	380	712	1250	0	7.6	11.4	160
S2	380	712	1250	125	7.6	11.4	160
S3	380	712	1250	250	7.6	11.4	160
S4	380	712	1250	375	7.6	11.4	160
S5	380	712	1250	500	7.6	11.4	160

4 Experimental Investigation

4.1 Compressive strength test

The compressive strength of the concrete was assessed using conventional cube specimens that were 150 x 150 x 150 mm. Three samples were tested for 28 days with varying percentages of E plastic trash as 0%, 10%, 20%, 30%, and 40% while maintaining the proportion of fibres at 2% (each 1% of the weight of concrete). The usual concrete mix was contrasted with these. The components were weighed, and then hand mixing was used to combine the materials. Using a table vibrator, the mixtures were vibrated. Superplasticizers made up 0.5% of the binder's weight. After 24 hours, the specimens were taken out of the

mould and allowed to cure for 28 days in water. Table 7 displays the test values and Figure 1 shows the variation of average compressive strength values of all mixes were presented.

Table 7. Compressive and Split tensile strength results

Mix/ Test (N/mm^2)	S1	S2	S3	S4	S5
Compressive Strength	36.67	42.12	52.41	47.23	45.13
Split tensile strength	3.04	3.36	3.94	3.52	3.42

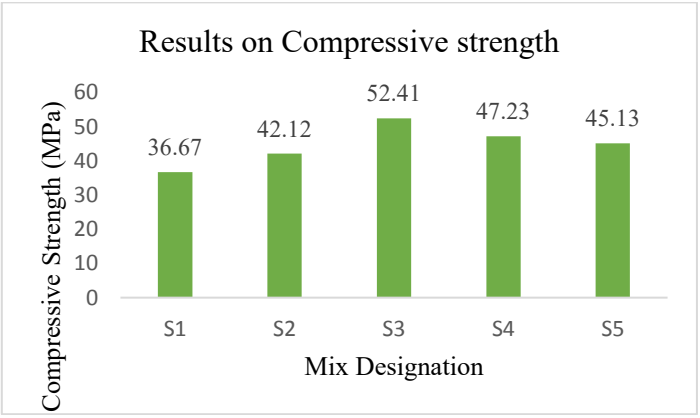

Fig. 1. Test Results on Compressive Strength at the age of 28 Days

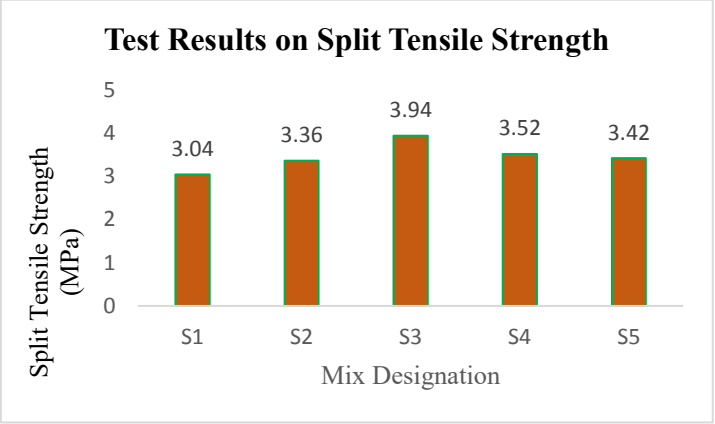

Fig. 2. Test Results on Split Tensile Strength at 28 Days

4.2 Split Tensile Strength

To test the split tensile strength, standard cylinder moulds 100 mm by 300 mm were manufactured. In this test, the specimen was broken by compression line stresses that were delivered in a vertical, symmetrical plane. According to BIS: 5816-1999, tests were conducted and the average split-tensile strength values were obtained. Fig. 2 display the splitting tensile strength test findings.

4.3 Two point load setup for RCC beams

To conduct the testing, a two-point loading technique was used. Two pedestals supported the beams, and 40-ton universal testing equipment delivered concentrated stresses on them (UTM). Utilizing LVDTs, which were positioned in the middle of the span and underneath the loading areas, the deflections were measured. The specimen failure load, kind of failure mechanism, and failure load for each beam were noted. In addition, the load at which concrete began to break was noted. Figure 3 specifics of the reinforcement for the RCC Beam and the Figure 4 depicts experimental configuration.

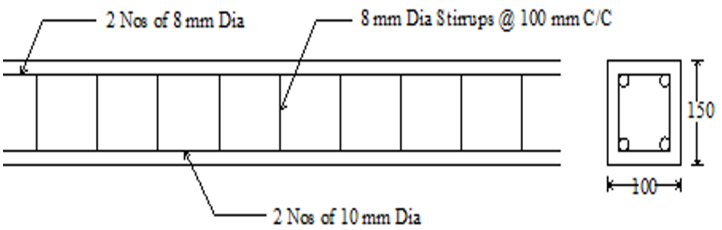

Fig. 3. Details of reinforcement for RCC beam

Fig. 4. Two-point loading setup

With increasing the percentages of E Plastic waste and hybrid fibre in R.C.C. members, the ultimate load-carrying capability of the R.C.C. beams under flexural loading is significantly increased. The equation is used to determine the beam's flexural strength.
Flexural strength (N/mm^2 or MPa) = PL/bd^2
Where,
P = load at failure
L = The support's distance from centre to centre = 1500 mm
b = breadth of specimen =100 mm,
d = depth of specimen= 150 mm
Compared to the standard concrete mix, the flexural strength of a hybrid fibre reinforced concrete (HFRC) beam with a 20% substitution of coarse material with E plastic waste performs better. Table 8 and Fig. 5 demonstrate their flexural strength findings for HFRC beams.

Table 8. Average flexural strength (N/mm^2) at 28 days

Mix Designation	Average flexural strength (N/mm^2)
S1	5.40
S2	5.45
S3	5.62
S4	5.23
S5	5.16

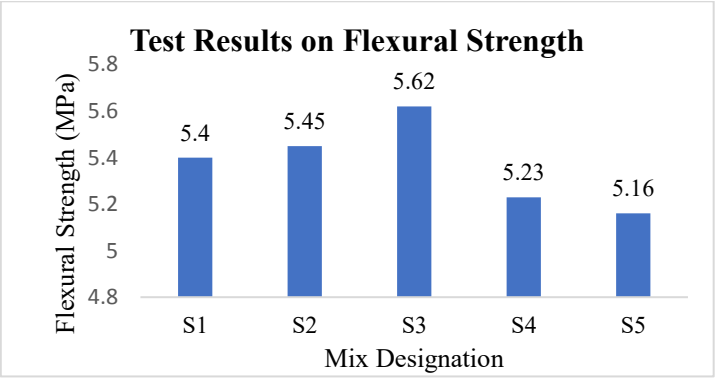

Fig. 5. Flexural strength of RC beam at 28 days

The load-deflection behaviour of different percentages of E-Plastic waste in HFRC beams is shown in Figure 6 in order to compare and more correctly portray the load against mid-span deflection curve for all the tested flexural beams. By substituting different percentages of E-waste, the ultimate load was raised, as seen in Table 9's comparison of load to midspan.

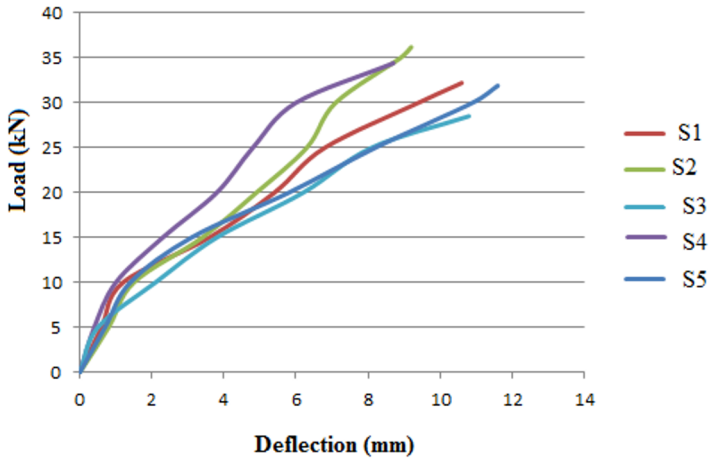

Fig. 6. Load-Displacement behaviour of beams

Table 9. Load Versus Mid Span Deflection for the Beams

S1		S2		S3		S4		S5	
Load (kN)	**Deflection (mm)**	**Load (kN)**	**Deflection (mm)**	**Load (kN)**	**Deflection (mm)**	**Load (kN)**	**Deflection (mm)**	**Load (kN)**	**Deflection (mm)**
5	0.6	5	0.8	5	0.7	5	0.4	5	0.5
10	1.2	10	1.5	10	1.4	10	1	10	2.1
15	3.6	15	3.4	15	3.1	15	2.3	15	3.8
20	5.4	20	4.9	20	5.8	20	3.8	20	6.2
25	6.8	25	6.3	25	8.2	25	4.8	25	8.1
30	9.4	30	7.1	30	10.9	30	6	28.5	10.8
32.2	10.6	35	8.9	31.9	11.6	34.4	8.7	-	-
-	-	36.2	9.2	-	-	-	-	-	-

5 Conclusion

This study aimed to identify practical methods for recycling hard plastic trash into concrete aggregate. In general, from all the test results, it is clear that the concrete cast using the 20% replacement of coarse aggregate with e-plastic waste and 1% of each glass fibre and Polypropylene fibre gives better results than the conventional concrete. Because of this, the non-structural parts of a concrete construction can be prepared with this particular kind of concrete that is based on E-waste. E-waste aggregate improves the ductility of concrete as compared to conventional concrete, which indicates its ability to resist seismic loads. The incorporation of E-waste increases the durability and mechanical properties of concrete, which indicates that it has the potential to be used in the preparation of structural concrete. This also indicates that it has the potential to be used in the production of structural concrete.The findings of an analysis of concrete's strength properties, including recycled waste plastic and hybrid fibre, are as follows.

1. The electronic waste can be disposed of by utilising them as building materials in the construction industry.
2. The smooth surface texture of manufactured E-Waste plastic waste aggregates improves the workability of concrete. Hybrid Fibre-reinforced concrete can contain 20% of E-waste aggregate in place of coarse aggregate without any detrimental long-term effects and with acceptable strength development attributes.
3. Overall, it is evident from all the test findings that ordinary concrete does not perform as well as concrete which has had 20% of the coarse aggregate replaced with E-plastic waste and 1% of both glass fibre and polypropylene fibre.
4. Glass and polypropylene fibres significantly boost concrete's compressive strength and this strength rises as the fibre content does as well. Hybrid fibre is an excellent additive to reinforced concrete that meets all standards and may be utilised for all building purposes.
5. Due to the incorporation of hybrid fibres, the HFRC beams display widely dispersed and fewer cracks than control beams, increasing the toughness, ductility, and stiffness properties. The purpose of this project is to investigate in greater depth how to capitalise on the growing amount of e-waste around the world in future.

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Intrusion Detection System Using Machine Learning by RNN Method

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[1] Assistant Professor, Department of Computer Science &Engineering,-Velammal College of Engineering &Technology, (Autonomous) Madurai, India Email: kad@vcet.ac.in

[2] UG Student Department of Computer Science &Engineering,-Velammal College of Engineering &Technology, (Autonomous) Madurai, India Email: codeurrakesh17@gmail.comsathaiahbalaji333@gmail.com prvishal2000@gmail.com

* Corresponding author: ghualamdasthageer25@gmail.com

Abstract

As computer networks continue to grow, network intrusions become more frequent, advanced, and volatile, making it challenging to detect them. This has led to an increase in illegal intrusions that current security tools cannot handle. NIDS is currently available and most reliable ways to monitor network traffic, identify unauthorized usage, and detect malicious attacks. NIDS can provide better visibility of network activity and detect any evidence of attacks and malicious traffic. Recent research has shown that machine learning-based NIDS, particularly with deep learning, is more effective in detecting variants of network attacks compared to traditional rule-based solutions. This proposed model that introduces novel deep learning methodologies for network intrusion detection. The model consists of three approaches: LSTM-RNN, various classifying methodology, and a hybrid Sparse autoencoder with DNN. The LSTM-RNN evaluated NSL-KDD dataset and classified as multi-attack classification. The model outperformed with Adamax optimizer in terms of accuracy, detection rate, and low false alarm rate.

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Sathya Narayanan Velmurugan
Department of Computer Science and Engineering, Kalasalingam Academy of Research and Education, Tamil Nadu, India

Azarudeen K
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Selvalakshmi Sekar
Department of Electronics and Instrumentation Engineering, R.M.K. Engineering College, Thiruvallur, India

Bharath Singh Jebaraj
Department of Computer Science and Engineering, Kalasalingam Academy of Research and Education, Tamil Nadu, India

Vishnu Sakthi D
Department of Computer Science and Engineering, R.M.D Engineering College, Thiruvallur, India

Shanmuga Raja B
Department of Computer Science and Engineering, Kalasalingam Academy of Research and Education, Tamil Nadu, India

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I. Introduction

There are roughly 285 million blind and visually impaired people in the world. Visually impaired people are individuals who have partial or total loss of vision. This can range from mild impairment where they can see some shapes and colors, to complete blindness where they cannot see anything at all. Visual impairment can be caused by various factors such as genetics, diseases, injuries, or aging. Visually impaired individuals face various challenges in their daily lives, including difficulties with mobility, communication, and accessing information. They often rely on specialized tools and technologies, such as white canes, guide dogs, screen readers, and braille devices to help them navigate the world [1], [2].

Authors

Sathya Narayanan Velmurugan
Department of Computer Science and Engineering, Kalasalingam Academy of Research and Education, Tamil Nadu, India

Azarudeen K
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Selvalakshmi Sekar
Department of Electronics and Instrumentation Engineering, R.M.K. Engineering College, Thiruvallur, India

Bharath Singh Jebaraj

Department of Computer Science and Engineering, Kalasalingam Academy of Research and Education, Tamil Nadu, India

Vishnu Sakthi D
Department of Computer Science and Engineering, R.M.D Engineering College, Thiruvallur, India

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R Krishna Priya
Department of Engineering-Electrical Section, College of Engineering and Technology, University of Technology and Applied Sciences, Shinas, Sultanate of Oman

Sabarmathi K R
Department of Information Technology, Bannari Amman Institute of Technology, Sathyamangalam, Tamilnadu, India

Aanandha Saravanan K
Department of ECE, Veltech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology, Chennai, India

Niranjanamurthy M
Department of AI, ML BMS Institute of Technology and Management, Bangalore, Karnataka, India

Aashish A. Gadgil
Department of ECE, KLS GOGTE Institute of Technology, Belagavi, Karnataka, India

Azarudeen K
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

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I. Introduction

Artificial intelligence has become a new engine of economic development, which brings new opportunities for the development of language services[1]. Today, with the continuous integration of domestic and foreign cultures, more and more industries and scenes need language translation. According to the research results of language usage, it can be seen that in daily life, it is often necessary to translate English online[2]. Therefore, in recent years, the momentum of English translation industry has developed rapidly. In recent years, Artificial Intelligence (hereinafter referred to as AI) technology has developed rapidly, which has more and more profound influence on all walks of life[3]. Machine translation in the language service industry, termed as "AI in AI", has historically been considered humanity's last knowledge treasure, "the jewel in the crown of AI". Many universities and research institutions have studied this dazzling gem, and Google and Ali have invested in it[4]. As social science and technology advance, AI technology improves. With computer Internet development, artificial intelligence machines can give corresponding instructions based on people's design requirements, copy human behaviour, have certain induction, and simulate human behaviour to provide corresponding results.

Authors

R Krishna Priya
Department of Engineering-Electrical Section, College of Engineering and Technology, University of Technology and Applied Sciences, Shinas, Sultanate of Oman

Sabarmathi K R
Department of Information Technology, Bannari Amman Institute of Technology, Sathyamangalam, Tamilnadu, India

Aanandha Saravanan K
Department of ECE, Veltech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology, Chennai, India

Niranjanamurthy M
Department of AI, ML BMS Institute of Technology and Management, Bangalore, Karnataka, India

Aashish A. Gadgil
Department of ECE, KLS GOGTE Institute of Technology, Belagavi, Karnataka, India

Azarudeen K
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

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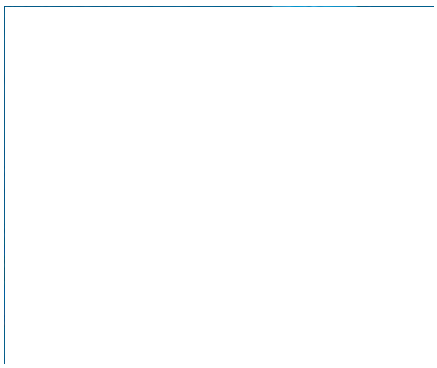

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The Intrusion Detection System (IDS) is a security tool that uses pattern recognition algorithms to detect unusual activity in a network. IDS-based pattern recognition techniques search through network traffic for patterns that might indicate a security issue. IDS-based pattern recognition may find attacks of various types, such as malware infections, brute-force attacks, and insider threats. IDS-based pattern recognition techniques may be trained using methods based on machine learning, which allows the system to learn from previous attacks and improve its accuracy. Even though signature-based IDS analyzes network data for known attack patterns, anomaly-based IDS looks for anomalous network behaviour. IDS uses pattern recognition-based machine learning methods to enhance detection precision while decreasing false positives. The ability to identify previously unidentified attacks and the flexibility to shifting attack patterns are just two advantages of pattern recognition-based IDS. The 2 categories of pattern recognition-based IDS are signature-based and anomaly-based systems. Security staff can get alerts and notifications, that allows them to respond quickly to reduce security hazards. IDS-based pattern recognition systems rely on training data to learn what constitutes a security threat. If the training data is biased or incomplete, this can lead to inaccurate or incomplete detection. For example, if

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the training data only includes examples of attacks from a specific geographic region or industry sector, the system may not be able to detect attacks that occur outside of these parameters

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Conference Location: Coimbatore, India

Contents

I. Introduction:

Intrusion detection systems (IDS) are essential tools for ensuring the security of computer networks by detecting and preventing unauthorized access, malware, and other security threats. Pattern recognition is a popular approach for intrusion detection, which involves analyzing network traffic patterns to identify anomalies and potential attacks. In recent years, Convolutional Neural Networks (CNNs) have been increasingly used for pattern recognition due to their ability to learn complex patterns and features from data. This essay will provide an overview of intrusion detection systems based on pattern recognition using CNNs and discuss their advantages, limitations, and potential applications. The rest of the essay will delve deeper into the topic and explore the different aspects of IDS based on pattern recognition using CNNs.As computer networks become increasingly complex and connected, the threat of cyber attacks continues to grow. Intrusion detection systems (IDS) play a critical role in securing networks by detecting and preventing malicious activities, unauthorized access, and anomalous behavior. Pattern recognition is a widely used approach for IDS, which involves analyzing network traffic patterns to identify abnormal activities. However, traditional pattern recognition methods often struggle to detect complex patterns and features in large datasets.Convolutional Neural Networks (CNNs) have emerged as a powerful tool for pattern recognition in recent years. CNNs can learn complex patterns and features from data and are particularly effective for image recognition and natural language processing. These characteristics make CNNs well-suited for analyzing network traffic data and identifying potential security threats.Pattern recognition is a widely used approach for IDS, which involves analyzing network traffic patterns to identify abnormal activities. Traditional pattern recognition methods often

struggle to detect complex patterns and features in large datasets. Convolutional Neural Networks (CNNs) have emerged as a powerful tool for pattern recognition in recent years. CNNs can learn complex patterns and features from data and are particularly effective for image recognition and natural language processing. These characteristics make CNNs well-suited for analyzing network traffic data and identifying potential security threats.CNNs are a type of deep neural network that has been widely used for image recognition, natural language processing, and other machine learning tasks. CNNs are particularly effective for pattern recognition because they can automatically learn complex patterns and features from data.The basic structure of a CNN consists of multiple layers of interconnected neurons. The first layer is typically a convolutional layer that applies a set of filters to the input data. Each filter is designed to detect specific features or patterns in the data. The output of the convolutional layer is then passed through a pooling layer, which reduces the spatial dimensions of the data. The pooled data is then passed through one or more fully connected layers, which perform the final classification.CNNs can be trained using supervised learning, where the network is presented with labeled examples of input data and their corresponding output classes. During training, the network adjusts its weights and biases to minimize the difference between its predicted outputs and the true outputs. Once trained, the network can be used to classify new input data.IDS based on pattern recognition using CNNs offer several advantages over traditional IDS approaches. For instance, CNNs can achieve higher detection rates with lower false positives, and they can analyze network traffic data in real-time, enabling quick responses to potential security threats. However, IDS based on pattern recognition using CNNs also have some limitations and challenges, such as the need for large amounts of high-quality data, high computational costs, and potential privacy concerns.While IDS based on pattern recognition using CNNs offer many advantages, they also come with some limitations and challenges that must be considered. One significant limitation is the need for large amounts of high-quality data to train the CNNs effectively. The more data available for training, the more accurate the CNNs will be at identifying anomalous behavior. However, collecting large amounts of high-quality data can be challenging and time-consuming. Additionally, the data must be accurately labeled, which can be a difficult task that requires domain expertise.Another challenge of IDS based on pattern recognition using CNNs is their high computational costs. CNNs require significant computational resources to train and analyze data, which can be a significant barrier for organizations with limited resources. Furthermore, CNNs must process data in real-time, which requires additional computational power.

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An Ensemble-Based Machine Learning-Envisioned Intrusion Detection in Industry 5.0-Driven Healthcare Applications
IEEE Transactions on Consumer Electronics
Published: 2024

On the feasibility of adversarial machine learning in malware and network intrusion detection
2021 IEEE 20th International Symposium on Network Computing and Applications (NCA)
Published: 2021

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Air Canvas: Expressing Creativity in the Real World with OpenCV and Python

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I. Introduction

II. Literature survey

III. Methodology

IV. Implementation

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Abstract:
In today's world, online education has become one of the most important and widely used platform as it has spread all over the world. But online learning also has many challenges. One of the most important problems is to focus on the courses taught. To solve this problem, we created an "air canvas" that allows content to be delivered in real space and allows us to draw our needs by holding our fingers in the air. . It works by using a webcam to capture finger movements. It is built using the famous OpenCV library and python. There are numerous ways to write when drawing, including utilising a keyboard, touch screen, digital pen, pencil, or electric glove. But in the proposed system, Python computer vision programming and gesture detection are used to produce natural human-computer interaction.

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▸ ISBN Information:

Conference Location: Madurai, India

Shanthalaksmi Revathy J
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Suresh A
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Sanjith Bala B
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

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I. Introduction

Recent years have seen writing in the air research become one of the most fascinating and intriguing areas in the domains of image processing and pattern recognition. It contributes significantly to the creation of an automation process and enhances the interface between people and machines in many different operations [1]. Numerous studies have concentrated on novel techniques and aesthetics that would expedite processing while delivering higher recognition accuracy. Numerous studies have focused on novel tactics and methods that might has the recognition while slowing down processing. Drawing simple items becomes amazing and interesting since it enables the user to create images by simply moving their finger. Today, innovation has reached a significant level and human-machine interaction has increasingly become an important part of our lifestyle [2]. The motivation stems from the concept of providing students with a dust-free classroom experience through digital painting/teaching. We are working hard to constantly build this AI. Using our modern technologies such as OpenCV and Python. Open CV is often referred to as open computer vision and machine learning software. The advancement of computers, the availability of inexpensive products, the availability of quality tapes, and the need for robotic video surveillance have increased the demand for attacks against: Python is one of the most widely used programming languages [3]. An object-oriented approach often helps software engineers input clear and consistent code for both small and large projects. The demand for tracking devices continues to increase due to the need for automatic video analysis. Finding an object, following its movement in the frame, and providing a preliminary analysis of the object's characteristics make up the three primary steps of the video review process. When tracking an item, four main types of concerns are taken into account: selecting the best way of object representation, selecting the features required for tracking, locating the object, and tracking the object. The object tracking algorithms are a crucial part of many applications today, including automated monitoring, vehicle direction, and indexing of video. It makes use of computer vision to monitor the finger's motion [4]. It might be a means of communication for those who are deaf. It might be a way for deaf people to communicate. It substitutes a potent communication mechanism for written communication on paper.

Authors

Shanthalaksmi Revathy J
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Suresh A
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Sanjith Bala B
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

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A Robust Webcam-based Eye Gaze Estimation System for Human-Computer Interaction
2022 International Conference on Innovations in Science, Engineering and Technology (ICISET)
Published: 2022

User experience enhancing filter for a Webcam based human computer interaction
2017 IEEE 6th Global Conference on Consumer Electronics (GCCE)
Published: 2017

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Disease Detection Based on Iris Recognition

Shanthalaksmi Revathy J ; Yogeshwaran R ; Vishal S K **All Authors**

Abstract

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II. Literature survey

III. Methodology

IV. Implementation

V. Result

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Abstract: Disease detection using iris recognition technology has emerged as a transformative paradigm in the realm of healthcare diagnostics. Leveraging the intricate patterns wit... **View more**

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Abstract:

Disease detection using iris recognition technology has emerged as a transformative paradigm in the realm of healthcare diagnostics. Leveraging the intricate patterns within the iris, this study explores the development and evaluation of a sophisticated machine learning model for disease identification. Through meticulous pre-processing and feature extraction, the iris patterns are translated into a comprehensive set of data points. Utilizing state-of-the-art machine learning algorithms, the model achieves a remarkable accuracy rate, revolutionizing the precision of disease diagnostics. Ethical considerations play a pivotal role in this research, with a strong emphasis on patient privacy and algorithmic fairness. Rigorous anonymization protocols and bias-mitigating strategies are integrated, ensuring that patient data is handled responsibly and diagnostic outcomes are equitable across diverse demographic groups. Looking forward, the potential applications of iris recognition in healthcare are vast. From real-time disease detection to secure access control within medical facilities, the technology's versatility promises transformative shifts in healthcare delivery. Moreover, the integration of iris recognition with telemedicine platforms opens doors for remote diagnostics, bridging healthcare disparities and ensuring accessibility to even the most remote populations.

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Shanthalaksmi Revathy J
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Yogeshwaran R
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Vishal S K
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

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I. Introduction

In the realm of healthcare diagnostics, the fascinating discipline of iridology has emerged as a powerful tool, offering unique insights into an individual's health by analyzing the intricate patterns within the iris, the colored part of the eye [1]. The primary focus of this paper is to introduce an innovative and non-invasive approach for variety of diseases within the human body through the utilization of an iris recognition algorithm. Diseases, regardless of their specific classification, pose substantial health risks, often leading to adverse health outcomes. In many cases, the presence of diseases can be associated with specific biomarkers or physiological changes within the body. This study explores a novel method for identifying and monitoring these disease markers, providing a more patient-friendly alternative to traditional invasive diagnostic techniques [2]. Traditionally, the measurement of disease markers has often required invasive procedures, causing discomfort and anxiety among patients. In response to these concerns, a proposed solution involves the application of laser-based technology for non-invasive disease marker detection through the skin. That novel approach relies on the characterization of relevant biomarkers within the skin using infrared (IR) absorption spectroscopy [3]. The roots of iridology can be traced back to the pioneering work of Dr. Ignatz Van Peczely in 1881, meticulously chronicled in his seminal work, "Discoveries in the Field of Natural Science and Medicine.". Over the course of centuries, iridology has continually evolved, embracing contemporary advances such as digital imaging to enhance its capacity to assess patients' health. In our modern era, cardiovascular diseases have assumed a stark prominence on the global health stage, accounting for a staggering annual toll of approximately 17 million lives. This paper unveils a systematic approach that capitalizes on the prowess of Canny edge detection and Principal Component Analysis (PCA) to extract crucial cardiac-related information encoded within the iris. Canny edge detection, a robust technique, is harnessed to pinpoint subtle anomalies within the iris that correspond to the heart region [4]. Complementing this, PCA steps in to distill the most salient features unearthed by Canny, culminating in a refined dataset ready for processing by a backpropagation neural network. Prior research undertakings have delved deeply into the realm of detecting potential heart diseases through iridology [5]. One of the most intriguing applications arising from this technological progress is iris recognition, which capitalizes on the unique and unchanging features found in the human iris texture. The iris, with its intricate and distinguishing characteristics, forms the cornerstone of sophisticated identification systems [6]. Numerous methods and techniques have been devised to propel the evolution of iris recognition systems (IRS), one central challenge looms large: achieving pinpoint precision in recognition. Our endeavour in this paper revolves around addressing the pivotal dimensions of accuracy and computation time— foundational benchmarks in the assessment of IRS performance. At its core, our primary aim is to elevate the performance of iris recognition by deploying precise hybrid feature extraction techniques.

Authors

Shanthalaksmi Revathy J
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Yogeshwaran R
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Vishal S K
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

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Prediction of Alzheimer's disease using Machine Learning Algorithm
2022 Joint International Conference on Digital Arts, Media and Technology with ECTI Northern Section Conference on Electrical, Electronics, Computer and Telecommunications Engineering (ECTI DAMT & NCON)
Published: 2022

Detection of Cardiovascular Disease of Patients at an Early Stage Using Machine Learning Algorithms
2022 International Conference on Healthcare Engineering (ICHE)
Published: 2022

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Design and Implementation of a Comprehensive Intelligent E-Learning Systems Integrated Web App Solution For Dyslexic Students

Publisher: IEEE Cite This PDF

R. Deepalakshmi ; J Shanthalakshmi Revathy ; S.P. Revathy ; N. Kousika **All Authors**

Abstract

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I. INTRODUCTION

II. METHODOLOGY

III RESULTS & DISCUSSION

IV. CONCLUSION

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The prevalent learning disorder, dyslexia impair a person's capacity for reading, writing, and spelling. But with the aid of successful interventions like multisensory te... **View more**

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Abstract:
The prevalent learning disorder, dyslexia impair a person's capacity for reading, writing, and spelling. But with the aid of successful interventions like multisensory techniques, phonics training, and assistive technology, persons with dyslexia can improve their reading and writing skills and excel in school and in daily life. This research paper "Dyslexi Duo" is a comprehensive solution for dyslexic students in all age group and includes 3 major sections. A Super Pad for the age group >18 to help them read digital documents like pdf with ease. An Interactive & Educational game -Hydra Hunt for the age group of 4-10 to learn formation of words with letters using both visual & auditory techniques. This game incorporates 4 key elements: storyline, clear goals, multiple levels, and points. An attached mobile application "Alpha360" for the age group of 3-8, which is an interactive multimedia learning app using 3d viewing, TextToSpeech, SpeechToText technology & a multisensory approach. This entire application was tested & evaluated with dyslexic students of the corresponding age group. Overall, our application can be a one stop solution to help dyslexic students overcome theirchallenges at an earlier age and achieve academic success.

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Contents

I. INTRODUCTION

According to English Oxford Living Dictionaries the word "dyslexia" is defined as "a general term for disorders that involve difficulty in learning to read or interpret words, letters, and other symbols, but that do not affect general intelligence" [1]. Dyslexia results from individual differences in the parts of the brain tht enable reading. It tends to run in families. Dyslexia appears to be linked to certain genes that affect how the brain processes reading and language. A study was done to look at the impact of different text formatting techniques on readability, Daniela Traficante, Laura Giordano, and Giovanna Mazzotta (2020) [2] conducted a study with 128 participants (64 with dyslexia and 64 without dyslexia). Reading speed and accuracy for those with dyslexia were found to be greatly improved with more space between letters and words. The study highlights how crucial it is to employ various text formatting strategies to increase text readability for those who have dyslexia. Another study by Sierra Laddusaw and Jeremy Brett (2019) [3] found that incorporating the Open Dyslexic font in exhibit materials at Cushing Library improved access for dyslexic visitors. The results of adding Open Dyslexic font to the exhibit were positive. The study by Bonifacci et al. (2021) [4] examined the effects of text-to-speech technology on rates of mind wandering in students with dyslexia (20) and typical development (50). The results showed that both groups had better comprehension and reduced rates of mind wandering in the text-to-speech condition. Sweep Sweep Spell technique by Ronald Dell Davis [5] is a native approach in which students are usually instructed to hide the words they are reading with a finger and slide the finger by one letter then it continues from reading out each letter loud to the whole word. WebHelpDyslexia [6], intended to assist in making web material more readable for people with dyslexia. The application has options for modifying the font size and type, stripping away text decorations, altering the foreground and background colors, and finding synonyms for words. Preliminary evaluations with dyslexic users showed that the features to help concentrate when reading and considered very useful. Web pages to make reading easier, such as font type, font size, letter spacing and word spacing (e.g., Open Dyslexic for chrome [7], Dyslexia Reader Chrome [8], Dyslexia Friendly [9], and Helper bird [10]), Helper Bird stands unique and provide additional features to contrast between text and background colors and To gain their interest VAKT (Visual, auditory, Kinesthetic and Tactile) has been introduced which uses a Multisensory technique [11], this technique has shown increased engagement and achieved a promising result with students in learning. Another study by Siti Khatijah Nur Abdul Rahim and Nur Hasni Nasrudin (2018) [12], stated that if the multi-sensory method was adopted in learning strategy it could help dyslexia. The learning strategy refers to teaching dyslexia persons more than one of the five sense like tactile method and visual memories. Augur and Brigger developed Hickey Multisensory Language Course program [13]. Stratigoula Politi-Georgousi [14], numerous mobile apps have been designed and developed to assist them with specific learning skills such as reading, writing, spelling etc. A preliminary study was undertaken by Jorge Buele, Victoria M. López, L. Franklin Salazar, Jordan-H. Edisson, Cristina Reinoso, Sandra Carrillo, Angel Soria, Ral Andrango, and Pilar Urrutia-Urrutia (2020) on an interactive system to improve the skills of children with dyslexia[15]. Another study was conducted by Aleksandra Sholdova (2020) [16] on how educational games can benefit dyslexic

Optimization enabled deep learning methods for Container-based Cloud Computing Environment

Indumathi G ; Sarala R **All Authors** •••

Abstract

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II. RELATED WORK

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IV. FUTURE SCOPE OF WORK

V. CONCLUSION

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Cloud applications are now evolving towards a more granular micro-service paradigm, where fewer and simpler working elements are joined for providing end-to-end services,... **View more**

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Abstract:
Cloud applications are now evolving towards a more granular micro-service paradigm, where fewer and simpler working elements are joined for providing end-to-end services, in response to the demand for agile development and administration. The increase in the utilization of container have gained more insight and helped in ensuring maximized and large portability with minimized overhead and rapid deployment in the cloud platform. But the rapid growth of container technology has introduced phenomenal changes in the management and automation of containers in the cloud computing environment. In specific, container resource allocation is the most potential challenge realized from the dimension of cloud providers since it possesses a direct impact on system performance and resource management. In this paper, a comprehensive review on Optimization enabled deep learning methods for Container-based Cloud Computing Environment is presented with its merits and limitations. It has presented the possible number of deep learning models-based container scheduling process that helps in significant load prediction in the cloud platform. This study also outlines the prospective research areas that might be explored moving forward with this implementation research.

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Contents

I. INTRODUCTİON

Containerization puts everything required to operate a single application or micro-service into a single unit rather than requiring the creation of a full virtual machine (along with runtime libraries they need to run). A hypervisor virtualizes physical hardware in classical virtualization. As a result, each virtual machine includes a guest OS, a virtual replica of the hardware that the OS needs in order to function, an application, as well as the libraries and dependencies that go along with it. Containers virtualize the operating system as opposed to the underlying hardware, thus each container just includes the programme and its libraries and dependencies. Unlike virtual machines, which must always incorporate a guest OS, containers can just use the host OS, making them tiny, quick, and portable. In the recent decade, cloud computing which facilitates the required computer services through the Internet has emerged as one of the most potential paradigms [1]. The rapid and phenomenal development of several sophisticated clouds that serves the domains of Things (IoT) devices have evolved due to the recent growth in terms of user demands. It opens the option of provisioning the available services, the memory of the cloud and machine learning programmes which is mandate for possible amenities of the clouds which have rapidly grown in a more substantial manner [2]. In specific, the business related to cloud computing has evolved rapidly in the recent years due to the introduction of various technologies of virtualization that includes Zen, KVM, Citrix and VMware. But the use of widespread technologies of virtualization has brought in about some of the limitations that include procedures of migration, difficult planning, extended shutdowns, extended executions and high time consumption. On the other hand, the virtualization of hardware in the traditional setup, and each individual virtual machine executing the entire operating system is responsible for supervising the entire activities of the computers' applications [3]. The container never possesses its own virtualization of hardware or kernel, and this process of application directly communicates with kernel of the host in a more reliable manner. Thus the containers are identified to be comparatively lighter than the conventional virtual computers.

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Research on Forecast Algorithm of Financial Time Series Analysis Based on Markov Model

Publisher: IEEE

Devi M ; J. Jasmine Hephzipah ; N. Esanmurodova ; A. H. Alkkhayat ; M. Sahaya Sheela ; Sarala R **All Authors**

Abstract

Document Sections

I. Introduction

II. Financial time series analysis forecasting

III. Research on forecasting algorithm of financial time series analysis based on Markov model

IV. Conclusions

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Abstract:

The financial system is both transparent and convoluted, with deep connections between the myriad of economic factors that are at play. The contemporary view of finance can be broken down into three distinct components: the time value of money, asset pricing, and risk management. The crux of the issue is finding the appropriate distribution of resources across time periods while operating in an uncertain environment. In the subject of forecasting financial time series, numerous studies have proven that the link between input and output variables is not stable, and that both variables always vary with time. This has been demonstrated by the findings of the studies. Because data comprises a significantly greater amount of information, it is only natural to give more weight to more current information. The study of financial markets now would be incomplete without the inclusion of time series analysis, both as a theoretical framework and a practical methodology. One of the methods that are considered to be part of the mainstream in quantitative financial analysis is the time series analysis method. This study makes use of the Markov model, which is a technique for forecasting financial time series that has been shown to reduce the amount of error associated with forecasting.

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Devi M
Electrical And Electronics Engineering, New Prince Shri Bhavani College Of Engineering And Technology

J. Jasmine Hephzipah
Department of Electronics & Communication Engineering, R.M.K. Engineering College, RSM Nagar, Chennai, Tamil Nadu, India

N. Esanmurodova
Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, National Research University, Tashkent, Uzbekistan

A. H. Alkkhayat
College of Technical Engineering, The Islamic University, Najaf, Iraq

M. Sahaya Sheela
Department of ECE, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology (Deemed to be University), Chennai, Tamil Nadu, India

Sarala R
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Contents

I. Introduction

A particular mathematical model is needed for time series modelling. We can use past data to determine the input-output relationship with this specific mathematical model. Forecast output [1]. In finance, financial time series are crucial. Financial time series are complex, making it challenging to create an economic time series model in a forecasting model. Even if the modelling works, the predicted effect is generic for various reasons. Not good [2]. The financial market is the core of a country's economic operation. Studying the changing laws of the financial market, managing it effectively, and improving the rate of return on financial investment is the diligent pursuit of the surrounding governments and investment institutions. Predicting the future prices of financial trading products can help investors avoid risks and obtain higher returns, so financial time series forecasting has become a hot spot in the financial field [3]. The combination of advances in data collection, storage, and management technologies and the urgent needs of the business world has resulted in widespread use of database technology in the past two decades. The financial market is a place for financing funds. It completes the connection between investment and financing needs and resolves the contradiction between capital supply and demand. There are many research results in finance and econometrics to predict financial time series and various uncertain factors can often affect prediction accuracy [4]. A large part of financial time series are non-stationary time series and generally do not have linear characteristics. Therefore, when the traditional linear prediction model is applied to the prediction of financial time series, the prediction results are often distorted [5].

Authors

Devi M
Electrical And Electronics Engineering, New Prince Shri Bhavani College Of Engineering And Technology

J. Jasmine Hephzipah
Department of Electronics & Communication Engineering, R.M.K. Engineering College, RSM Nagar, Chennai, Tamil Nadu, India

N. Esanmurodova
Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, National Research University, Tashkent, Uzbekistan

A. H. Alkkhayat
College of Technical Engineering, The Islamic University, Najaf, Iraq

M. Sahaya Sheela
Department of ECE, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology (Deemed to be University), Chennai, Tamil Nadu, India

Sarala R
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

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IEEE Transactions on Knowledge and Data Engineering
Published: 2024

A Time-series Analysis of How Google Trends Searches Affect Cryptocurrency Prices for Decentralized Finance and Non-Fungible Tokens
2021 International Conference on Data Mining Workshops (ICDMW)
Published: 2021

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"IntelPark" Website Based Advance Parking Booking System with Number Plate Detection

Publisher: IEEE

R. Pandimeena ; V. Saumiya ; R. Sarala ; R. Deepalakshmi **All Authors** •••

Abstract

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III. Problem Statement

IV. Conceptual Model of Intelpark Architecture

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Abstract:
The issue of vehicles being randomly parked on busy roads due to drivers' lack of awareness of nearby parking centers can be effectively addressed through the implementation of a Smart Parking System with online reservation capabilities. This system offers real-time information on available parking spaces, enabling drivers to locate spots promptly. Additionally, it allows drivers to reserve parking spaces in advance, guaranteeing them a spot upon arrival at their destination. By providing drivers with accurate information on parking availability, this system reduces congestion on roads and minimizes the time spent searching for parking. Furthermore, it enhances convenience for users by ensuring users have a designated parking space waiting for them. Moreover, the implementation of such a system enables efficient regulation of parking spaces, ensuring that users park their vehicles in their allocated spots. This not only optimizes the utilization of parking facilities but also enhances overall traffic management.

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Contents

I. Introduction

Nowadays due to an increase in population, there are a lot of vehicles on the road and less parking spaces are leading to traffic and difficulty in parking. It is a bottleneck situation for vehicle users to find appropriate space for parking. Traditional parking systems have struggled to keep pace with the increasing demand for parking spaces, necessitating the development of innovative solutions to alleviate this problem. To solve this problem, the online parking booking system can be a great solution. This paper aims to provide a comprehensive overview of this system, focusing on its principles, features, benefits, and the impact it has on city centric lifestyle. Historically, parking management relied heavily on manual processes and rudimentary systems, leading to various inefficiencies. Finding parking spaces involved circling congested areas, leading to increased traffic congestion, pollution, and frustration among drivers. Parking operators struggled with inefficient space allocation, revenue collection, and the lack of real-time data to optimize operations. These systems leverage modern technology, including mobile applications and web platforms, to streamline the entire parking experience. users can conveniently locate, reserve, and pay for parking spaces in advance, reducing the uncertainty associated with traditional methods. This paper will explore the core features that make online parking booking systems effective. These include user-friendly websites, real-time availability updates, secure payment gateways, and integration with navigation tools. The adoption of online parking booking systems has far reaching implications for urban living. Not only does it alleviate the stress associated with finding parking spaces, but it also promotes sustainable transportation options by encouraging shared rides and reducing the need for unnecessary driving. This paper is structured to provide a comprehensive understanding of online parking booking systems. To solve this problem, our concept is to create website based online parking reservation system. after the reservation of the vehicle, to identify the vehicle we have included object detection concept by detecting the vehicle's number plate using open CV. Real-world case studies and success stories will be examined to illustrate the system' s practical impact. Additionally, the paper will discuss the future prospects and potential innovations in online advance parking booking system.

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Patient surveillance system

Publisher: IEEE

R. Sarala ; G S Shunmugha Krishnan ; I Mohamed Imran Khan **All Authors** •••

Abstract

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There have been several attempts to use the new technology in various fields to improve the quality of life as a result of technological advancement and the shrinking of ... **View more**

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Abstract:
There have been several attempts to use the new technology in various fields to improve the quality of life as a result of technological advancement and the shrinking of sensors. Since the last ten years, the healthcare monitoring system has evolved into one of the most important systems and has become more technologically focused. Unexpected deaths from a variety of ailments are an issue that affects people, and it is caused by a lack of timely medical attention for patients. The main objective is to create an IoT-based patient surveillance system that would assist healthcare providers in keeping track of their patients. An IoT-based integrated healthcare system can monitor this both in hospitals and at patients' homes to provide improved patient care. Medical professionals or caregivers can remotely access patient data to monitor health improvements from locations outside the hospital. The application of Internet of Things (IoT) principles has been widespread in connecting available medical resources, offering patients intelligent, reliable, and efficient healthcare. This project has introduced a specially designed IoT architecture tailored for healthcare applications. Therefore, the suggested design gathers the sensor data using an Arduino microcontroller and transmits it to the cloud

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where it is processed and examined before being displayed. In the event of an emergency, patients' actions based on the health data analysis can be sent back to the doctor or nurses via messaging.

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Contents

I. Introduction

The healthcare sector is world’s largest developing sector which will go through many changes in upcoming years. The healthcare sector occupies a pivotal position in our society, serving as the linchpin for the overall well-being and vitality of communities. In an era marked by remarkable strides in medical science, technology, and patient care, it is imperative that the healthcare industry remains agile and adaptive to meet the evolving needs of a burgeoning and aging population. Moreover development of technology in rural areas is still in the developing conditions and these people face various difficulties to go to hospital and have a checkup for their health. The application which is proposed will also be user friendly and ease to handle as it can also be utilized by the rural people. These rural people should travel a long distance to reach the hospital, this application might help them. There are various applications developed in health industry for various purposes and also for monitoring the health status of the patients.

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IoT-Based Smart Kitchen with Enhanced and Automated Safety Measures

S. Murali[1]
Assistant Professor/CSE
Velammal College of Engineering and Technology,
Madurai
smu@vcet.ac.in

Dr. J. V. Anchitaalagammai[2]
Professor/CSE
Velammal College of Engineering and Technology,
Madurai
jva@vcet.ac.in

S. Kavitha[3]
Assistant Professor/CSE
Velammal College of Engineering and Technology,
Madurai
skt@vcet.ac.in

Jerlin Sugirtha C4
Final year UG Scholar
Computer Science and Engineering
Velammal College of Engineering and Technology,
Madurai
jerlinsugirtha@gmail.com

Iraimalar B5
Final year UG Scholar
Computer Science and Engineering
Velammal College of Engineering and Technology,
Madurai
iraimalarbaskaran@gmail.com

Abstract **- In today's world, many technologies have emerged for the implementation of Smart homes, Smart Cities, Smart Farming, etc. We are very excited and involved in decorating our house with Smart TVs, Smartphones, Home theatres, and Computers but we forget about the kitchen which is the most important part of our house. Nowadays, Liquified Petroleum Gas (LPG) is the fuel that is frequently used for cooking in the kitchen which is filled as a liquid in a cylinder. Many accidents happen because of the blast of these cylinders, mainly due to gas leakage in the kitchen. Due to LPG's high level of flammability, even a minor gas leak can pose a serious hazard to the environment. So, in order to avoid this, we must find, warn about, and stop gas leaks. Not only is the detection of gas leakage important but the control and prevention of leakage are also most important. The Internet of Things (IoT) technology is utilized in this project to lower the dangers in our kitchen. Both hardware and software will be utilized to implement this process. We use various sensors and mobile applications to detectand control gas leakage.**

Keywords: Node MCU(ESP8266-12E), DHT11 Sensor, PIR Sensor, Gas Sensor, 4CH- Relay module, Arduino IDE, MG995 Servo, Web App (Blynk App).

I. INTRODUCTION

Human life has transformed as a result of IoT. The networking of common things is made possible by changes to internetworking technologies and the huge expansion of Internet users. Each object can be uniquely identified using an embedded computing system that is part of the internet infrastructure. The IoT is all about physical items being able to communicate with one another in terms of connectivity between machine and machine and between a person and a computer. The mainobjective is to improve people's quality of life by creating a worldin which things respond to our needs and wants without furtherinstruction since they are aware of what we like, want, and want from them. Traditionally, kitchens have been associated with cooking and food preparation. However, with the advent of IoT technology, kitchens can now prioritize safety through interconnected devices, sensors, and automation systems. This paper examines how an IoT-based smart kitchen, centered on safety, can provide enhanced protection for users, especially concerning gas leak detection and automated safety measures, all managed by NodeMCU.

II. RELATED WORKS

Shubham More and his colleagues presented the planning and execution of an IoT-based Smart Kitchen System in 2021[1]. Their wireless system consists of an LCD (Liquid Crystal Display), an Arduino UNO microprocessor, GSM for connectivity, and other components. MQ-2 gas sensor and buzzer are also utilized. In the event of an alarm, this system reacts quickly.

B. Sneha Reddy and her team used the Nodu MCU in 2022 to implement the IoT-based smart kitchen with Automation and Monitoring System [2]. Their method allows for the monitoring of kitchen gas leaks, which shortens response times in the event of a leak condition. Additionally, the main power supply will automatically turn off at night if a gas leak develops without warning in order to stop a blast and keep an eye on the Cylinder and other kitchen appliances the user uses.

The IoT-based Gas Leakage Detection System was implemented in March 2023 by N. Manjunathan and his team [3]. They created and tested an IoT-based Smart LPG Leakage Detector system using the ESP8266 NodeMCU Module. An MQ-6 sensor, a buzzer, a solenoid valve, an IR flame sensor, and the Blynk application are used by the system to monitor and control gas levels.

Sahil Kapadnis and his group implemented the Smart Kitchen using IoT in 2022[4]. In their method, if a gas leak is discovered, the gas sensor notifies the registered mobile number via an alarm message, which causes the stove knob to switch off automatically. 4 different types of sensors and an Arduino Mega are used in the system's design. A DHT 11 sensor is used to track temperature and humidity, an MQ-6 LPG sensor for gas detection, an MQ-3 sensor for ethanol detection, and a water level sensor for water leak detection in the kitchen.

An Automatic Gas Leakage Detection and Shut Off System was developed in 2021 by Boga Vinay and Dr. G. Venkata Hari Prasad [5]. The goal of the project is to create a tool that can identify gas leaks, notify subscribers via alarm and status displays, and, as the primary preventative step, shut off the gas supply valve. A variety of sensors are used to

construct this model. The Raspberry Pi is utilized in this alert system to connect the various sensors and hardware parts.

The Sensor-Based Gas Leakage Detector System was proposed by Mohammad Monirujjaman Khan in 2020 [6]. This study proposes and discusses an architecture for a gas leakage monitoring system that can automatically detect, alert, and manage gas leakage. To detect LPG gas in this system, semiconductor sensors are employed. The system's core components are the Arduino UNO R3 and the MQ-6 gas sensor.

A. Components of IoT-Based Smart Kitchens for Safety:

- Gas Leakage Detection System:
  - Gas leakage sensors integrated with NodeMCU.
  - Immediate detection of gas leaks with real-time alerts.
- Automated SafetyMeasures:
  - NodeMCU-controlled gas regulator valve closure during gas leak incidents.
  - Door automation system utilizing NodeMCU for rapid kitchen isolation during emergencies.
    - 4-Channel Relay Module
    - Breadboard
    - Jumper Wire
    - PIR Sensor
    - SERVO MG995
    - DHT11 Sensor
    - 5 V 1Amp AC To DC Adapter
- Mobile Application:
  - User-friendly mobile application for monitoring, receiving gas leak alerts, and controlling safety mechanisms powered by NodeMCU.

III. PROPOSED SYSTEM

A. ARCHITECTURE

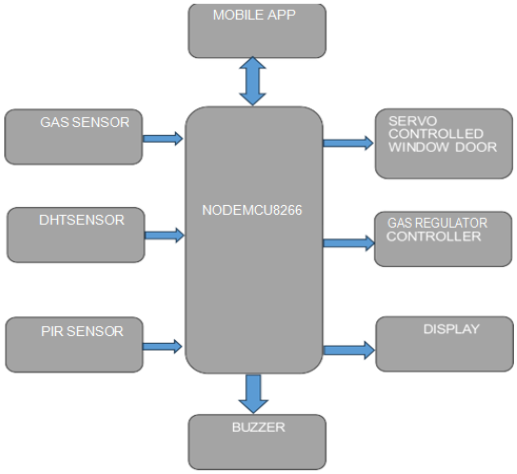

Fig. 1.

B. NODE MCU (ESP8266- 12E)

NodeMCU: The Brain of the Operation

Popular open-source Internet of Things platform NodeMCU is built on the ESP8266 Wi-Fi module. It offers a user-friendly platform for creating IoT projects. Numerous developers can use NodeMCU because it is compatible with the Arduino IDE. Its built-in Wi-Fi capabilities allow it to connect to the internet, making it ideal for sending data from sensors to the cloud or a local server. It has ESP-12 module-based hardware and ESP8266 Wi-Fi SoC-based firmware from Espressif Systems.

Node MCU was created to get over the drawbacks of the early versions of the ESP8266 module, which were incompatible withbreadboards, challenging to power, and more challenging to program. Due to its low cost and ease of use, the Node MCU board quickly became one of the most popular boards today.

Fig. 2.

A dual in-line package (DIP), which combines a circuit board operating as a USB microcontroller with a small surface-mounted board carrying the MCU and antenna, is the standard kind of prototyping equipment. The only benefit of using the Node MCU over the Raspberry Pi is its built-in Wi-Fi. The Node MCU is less expensive than similar devices on the market as a result of the cost savings. Remote access is facilitated by the built-in Wi-Fi. Any remote place in the world with an online connection can access the system. After receiving the input, the device will continue to work even without an internet connection. The tool can also be physically handled.

C. 4-CHANNEL RELAY MODULE

The relay is the mechanism that causes the contacts to open or close so that the opposing electric control will operate. It recognizes an unfavorable or undesirable situation in a designated area and instructs the circuit breaker to shut off the affected area. Thus, the system is protected from harm. The 4-Channel Relay Module is a practical piece of equipment that can be used to control high-voltage, high-current loads such AC loads, motors, solenoids, and lighting. It is designed to deliver and receive data via communication with microcontrollers including the Arduino, PIC, and others.

Screw terminals are used to expose the relay's terminals (COM, NO, and NC). An LED indication additionally shows the relay's status. An electromagnet provides power to a relay module, and an electrical switch. A separate, low-power

signal from a microprocessor activates the magnets. The electromagnet pulls to open or close a circuit when it is turned on.

Fig. 3.

Working Principles of RELAY

The concept of electromagnetic attraction is used to make it work. A temporary magnetic field is produced when the electromagnetic field is energized by the relay's circuit upon detection of a fault current. This magnetic field moves the relay armature, opening or closing connections. In contrast to the small-power relay's single contact, the high-power relay includes two contacts for activating the switch.

SOFTWARE USED

D. ARDUINO IDE

The C, C++, and Java programming languages were used to create the cross-platform Arduino IDE (integrated development environment). The Arduino IDE is also a derivative of Processing IDE. The Arduino IDE is used for easy-to-write and uploading programs in Arduino boards by using a cable that is connected between the board and the IDE. The operating system for Arduino software can be Windows, Mac OS, or Linux depending on the user. The IDE has a software library for the wiring projects and to provide common input and output procedures.

- setup (): a function that only executes once at the beginning of a program and can initialize and specify settings.
- loop (): a function that is used until the board shuts down.

To program the Node MCU with the Arduino IDE, you must first add it to the library in the Arduino IDE settings by adding this address. When this reference has been added to the Arduino IDE, select Node MCU 1.0 (ESP12E Module) to download Node MCU to the board manager. After adding the node MCU to the Arduino IDE library, upload this code while changing the hotspot's username and password.

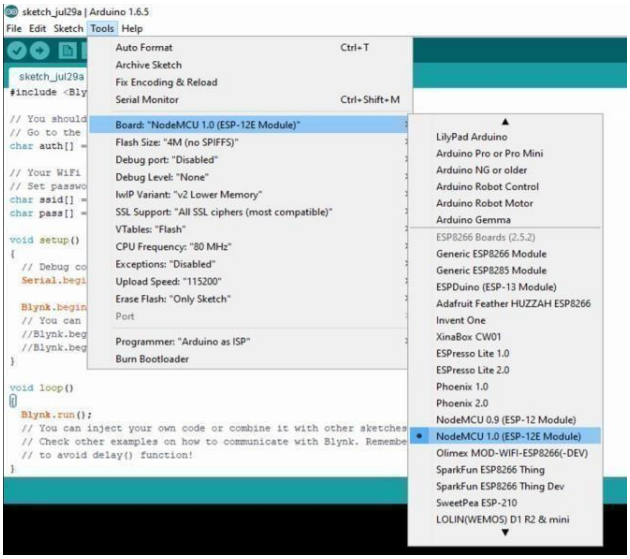

Fig. 4.

E. GAS SENSORS: Detecting Air Quality

Gas sensors are crucial for keeping track of the quality of the air in a variety of contexts, including homes and workplaces. They are capable of detecting a variety of gases, including methane (CH4), carbon dioxide (CO2), and carbon monoxide (CO). A gas sensor can be used in our environmental monitoring system to measure the amount of a particular gas in the air, giving important information about indoor air quality or spotting gas leaks.

Fig. 5.

Smoke is detected via a MQ-2 sensor. Because the smoke sensor contains a built-in potentiometer, the client can alter its affectability based on how accurately the gas is to be identified. The other threshold is specified in the code, thus this is an additional resistance that is provided. Smoke and the flammable gases that it is surrounded by are fragile. The sensor voltage varies depending on how much smoke or gas is in the air. Depending on how much smoke or gas is present, the sensor generates a voltage.

F. PIEZO ELECTRIC BUZZER

Even though LPG is a need for every home, a leak might be disastrous. There are many products that detect the leakage in order to notify of it and prevent any accidents. When LPG gasis found, a piezoelectric buzzer is employed as an alarm. The buzzer has an outside housing and two pins for connecting topower and ground. A ceramic disc in the center is encircled by a metal (typically bronze) vibration disc inside of a piezo element. When current is applied to the buzzer, the ceramic disk shrinks or expands. The surrounding

disc subsequently starts to vibrate as a result. The buzzer's frequency can be changed to alter the pace of the vibrations, which in turn alters the pitch.

G. PIR SENSORS: Detecting Motion

PIR sensors are motion detectors that monitor variations in heat patterns using passive infrared technology. They can be used in IoT applications to track occupancy or movement in an area, in addition to being frequently utilized in security systems to find intruders. When motion is detected, PIR sensors are frequently used to transmit warnings or turn on lights because they are energy-efficient.

Fig. 6.

H. MG995 SERVO: Controlling Mechanical Movements

High-torque, high-performance motors like the MG995 servo are frequently utilized in robotics and automation projects. It is perfect for managing mechanical motions in an IoT context, such as opening and closing vents, curtains, or doors because it rotates with high precision. It's an important part of building interactive and responsive systems since it allows for exact control over the position of attached objects.

Fig. 7.

It turns counterclockwise, turning off the burner in the process. In order to return to the knob's original position and turn the stove off, the servo motor steps 180 degrees.

I. DHT11 SENSOR

DHT11 is a straightforward, inexpensive temperature and humidity sensor that is digital.

- The DHT11 digital humidity and temperature sensor outputs serial humidity and temperature data using a single-wire protocol.
- The DHT11 sensor delivers temperature measurements in degrees Celsius (0 to 50 °C) and relative humidity data in percentages (20 to 90% RH).
- The DHT11 sensor utilizes both the resistive humidity sensor and the NTC temperature sensor.

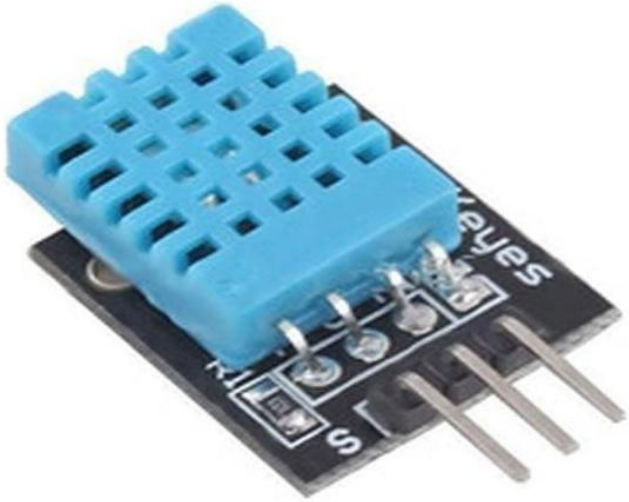

Fig. 8.

J. MOBILE APPLICATION

Use a mobile application along with an alarm and buzzer to warn the neighbors and stop serious mishaps that could threaten our lives. The focus of this work is efficient leakage management.

The operation of a fan is demonstrated using a propeller and a DC motor. The MQ-2 smoke sensor is connected to this so that when smoke is detected, the DC motor rotates. Electrical energy is transformed into mechanical energy by a device known as an electrical motor. A mechanical field is produced each time the current-carrying wire is subjected to a magnetic field.

IV. WORKING

All sensors are engaged when the Node MCU and Arduino UNO are powered on. The Node MCU's Wi-Fi module is linked to the Blynk app, the servo motor, and the Arduino. Whenever there is a gas or smoke leak in the kitchen, sensors automatically gather data through the Node MCU, the servo motor opens the window, closes the cylinder's knob, and the power supply shuts off. Sensors transmit an alert notification to the user via the Blynk Android app and display room temperature data. The user can react to the issue and take action right away.

V. RESULTS AND DISCUSSIONS

We have developed an efficient smart kitchen system using the Internet of Things (IoT) framework that detects gas leaks, notifies the user via notification, turns off the house's power supply, locks the cylinder's knob, opens the windows, and activates the exhaust fan. Through a mobile IoT interface, this automated system offers user-friendly

operation. It works as a socially responsible mechanism to stop today's catastrophic, perhaps fatal mishaps.

VI. BENEFITS OF IOT-BASED SMART KITCHENS FOR SAFETY

1) Gas Leakage Detection:

- Quick gas leak detection with prompt alerts.
- The reduction of potential health andfire dangers.

2) Automated safety precautions:

- In the event of a gas leak, NodeMCU provides quick closure of the gas regulator valve.
- Door automation increases safety by removing the threats of gas exposure.

a) Mental tranquility:

- Users can use the mobile application to check the safety of their kitchen remotely.
- Even when consumers are away from home, immediate alerts give them security.

VII. CHALLENGES AND CONSIDERATIONS

A. Privacy and Security:

- Preventing unwanted access to kitchen safety systems and ensuring the protection of user data.

1) Interoperability:

- Compatibility between NodeMCUs made byvarious manufacturers and IoT components.

2) Cost:

- For some users, the initial setup and ongoing maintenance costs may be prohibitive.

3) User Familiarity:

- It could take some time for users to get used to IoT-based safety measures.

VIII. FUTURE PROSPECTS

IoT-based smart kitchens for safety are poised for significantgrowth and innovation:

- AI Integration - Improved AI algorithms for moreaccurate gas leak prediction.
- Enhanced Safety Measures - Further automation and integration of safety features within the kitchen environment.
- Market Expansion - Wider adoption of IoT safety technology, making it more accessible to all.

IX. CONCLUSION

Smart kitchens driven by the Internet of Things, with a primary focus on safety via automated safety measures and gas leakage monitoring, represent a significant development in home safety technology. By immediately detecting and responding to any gas- related concerns, these kitchens give users peace of mind. Despite ongoing difficulties, there is a lot of hope for increased innovation and wider acceptance in the coming years. These safety-conscious kitchens have the potential to greatly improve household security and shield consumers from kitchen-related mishaps as they spread in popularity.

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Garden Irrigation System Using IOT

S. Murali
Assistant Professor
Computer science and engineering,
Velammal College of Engineering and Technology,
Madurai, India
smu@vcet.ac.in

Dr. J. V. Anchitaalagammai
Professor
Computer science and engineering,
Velammal College of Engineering and Technology,
Madurai, India
jva@vcet.ac.in

S. Kavitha
Assistant Professor
Computer science and engineering,
Velammal College of Engineering and Technology,
Madurai, India
skt@vcet.ac.in

Astro Flavin P
Computer Science and Engineering,
Velammal College of Engineering and Technology,
Madurai, India
astro.flavin@gmail.com

Sanjay Karthick S
Computer Science and Engineering,
Velammal College of Engineering and Technology,
Madurai, India
sanjaykarthickvasu@gmail.com

***Abstract*— Addressing the global challenges of water resource depletion and efficient agricultural water management has led to the emergence of an innovative solution - the integration of Internet of Things (IoT) technology into irrigation systems. This abstract introduces a smart irrigation system designed to harness IoT capabilities, ultimately optimizing water utilization and enhancing crop yields. The proposed smart irrigation system comprises several key components: sensor nodes, actuators, a central controller, and cloud-based data analytics. Soil moisture sensors are placed in field, continuously monitoring soil moisture levels in real-time. These sensors transmit the collected data wirelessly to a central controller. This central controller, equipped with predefined thresholds and crop-specific parameters, processes the incoming data to determine irrigation requirements. To control water flow within the irrigation system, the system employs actuators like water pumps or valves. The central controller makes data-driven decisions, activating or deactivating these actuators based on sensor data analysis. Moreover, the system has the capability to incorporate weather forecast data to dynamically adjust irrigation schedules. Crucially, cloud-based data analytics play a pivotal role in this system. They store and analyze the collected data using advanced algorithms and machine learning techniques. This analysis identifies patterns, optimizes irrigation schedules, and generates actionable insights for farmers. The system also enables notifications and alerts, which can be sent to farmers through mobile applications or web interfaces, allowing them to remotely monitor and manage the irrigation process.**

Keywords— :Node MCU(ESP8266-12E), Arduino Processor, DHT11 Sensor, PIR Sensor, LDR sensor, Web App (Blynk App).

I. INTRODUCTION

In the current era, the world is grappling with a significant water crisis, which poses a substantial challenge to agriculture—a sector that heavily relies on water. While Drip irrigation has been considered a solution to conserve water in agriculture, it falls short in accurately determining the precise water requirements for crops. This can result in either under or over-irrigation, which is not ideal. The proposed system aims to revolutionize irrigation by providing a smarter and more efficient approach.

This system represents an innovative step towards the concept of smart irrigation for gardens, with a strong emphasis on water conservation. An electronic device plays a pivotal role in monitoring temperature and humidity conditions [1]. When the soil's moisture levels in the irrigation field fall below the required threshold, the system activates a motor to initiate irrigation in the associated garden field. Additionally, it sends alert notifications to registered mobile phones to keep users informed.

The utilization of IoT in garden irrigation systems is geared towards accurately assessing and measuring the reduction in soil humidity, enabling precise control over the irrigation process. This approach ensures that water is supplied to the plants as needed while minimizing any unnecessary water usage [3]. To further improve water efficiency, it is crucial to implement a well-structured irrigation scheduling strategy.

II. RELATED WORKS

The primary goal of this system is to provide accurate sensor readings through an Android application. It empowers end-users to control the nodes via WIFI or Bluetooth, enabling them to toggle the nodes on or off. These sensor values are then utilized to regulate the supplying water to farm. To optimize the utilization of fresh water, it's essential for farmers to not only have an effective means of delivering water to their plants but also to implement an efficient watering schedule. This ensures that the plants receive the appropriate amount of water at the right moments.

A. Automated Irrigation System Using a WirelessSensor Network and GPRS Module.

The core aim of the automated irrigation system, which incorporates a Wireless Sensor Network (WSN) and a GPRS module, revolves around optimizing water utilization. This system relies on WSN components such as soil moisture and temperature sensors, strategically positioned in a distributed network [4].The gateway plays a pivotal role in transmitting data collected by the sensing unit to the central base station. Simultaneously, the actuator takes charge of irrigation operations, following commands and managing data obtained from the sensing unit. To achieve controlled water distribution

across the field, a specialized algorithm tailored to the field's conditions is deployed [5]. This algorithm is programmed into a microcontroller, and its primary function is to direct the actuator to deliver a predefined quantity of water through the valve [3]. The core aim of the irrigation system automation, which incorporates a Wireless-Sensor-Network(WSN) and a GPRS module, revolves around optimizing water utilization. This system relies on WSN components such as soil moisture and temperature sensors, strategically positioned in a distributed network [4].The gateway plays a pivotal role in transmissions of informations collected by the sensing unit to the central repository. Simultaneously, the actuator takes charge of irrigation operations, following commands and managing data obtained from the sensing unit. To achieve controlled water distribution across the field, a specialized algorithm tailored to the field's conditions is deployed [5]. This algorithm is programmed into a microcontroller, and its primary function is to direct the actuator to deliver a predefined quantity of water through the valve .

B. Automatic Irrigation System using Wireless Sensor Network and Data Mining Algorithm.

Data mining algorithms play a crucial role in the decision-making process for drip irrigation systems. The control station and base station are integral components of an automated drip irrigation system equipped with a diverse array of sensors, including soil temperature and moisture sensors [1].Utilizing Wireless Sensor Networks (WSN), this system establishes an ad hoc network that offers self-configuration and adaptability. Sensor data, transmitted via ZigBee, is relayed to the base station, which then processes this data to inform decision-making [3]. To aid in this process, a data mining algorithm is employed to analyze the sensor data and determine when to activate or deactivate the drip irrigation. Remote monitoring of these observations is facilitated through a web application. The algorithm evaluates the likelihood of specific attributes and uses this information to decide when to initiate or halt the drip irrigation. Additionally, a predefined dataset of agricultural information is employed to inform these decisions. All field data is seamlessly transmitted to the web application for real-time monitoring. However, it is worth noting that the system may encounter challenges due to data fluctuations influenced by soil and geological conditions, potentially affecting its proper functioning.

C. Automated Intelligent Wireless DripIrrigation Using Linear Programming.

A remote sensor network crop monitoring application proves to be a valuable tool for farmers seeking precise and efficient farming practices. This application leverages IoT technology to monitor the entire farm remotely, offering enhanced accuracy. The system operates on a sensor network framework with two distinct types of nodes, emphasizing energy-saving measures to optimize performance [3]. Data collection from the nodes to the base station employs a tree-based protocol. Within this system, sensor nodes are responsible for gathering vital environmental and soil parameters, including soil moisture, temperature, air humidity, light levels, and more [2].An automated intelligent wireless drip irrigation system takes advantage of linear programming techniques to maximize profit while efficiently managing available water resources and crop water requirements. This system calculates the water needs for various crops, considers available water resources, and identifies scenarios for achieving maximum profitability in different crop fields. It is further supported by a decision-making system to facilitate irrigation decisions for each crop field. However, it's worth noting that the linear programming approach can encounter challenges when objectives and constraints are not clearly defined. In real-time situations where these parameters are not pre-established, the system may not be applicable.

D. A Crop Monitoring System Based on WirelessSensor Network.

Remote sensor n/w crop checking is helpful to for accuracy farming. This system monitors the entire land from remote area. System works on two types of nodes.[1] Energy saving is utilized in node to save energy resources. Tree based convention is utilized for data collection from node to base station. System having sensor node which gather all ecological and soil parameters esteem soil moisture, temperature, air, humidity, light, and so on.[5] Crop monitoring application consists environment parameter collector. The data about crops is gathered by sensor. Sensor collects humidity, soil condition, and other information at the base station before sending it to the internet (web application). The analysis of the data occurs on the server side. The type of communication is duplex GPRS/CDMA.[5] The purpose of communication between nodes is served by an RF transceiver. For the purpose of experimentation, this application was used in Beijing, Henan, and Shandong Province, where temperature, humidity data were collected. It's made possible by IOT.

III. SYSTEM DESIGN

This system incorporates four distinct sensor types: the DHT11 sensor, moisture sensors, rain sensors, and an IP sensor. These sensors collectively play a crucial role in precisely determining the water requirements for specific crops and ensuring timely irrigation. The system's design integrates GSM technology to facilitate its functionality.

1) Moisture sensors:

A moisture sensor is buried deep into the soil and measures amount of moisture content present in soil. It allows the smart irrigation system to irrigate the amount of water required for the particular crop with the right amount of time needed by the

Fig. 1. Moisture Sensors

plants. It maintains the correct amount of water required for the crop. Also if the soil is wet due rainfall or due to over irrigation these sensor avoids irrigation. By stop watering when soil has correct level of moisture, it can correctly reduce the amount of water used for system(irrigation). This saves your amount of money.

2) DHT11 sensors:

These sensors serve the vital function of detecting temperature and humidity, relaying this information to the application for user access. The temperature sensor working is of displaying temperature data in either Celsius or Fahrenheit, providing flexibility for monitoring farming fields.

The DHT11 sensor comes in two fundamental physical types:

- Contact DHT11 Sensor Types
- Non-contact DHT11 Sensor Types

Furthermore, these sensors can be categorized into three main types: Electro-mechanical, Resistive, and Electronic. Among these, thermistor detectors are most commonly employed in agricultural fields. Thermistors are a specific type of temperature sensor, named by combining "THERM" for temperature and "res" for resistor, indicating their functionality. These thermistors are constructed using ceramic semiconductor materials, incorporating raw materials like manganese, cobalt, and nickel, among others. At room temperature, thermistors exhibit a certain resistance value, typically measured in kilo-ohms for practical purposes. Thermistors possess a variable resistance characteristic, requiring a current to flow through them to generate a voltage output. Additionally, thermistors can be connected in series with an appropriate reference resistor to create an implicit voltage divider network, with the resistor determining the voltage output at correct temperature points or values [5].

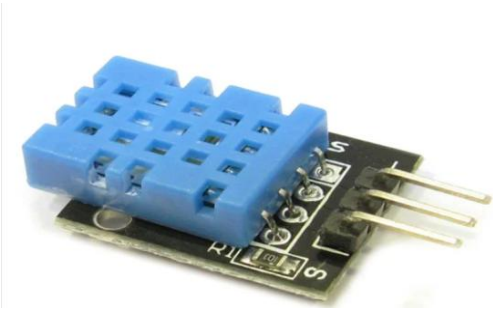

Fig. 2. DHT11 Sensors

3) Arduino (Micro Controller):

Arduino kits, which are based on microcontroller units (MCUs), enable the creation of digital and interactive hardware capable of both sensing and controlling physical devices. These Arduino boards are typically built around Atmel microcontrollers, ranging from 8-bit to 32-bit AVR variants, and are equipped with components that can be programmed and integrated into various circuits. One of the noteworthy features of Arduino is its standard connector, allowing the CPU board to seamlessly interface with a wide range of interchangeable add-on modules called "shields." The Arduino integrated development environment (IDE) is a significant component of this platform. It is a Java-based platform application that originated from the IDE used for the Processing and Wiring programming languages platforms [1]. Designed with newcomers to electronics in mind, the Arduino IDE offers a user-friendly code editor complete with features such as syntax highlighting, brace matching, automatic indentation, text manipulation (cutting, pasting, searching, and replacing), and a straightforward one-click upload mechanism for programming Arduino boards. The IDE also provides additional elements, including a text console.

Fig. 3. Arduino micro controller

4) Blutooth Device:

Bluetooth is a wireless technology primarily employed for establishing connectivity between devices. This versatile wireless device serves as a means to enable wireless connections. It is typically linked to an Arduino microcontroller, facilitating connectivity with other devices via Bluetooth. This setup empowers end-users to take control of the Arduino through their smartphones.

Fig. 4. Arduino with blutooth device

IV. SYSTEM ARCHITECTURE

The Smart Irrigation System utilizing IoT is structured with the following components:

Hardware:

- Bluetooth Module HC 05/06
- Arduino and Battery (including cable)
- LED
- 220Ω Resistor
- Android Device Software

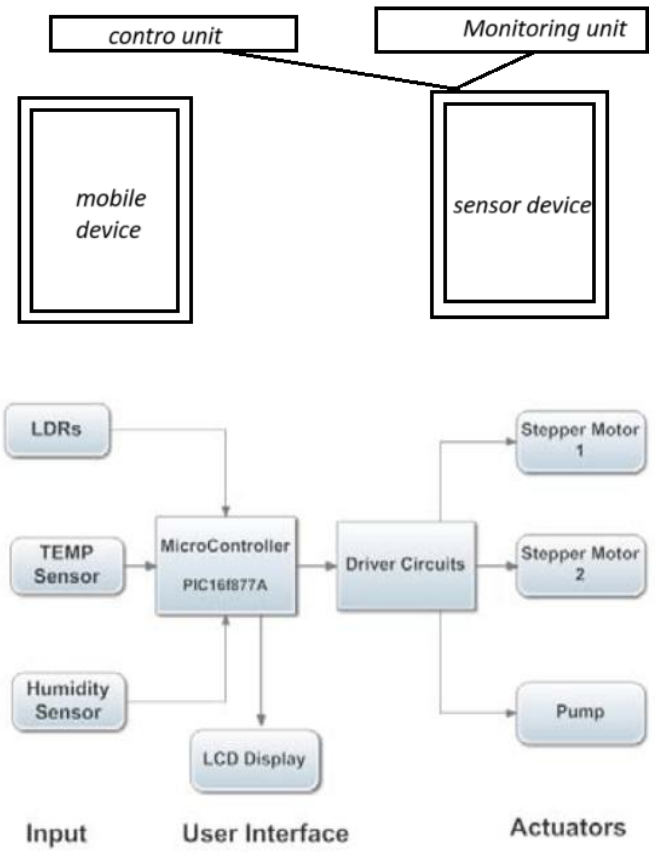

Fig. 5. Overall Architecture

The System Architecture comprises three primary components: an Android smartphone, an Arduino-Bluetooth device, and the Arduino itself. A visual representation illustrates the connections among these three elements [3].

To establish a connection between the Arduino and the Bluetooth device, four different configurations are possible, each utilizing distinct pins. These pin combinations are detailed below:

Arduino Pins vs. Bluetooth Pins:

RX (Pin 0) ↔ TX
TX (Pin 1) ↔ RX
5V ↔ VCC
GND ↔ GND

Additionally, to create a connection between an LED and the Arduino, connect the LED's positive leg to Arduino Pin 13, incorporating a resistor with a value ranging from 220 to 1K. The LED's negative leg should be connected to GND. For linking the Bluetooth module to the Arduino processor, employ jumper wires and a connector .

V. IMPLEMENTATION

This section delves into the various modules employed within the project, with each node following a similar architecture. The implementation is shown below.

A. Sensor Connection to Node MCU or Arduino: Each node interfaces with four sensors. The soil moisture sensor records moisture levels analogously and transmits the data using Node MCU's A0 (analog) pin. The DHT22 sensor data is acquired through Node MCU's GPIO pin 5, while the PIR sensor connects to Node MCU's GPIO pin 14. The PIR sensor detects motion, registering values greater than 1 for motion and values less than 0 for no motion. All sensors operate at 3.3Volts .

B. Data Transmission to a Cloud Platform: The sensors measure various parameters, including temperature, humidity, motion, and soil moisture. Data is sent to the Thing Speak cloud platform via the built-in WIFI module (ESP8266) on the Node MCU board. The code establishes a connection to the Wi-Fi network and then utilizes an HTTP GET request to transmit data to the Thing Speak cloud platform .

C. IoT Analytics: Data analytics can be applied to the sensor data using the Thing Speak IoT cloud platform. After uploading data to the Thing Speak channel, MATLAB can be used for analysis. MATLAB analysis is used to publish all node data on a separate channel within the system. Users can configure reactive, timed controls within the Thing Speak platform to transmit sensor data at predefined intervals .

D. Notification Dispatch: By applying IoT analysis to the sensor data, the system can send notifications to the user's mobile device using IFTTT applets. Users can utilize IFTTT applets to set up SMS or email notifications on their mobile phones after writing the MATLAB code .

VI. PROPOSED METHODOLOGY AND EXISTING SYSTEM:

The core components of the system mainly consist of the temperature sensor and humidity sensor, the soil moisture sensor and the PIR sensor. The PIR sensor serves the purpose of detecting motion within the field, while the temperature and humidity sensor measures the ambient temperature and humidity. Additionally, the soil moisture sensor plays a pivotal role in determining the soil's moisture levels. All these sensors are seamlessly interfaced with the built-in WIFI Node MCU, which enables data collection and transmission to the Thing Speak cloud platform for further analysis.

Regarding current software solutions for irrigation system planning and design, we offer a range of functionalities:

Bill of Materials Generation: Our software includes features for generating detailed bills of materials, ensuring accurate planning and resource allocation.

Energy Calculators: We provide energy calculators to help users estimate the energy requirements for their irrigation systems, aiding in efficient energy management.

Custom Automations: Our software supports the creation of custom automation routines, allowing users to tailor their irrigation systems to specific needs.

Integrated Land Management Functions: We offer integrated tools for land management, assisting users in optimizing irrigation across various land areas.

Zone Analysis: Our software enables the analysis of existing irrigation zones, helping users identify areas for improvement.

Irrigation Design: We provide software with capabilities for customized irrigation system design, including features like Computer-Aided Design (CAD), Digital Terrain Modelling (DTM), and land survey data integration. This ensures precise and efficient irrigation planning.

Hydraulic System Modeling: Our software allows for the modeling of hydraulic systems and irrigation patterns, facilitating the design and optimization of irrigation setups.

Smart Controllers and Sensors: We offer software development for various sensors and smart controllers, encompassing rain, weather, pressure, and moisture sensors. Additionally, we provide applications for remote management of pumps, injectors, valves, sprinklers, and other irrigation equipment. This enhances the overall efficiency and control of irrigation systems.

These software solutions are designed to streamline and enhance the planning, design, and management of irrigation systems, promoting water efficiency and sustainable agricultural practices.

A. Proposed Methodology:

Here we use LDR sensor for providing the automatic lighting into the garden area . And also we include GSM module for providing data connection. And also we include solar pannel for providing overall electricity and we include drip irrigation pipes for proper flow of water to all plants in a garden.

VII. Result and Discussion:

Leveraging the Internet of Things (IoT) framework, we have effectively crafted and put into operation a garden irrigation system. This automated irrigation system boasts user-friendly operation via a mobile IoT interface. It operates as a smart switching system, intuitively administering irrigation to plants in response to soil moisture levels, ensuring optimal hydration and it maintains correct level of water to the garden by operating irrigation valves to adjust amount of water remotely.

VIII. Conclusion and Future Scope:

This paper describes the design and implementation of a irrigation system in the garden under agricultural sector. Irrigation, a traditionally time-consuming agricultural task, has been revolutionized through the adoption of Internet of Things (IoT) technology. This innovation has led to automated, efficient, and live monitoring of crucial agricultural contents and mainly LDR sensor automation in garden and drip irrigation pipes were newly implemented. The irrigation system has been enhanced by the integration of various sensors, significantly improving its functionality. Utilizing an open-source IoT platform, a dedicated channel has been established to collect and present data related to soil moisture and other essential parameters. Notably, this system is cost-effective and operates with low power consumption. Looking ahead, there is potential for the integration of deep learning and machine learning techniques to predict the system's future working. Moreover, comprehensive weather forecasts can be incorporated to make informed decisions about when irrigation is necessary.

An interesting alternative to the PIR sensor for motion detection could be the utilization of drone technology for live monitoring, further enhancing the system's capabilities.

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Enhancing Tor Network Security: Identifying Active Hidden Services

*S. Murali
Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai
Madurai, India
smu@vcet.ac.in.

*S.R.Harshitha
Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai
Madurai, India
harshadeepthi1223@gmail.com

*D.Rubavathy
Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai
Madurai, India
dhanarajrubavathy@gmail.com

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Abstract: ***The Onion Routing (TOR) network has been specifically developed to offer clients accessing the internet or the TOR network with high anonymity, while also anonymously facilitating the hosting of servers. Nonetheless, there is a mounting apprehension regarding the utilization of specific servers for hosting hidden services that partake in malicious activities. The objective of this research paper is to analyse the current vulnerabilities within the security framework of the TOR network and propose a more effective approach for identifying the URLs of active hidden services hosted on TOR.***

Keywords: Routing, TOR, Proof of Concept, hidden servers, Network, services, hosting, hidden, malicious activities

I. INTRODUCTION

The advent of digital technologies has precipitated a profound societal transformation, reshaping traditional analog formats into digital paradigms. This transition has heralded the emergence of a novel societal realm known as Cyber Physical Systems (CPS) (4). The ramifications of this digital revolution extend deeply into various facets of human endeavors, even encroaching upon domains that harbor illicit and criminal activities. Notably, the Tor protocol, often synonymous with Anonymous Communication Networks (ACNs) (5), has emerged as a conduit for individuals to engage in anonymous communication, safeguarding their civil liberties. However, it is imperative to recognize that this very protocol has also become an attractive instrument for those immersed in illicit pursuits, spanning a gamut of transgressions, including human trafficking, arms dealing, child pornography, the clandestine sale of controlled substances, and racketeering (3).

The enigmatic realm known as the Dark Web, facilitated by technologies such as Tor, poses enduring challenges for law enforcement agencies due to its unbounded and anonymized nature (2). Nevertheless, the relentless march of digital progress, encompassing machine learning and data analysis, has armed investigators with formidable tools to probe and unveil criminal activities, as well as the individuals who operate within the clandestine enclaves of underground markets (17). To navigate this subterranean digital landscape effectively, the availability of a repository housing dark websites or onion URLs becomes indispensable (1).

The research study in question illuminates the metamorphosis underway within the digital criminal landscape, proffering valuable insights into the development of sophisticated web crawlers adept at extracting onion URLs from potentially malicious executables (13). The catalog of diverse outcomes related to the identification and apprehension of malware concealed within the Dark Web commences with pioneering efforts by researchers employing text analysis techniques to discern the authorship of child sexual abuse material disseminated across the shadowy expanse of the dark web (13). In a parallel endeavor, Chen et al. (6) embarks on the meticulous collection and scrutiny of a substantial compendium, numbering nearly ten thousand web pages, dedicated to activities associated with online jihad terrorism, colloquially referred to as the "clear web" (6). Concurrently, Frank (18) delves into the depths of data emanating from the dark web, harnessing algorithms to delineate the demarcation between extremist and non-extremist content. This endeavor is driven by the overarching objective of refining the identification and categorization of extremist content, with the ultimate aim of combating the propagation of extremist ideologies in the virtual realm (18).

II. LITERATURE REVIEW

Mauro Conti, Ali Dehghantanha, and Tooska Dargahi. "Cyberthreat Intelligence: Challenges and Opportunities", arXiv:1808.01162v1 [cs.CR] 3 Aug 2020:
Given the (21) increasing frequency of cyberattacks it is crucial to have cybersecurity and forensic professionals who can quickly identify, analyze, and proactively defend against these threats. Effectively managing a number of attacks requires examining the characteristics of each attack and implementing intelligent defense strategies. This highlights the importance of cyber threat intelligence. However, achieving intelligence would be impossible, without the support of intelligence, machine learning, and advanced data mining techniques used for gathering, analyzing, and interpreting evidence from cyberattacks. This chapter explores the world of cyber threat intelligence by delving into its challenges and opportunities, in depth.

S. Nazah, S. Huda, J. Abawajy and M. M. Hassan, "Evolution of Dark Web Threat Analysis and Detection: A Systematic Approach," in IEEE Access, vol. 8, pp. 171796-171819, 2020, doi: 10.1109/ACCESS.2020.3024198.
The Dark Web, characterized by its elusive nature, serves as a magnet for cybercriminals, terrorists, and state-sponsored operatives due to its inherent difficulties in traceability and its offering of anonymity. These wrongdoers engage in activities that parallel their counterparts in the physical world, yet the

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vast expanse, unpredictable terrain, and anonymity of the Dark Web present formidable challenges for law enforcement agencies seeking to apprehend them. Consequently, it is imperative to explore potential solutions to combat cybercrimes within this realm. This paper undertakes an evaluation of the Dark Web, delving into the crimes perpetrated therein, their repercussions, and the methodologies employed by malefactors. Furthermore, it proposes strategies to mitigate these criminal threats in the future. From these articles we have. Synthesized data to address our predetermined research inquiries. The systematic literature review has provided us with insights, into the increasing prevalence of crimes on the Dark Web. Additionally, a holistic assessment is undertaken to gauge the social, economic, and ethical ramifications of (9) these cybercrimes. This research underscores the imperative for further exploration, emphasizing the need for innovative approaches to identifying Dark Web criminals. It highlights the pivotal role of analyzing cryptocurrency markets and Dark Web discussion forums in forensic investigations. Leveraging the anonymity afforded by Dark Web services as a tool for apprehending criminals emerges as a crucial strategy. Moreover, the meticulous examination and processing of digital evidence in accordance with law enforcement protocols are crucial facets facilitating the apprehension of wrongdoers and the shutdown of illicit Dark Web platforms.

Chander Prabha, Abhishek Mittal, "Dark Web: A Review on the deeper side of the Web", 2022 OPJU International Technology Conference on Emerging Technologies for Sustainable Development (OTCON), pp.1-6, 2023.

The Internet, a vast and intricate network of computers and infrastructure, constitutes a distinct virtual realm. While many individuals commonly use the Internet to access well-known websites and there exists a lack of comprehensive understanding regarding the depth and obscurity that define this virtual domain. This article offers an exhaustive exploration of the Dark Web, encompassing its characteristics, advantages, drawbacks, and the web browsers utilized for its access. Furthermore, it delves into the myriad illegal activities and occurrences that transpire within this concealed segment of the Internet. The emergence of crypto currencies, notably Bitcoin, has further streamlined illicit trade and unlawful undertakings on the Dark Web. The article conducts a thorough analysis of the surge in cybercrimes attributable to the utilization of the Dark Web by its users. Specific crimes that find their breeding ground on the Dark Web are illuminated, and the details of the monitoring tools that can be harnessed to curtail these criminal activities are discussed. Additionally, the article explores diverse applications of the Dark Web and contemplates its potential for a more regulated utilization aimed at preventing and countering criminal endeavors (1).

Víctor Labrador, Sergio Pastrana, "Examining the trends and operations of modern Dark-Web marketplaces", 2022 IEEE European Symposium on Security and Privacy Workshops (EuroS&PW), pp.163-172, 2022. The Dark Web has become a platform, for online trade. Both law enforcement agencies and security researchers are keen on examining the marketplaces found on. Onion sites. Previous studies have relied on information, which may not include products, especially those related to the COVID-19 pandemic. To ensure our data is up-to-date we developed a crawler to collect the most recent information. It is crucial to analyze data as these marketplaces are constantly evolving. However, there are obstacles in place that make collecting data more challenging resulting in a decline in years. Our data analysis (2) examines aspects of products, sellers, and markets such as sales volume, market categories, and origins. This study provides insights into the range of services and products available in these markets. Additionally, a case study has been conducted that is specifically focusing on a drug market called Cannazon. This incident likely led to the market's subsequent closure. Henceforth, our research provides significant revelations regarding the concluding stages of a remarkably efficient market's functioning and showcases the potential efficacy of intervention tactics to impede operations and cultivate skepticism.

III. METHODOLOGY&PROPOSED SOLUTION

The structured approach encompasses several key facets, including the formulation of research questions, identification of pertinent data sources and search methodologies, establishment of inclusion and exclusion criteria, data extraction procedures, and the comprehensive analysis and synthesis of the gathered data.One established approach to address the enumeration issue within the TOR network involves the utilization of the Low-Energy Adaptive Clustering Hierarchy (LEACH) algorithm. However, it is important to note that this method has certain limitations, such as increased network overhead and reduced performance.

To overcome these limitations, a forward-looking model has been proposed that leverages the Particle Swarm Optimization (PSO) and Long Short-Term Memory (LSTM) algorithms. PSO is known for its ability to optimize complex problems, while LSTM specializes in learning long-term dependencies in data, enabling the evaluation and selection of the most suitable candidate solutions. The chosen solution is then used to efficiently route traffic within the TOR network, with the aim of enhancing network security and resilience. To assess the model's performance, it is compared against the Ant Colony Optimization (ACO) algorithm, another form of swarm intelligence algorithm commonly used for routing problems. In addition, the Random Forest Algorithm (RF), a supervised machine learning algorithm, is employed to detect anomalies and potential attacks within the TOR network. RF's strength lies in its ability to identify suspicious behavior based on learned patterns. Furthermore, Deep Convolutional Neural Networks (CNNs) are utilized for in-depth pattern recognition, making them invaluable tools for real-time detection of anomalies in TOR network traffic within the domain of TOR network security.

The inclusion of a staggering 6,51,191 datasets significantly amplifies the capabilities of Deep Convolutional Neural Networks (CNNs) for in-depth pattern recognition within the TOR network. These networks can now process an extensive pool of data, equipping them for real-time detection of anomalies and potential security breaches.

In essence, the synergy of Deep CNNs with such an expansive dataset repository promises a new level of insight and real-time vigilance. The capacity to analyze a multitude of data sources ensures that the TOR network remains safeguarded

against a variety of threats and vulnerabilities, setting the stage for a more secure and resilient network environment.

The integration of Python and the Spyder console plays a crucial role in our proposed solution for enhancing TOR network security and resilience. Python's versatility, combined with its extensive libraries, provides a robust platform for executing various elements of our security strategy.

For advanced analytics and machine learning, Python offers an expansive ecosystem of libraries, including Scikit-learn and TensorFlow. These tools empower data scientists to develop and deploy intricate algorithms within the Spyder console. This capability enables the creation of predictive models, anomaly detection systems, and deep learning networks, (10) all of which are instrumental in enhancing TOR network security.

The integration of the PSO and LSTM algorithms becomes a seamless process with Python. By utilizing Python's NumPy and SciPy libraries, researchers and developers can effectively combine these algorithms within the Spyder console, thereby improving the network's security and resilience.

Python, in conjunction with the Spyder console, provides an ideal environment for comparative analysis. Researchers can conveniently compare the proposed model with the ACO algorithm. Python's visualization libraries, such as Matplotlib and Seaborn, allow for the clear presentation and analysis of results, yielding valuable insights into the model's performance.

In the realm of anomaly detection, Python proves invaluable. It supports the implementation of the Random Forest Algorithm within the Spyder console, a machine learning approach that can be effectively trained on the extensive dataset collection to identify suspicious network behavior.

Finally, the design and training of Deep Convolutional Neural Networks (CNNs) for pattern recognition is a seamless process within the Python Integrated Development Environment (IDE) offered by Spyder. Python's Keras and TensorFlow libraries make it straightforward to build CNN models that detect anomalies and security breaches in real-time within the TOR network.

By capitalizing on Python and the user-friendly Spyder console, our solution emerges as a versatile and potent tool for tackling the multifaceted challenges inherent to TOR network security and resilience. This integrated Python environment empowers researchers and organizations to fully harness the potential of the 6,51,191 datasets, allowing for the creation of robust security measures and responses within the TOR network. Python's adaptability and the accessible Spyder console ensure that this solution is not only effective but also user-friendly in the pursuit of a more secure TOR network environment.

IV. EXPERIMENTAL RESULTS AND DISCUSSION

CLIENT ONION PROXY (OP)

The Tor client is a software application that must be installed on your device. Its main purpose is to help you communicate with the directory servers (DS's) to manage connections, within the network, and keep an eye on connections. In this document, we always infer the software as “Tor client.”

DIRECTORY SERVERS (DS)

In this network, a group of master servers carefully keeps track of records important information about the network's condition. This collection of data creates a shared document that includes information, about network relays, available bandwidth, exit policies, and other relevant factors. Operators can access these documents from the server and then choose three appropriate relays to create a communication circuit towards their intended destination.

ENTRY NODE

Within the Tor network, there exists a crucial relay known as the "entry node." This entry node serves the function of facilitating direct client connectivity while also permitting the retrieval of the client's IP address. In the earlier stages of Tor's development, security vulnerabilities were identified, which involved compromising or introducing new entry nodes with the intent of de-anonymizing users, as extensively discussed in Section V. To mitigate the risks associated with adversary-controlled nodes potentially being designated as entry nodes, the Tor network implemented a safeguard mechanism referred to as "Guard nodes." In this particular context, network operators (OPs) make the decision to select a limited number of reliable nodes to serve as guardians. Within this chosen group, only a single guardian node is employed as the initial access point for all communication circuits, until a distinct set of guardians is subsequently chosen. The assignment of a "Guard Flag" to a node is contingent upon evaluations conducted by directory servers (DSs), which consider factors such as the node's bandwidth, uptime, and duration of existence within the Tor network.

HIDDEN SERVICES (HS)

While the Tor network offers users anonymity, it's important to note that it does not conceal the identities of the websites they visit. Yet, vulnerability arises when and individual with access to the exit node or the connection linking the node and the specific website shows the website's IP address. To tackle this issue the Tor network has implemented a feature called “Hidden Services” which is alternatively referred to as "Onion Services." These services have the capability to be hosted on either a Tor node or an external node, and they are assigned a. onion domain name. The owner or operator of a Hidden Service(15). It's worth emphasizing that Hidden Services have, in certain instances, attracted individuals engaged in criminal and unethical activities, ranging from illicit drug sales (7) to the distribution of child pornography. Consequently, law enforcement agencies (LEAs) are compelled to undertake efforts to identify and subsequently shut down these problematic services.

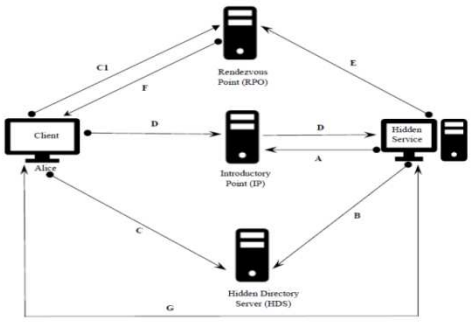

Fig.2. Tor hidden service architecture

V. RESULT

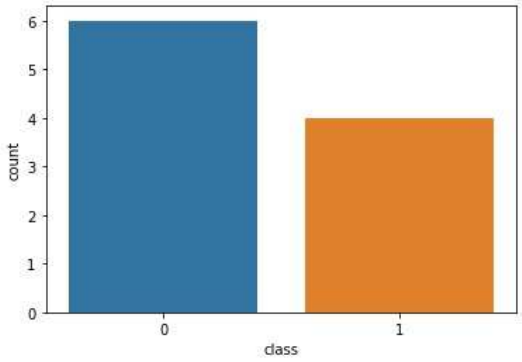

Fig.3. Bar chart

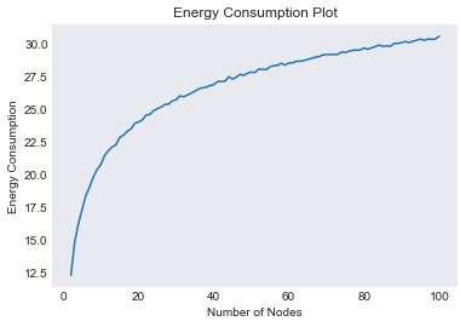

Fig.4 .Energy Consumption Plot

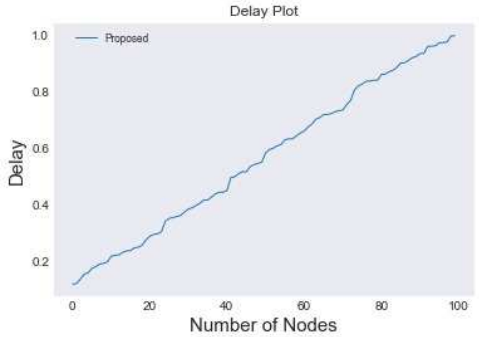

Fig.5. Delay Plot

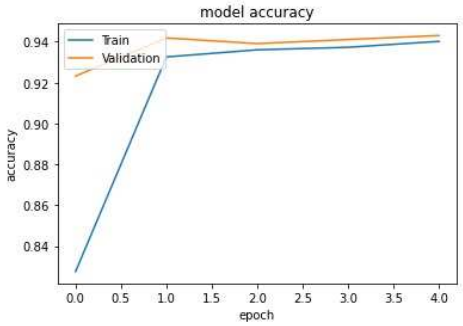

Fig.6. Model Accuracy

The bar chart [fig.3] visualizes the effectiveness of different algorithms in protecting against URL attacks. The shades represent the number of attacked and non-attacked URLs handled by each algorithm. Analyzing this distribution can help identify algorithms that offer better defense against such attacks, potentially guiding security implementation choices. The energy consumption plot [fig.4] and the delay plot[fig.5 depict the impact of time on two crucial network metrics: energy consumption and delay. Both Figures 4 and 5 show an exponential increase in both metrics for each node within the TOR network as time progresses. This highlights the growing resource demands and potential performance bottlenecks the network faces as it scales and experiences increased activity. Optimizing resource management and implementing network optimization strategies become crucial as the network expands. The model accuracy graph [fig.6] compares the accuracy of two algorithms, Bi-LSTM and Deep CNN, in detecting attacks. The Deep CNN algorithm demonstrates significantly superior performance, achieving an accuracy of roughly 94% from the outset and maintaining it throughout the evaluation period. This suggests that Deep CNN might be a more reliable and accurate choice for attack detection within the TOR network compared to Bi-LSTM.

VI. CONCLUSION

This paper extensively examines browsers utilized on the dark web thoroughly analyzing their structure, functionality, strengths, vulnerabilities and lack of secrecy (14) and security of the new upcoming technologies and the lack of awareness pose a real threat to one's personal life. In the following, we present some works that face cyber-security and also provides a concise overview of different attack methods and patterns that exploit these vulnerabilities. Additionally, the research includes mitigation techniques developed by experts to effectively counter, control, detect, and prevent damage caused by various attacks.
The proposed model leverages PSO and LSTM algorithms to enhance TOR network security and resilience. It is compared against ACO algorithm and RF algorithm. Python and Spyder console are used to implement the model. The inclusion of a large dataset amplifies the capabilities of CNNs for pattern recognition. Overall, the proposed solution is a versatile and potent tool for tackling the multifaceted challenges inherent to TOR network security and resilience. The paper provides in-depth explanations of various threat models, including the complexities of attack mechanisms and dynamics. Moreover, the paper not only highlights the strategies employed by adversaries to compromise security and expose sensitive information but also presents techniques for detecting attacks

and implementing countermeasures to strengthen defenses against them.

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Reseek on The Optimization Mould and Equation of E-Commerce Website Composition Based on Markov Mould

Publisher: IEEE

Annie ; S. Sankar Ganesh ; V. Vidhya ; Hassan M. Al-Jawahry ; Suseela D ; Murali S **All Authors**

Abstract

Document Sections

I. Introduction

II. Related theories

III. E-commerce website composition optimization mould and equation based on Markov mould

IV. Result And Discussion

V. Conclusions

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Abstract:

The quality of e-commerce website directly affects the competitiveness of enterprises in the electronic market environment, so how to improve and optimize the website has become a reseek topic that people are very concerned about. The quality of business websites directly affects the competitiveness of enterprises in the electronic market environment, so how to improve and optimize the composition of e-commerce websites has become a question that people are very concerned about. Since the optimization mould has many constraints and traits such as discreteness, it is very difficult to solve the above mould by using the existing graph principle equation. The Markov model, which is a statistical model with a double random path and has seen widespread use in the fields of speech recognition, creaturely sequence analysis, and management, serves as the foundation for this research. The Hidden Markov Model is built on a solid theoretical foundation consisting of probability and statistics, in addition to a robust mathematical framework. Its first applications were in the field of speech recognition and the analysis of creaturely sequences. Over the course of the last few days, individuals have started to investigate and investigate its applicability in the field of management.

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Annie
New Prince Shri Bhavani College Of Engineering And Technology, Chennai, India

S. Sankar Ganesh
Department of Computer Science and Engineering, Kommuri Pratap Reddy Institute of Technology, Telangana State

V. Vidhya
M.E.T Engineering College, Nagercoil, India

Hassan M. Al-Jawahry
College of Technical Engineering, The Islamic University, Najaf, Iraq

Suseela D
Department of Artificial Intelligence and Machine Learning, Bannari Amman Institute of Technology

Murali S
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Contents

I. Introduction

With the continuous and rapid improvement of technique and web technique, the theoretical reseek of e-commerce is being deepened, and its application has been paid more and more attention by enterprises [1]. Therefore, more and more enterprises are pushing their business to the Internet, promoting their goods and services to patrons through the Internet, and providing a convenient way for patrons and enterprises to buy and sell transactions. It is not difficult to build an e-commerce website nowadays [2]. What is difficult is how to use these websites result fully so that they can ultimately bring profits to the enterprise. This is also the ultimate goal of establishing an e-commerce website [3]. Therefore, how to make your website operate quickly and efficiently so as to maximize its efficiency and benefit has become an urgent and urgent task for major websites. In the e-commerce environment, the website is the window for enterprises to communicate with patrons [4]. The original link composition, the arrangement of page content, and the classification of goods all have an inducing effect on users, which directly affects the user's operation action on the website [5]. It can be said that the design and optimization of the website composition and the reasonable layout of the pages have a very important influence on the quality of e-commerce activities [6]. At the same time, various forms of e-commerce websites have sprung up, and almost all enterprises have their own e-commerce websites. Having a well-compositiond website is the foundation for an enterprise to successfully develop e-commerce, and it is also one of the main factors to promote the further improvement of the enterprise. For users, the traditional spatial distance between users and sellers no longer exists in e-commerce websites [7].

Authors

Annie
New Prince Shri Bhavani College Of Engineering And Technology, Chennai, India

S. Sankar Ganesh
Department of Computer Science and Engineering, Kommuri Pratap Reddy Institute of Technology, Telangana State

V. Vidhya
M.E.T Engineering College, Nagercoil, India

Hassan M. Al-Jawahry
College of Technical Engineering, The Islamic University, Najaf, Iraq

Suseela D
Department of Artificial Intelligence and Machine Learning, Bannari Amman Institute of Technology

Murali S
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Figures

References

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PhotoPlethysmoGraphy based Low-Cost Glucometer With Haemoglobin Measurement

Mr. S. Murali
Assistant Professor/CSE
Velammal College of Engineering and Technology
Madurai

Mr. S. Shiva Rakesh
UG Scholar/CSE
Velammal College of Engineering and Technology
Madurai

Mr. R.V.J. Dharwin
UG Scholar/CSE
Velammal College of Engineering and Technology
Madurai

Mr. M. Gajendrapandi
UG Scholar/CSE
Velammal College of Engineering and Technology
Madurai

Mr. R. Praveen Kumar
UG Scholar/CSE
Velammal College of Engineering and Technology
Madurai

***Abstract*—The Human body is made of tissues, fluids, hormones, organs and organ structures. To sustain a healthy life, people need to be in conscious of their health to prevent diseases. Various medical devices are used for tracking the health of people. Blood glucose level is essential need to track a patient's metabolism. In regular ways, the amount of glucose in the blood is measured by diagnosis of blood samples in a medical laboratory. Also there are products that measure blood glucose by pricking the fingers to draw drop of blood for glucose estimation. Both these ways are medically used for health care, which involves a invasive, painful way to measure blood glucose. This paper involves the design and implementation of a non-invasive technology based prototype for the measurement of blood glucose level along with Haemoglobin measurement. The prototype makes use of PhotoPlethysmoGraphy to achieve non-invasiveness, thereby overcoming the problems of prevailing medical devices. This prototype is implemented with low-cost sensors for providing economic viability. A Pilot study on volunteers to obtain results from the prototype. The results obtained from the prototype is analysed with the results from existing invasive product. Thus the paper defines the modelling a low-cost photoplethysmogrpahy based glucometer along with haemoglobin concentration measurement.**

***Index Terms*—Blood glucose level, Diabetes, Non-invasive technology, Photoplethysmography, Glucometer, Haemoglobin concentration**

I. INTRODUCTION

Diabetes mellitus is a chronic disorder associated with high blood sugar levels that affects the metabolism in humans. Diabetes occur in either way of the insulin hormone is not adequately produced by pancreas or the body cannot properly utilise the insulin produced. Diabetes also leads to other complications like leading to vision loss[1]. To diagnose the diabetes patients, the blood glucose level is monitored for further medications. The prevailing process of monitoring the glucose level in blood is done by taking blood samples using finger pricks. This process of Measuring blood glucose level is painful to the patients and there is a chance of infection when using finger pricks to collect blood invasively[2]. During Covid 19 quarantines, the patients are also needed to be cautious with infections by finger pricks and needed a haemoglobin measuring device at their homes to keep them track of their health.

II. LITERATURE SURVEY

The various works done previously in the domain are discussed below

Castaneda, Denisse et al. [3] established a clear understanding of photoplethysmography sensors helps in detection of early diseases. This research indicates the effectiveness of using sensors for low-cost, non-invasive treatment in the diagnosis of cardiovascular diseases. Description of Photo-PlethysmoGraphic waves for more accuracy in pulse sensors for heart rate readings is found.

Alyson Blum [4] designed a sensor based glucose monitoring device. This device is used for measuring continuous glucose level based on subcutaneous, wired enzyme glucose sensing technology. The device need to be worn on the back of your upper arm and the sensors read glucose level from interstitial fluids just underneath the skin. It does not require any finger pricks, but the sensor needs to be changed in 14 days and it leads to skin irritation from applying the sensor. This device primarily designed for clinical use, as it requires low installation costs for hospitals. This device is not used for personal use and has less accuracy in lower glucose levels.

Lubinski, Thorsten et al. [5] evaluated a shoebox-sized device used to measure glucose level non-invasively. The prototype holds 98.8% accuracy with data from study of 100 individuals. The prototype works on basis of photothermal

detection. As the prototype requires various sensors to capture the heat, the product's size is big and the product is not portable. The prototype works efficiently in terms of accuracy, but the device is still in development and the size of product is not portable.

A. Hina, H. Nadeem and W. Saadeh [6] presented a continuous glucose measurement system. The glucose in the blood is predicted through near infrared spectroscopy. The system works on a single wavelength of the infrared light. Based on the data from 200 patients the system is tested for its accuracy. The system has a mean absolute relative difference of 8.97% in comparison to regular invasive methods.

Didyuk, Olesya et al. [7] provided a overview on continuous glucose measurement. The paper analysed about Eversense, a subcutaneous implant device that involves a small sensor that needed to be implanted in contact with the skin, along with a transmitter you wear on top. This is usually applied to your upper arm. The product involves continuous glucose measurement for 180 days. The product must be set up only by medical professionals and is sensitive to sunlight. This product gives continuous measurement of glucose for six months but the main disadvantage is that the device requires incision during insertion and removal of sensor, thus it is not entirely non-invasive.

Valero, Maria et al. [8] proposed a prototype definition for non-invasive glucose measurement. The prototype involves Raspberry Pi with camera that captures images of light to calculate glucose level using artificial intelligence models. The absorption and scattering of light is used for calculating the glucose level. This prototype holds non-invasive measurement of glucose, but the results of the pilot study shows that the prototype has only 79% accuracy.

Pintavirooj, Chuchart et al. [9] developed a monitoring system for haemoglobin measurement. The prototype uses Max30100 pulse sensor for implementation. This prototype is embedded with measurement of haemoglobin based on Beer-Lambert law. This research provides a non-invasive haemoglobin measurement within a short time., But the prototype defined in the system does not have any other usage other than finding haemoglobin level. The system has an accuracy of 90% in the haemoglobin measurements.

III. Problem Statement

The Problem statement is identified and discussed below.

A. Problems with traditional method

The traditional method of measuring blood glucose level involves the invasive way of collecting blood samples through finger pricking. The main issue in finger pricking the patients is that, the patients who were already suffering from disease are now being suffered when measuring glucose level at each time. This process is painful to the patients as the diabetes patients are affected by the wounds and also studies made sure that there are more complications in the healing process of a diabetes patient[10]

The Problem is thus identified and that is the diabetes patients have discomfort with the invasive way to measure their blood glucose level, as the process inflicts pain during finger pricks.

IV. Proposed Solution

To overcome the difficulties and inconvenience in the traditional methods, the proposed solution after analysing the problem statement is that, the diabetic patients need a way to measure their blood glucose level non-invasively without any pain during the process.

The proposed solution for the problem statement is, A Non-invasive Glucometer. For the solution to be available to everyone, we need a way to produce it at low-costs and the glucometer should be capable of measuring haemoglobin level at their homes to aid patients to keep track of their health at their homes. So, We need "A Low-Cost Glucometer with Haemoglobin measurement". For the solution need to be using a non-invasive technology, This may be suitable with PhotoPlethysmoGraphy as it involves a much cost-efficient way of working mechanism.

V. Method and Materials

The prototype involves the measurement of blood glucose level using PhotoPlethysmoGraphy(PPG) achieved with the help of cost-efficient sensors.

A. PhotoPlethysmoGraphy

For implementation of the proposed solution, PhotoPlethysmoGraphy technique is used. Plethysmography is the methodology, that is used to identify the change in volume in parts of human body. This method has been found influence in the Pulmonologic medical fields by finding the capacity of lungs using compressed gas[11]. But in this prototype, To achieve non-invasiveness, PhotoPlethsmography is used[12]. In this prototype we use optical light to identify the variations in the volume of blood, Hence measuring the glucose level in the blood. This is made possible by the use of sensors. Sensors provide powerful, reliable, cost-efficient way to produce our prototype. The PhotoPlethysmoGraphy deals with the calculation of change in volume in the blood with the help of a Light Emitting Diode that illuminates the skin and the amount of light that is either transmitted or reflected is captured with a photodiode for measurement. Based on the amount of light reflected, the corresponding volume changes are calculated for the corresponding glucose level in mg/dl and the haemoglobin level in mg/ml.

B. Materials involved

The prototype is made cost-efficient with the help of sensors and using reliable microcontrollers. For the reliable measurement of glucose and haemoglobin levels in the blood, we make use of the Pulse sensor that emits the optical light for our plethysmographic process. To predict the fever, we need temperature sensor-LM35 to readout the patients body temperature accurately. for programming the prototype,

Device	Quantity
Arduino uno	1
Pulse Sensor	1
Temperature Sensor	1
Respiration Sensor	1
Wires	2 set of wires
LCD	1

Fig. 1. The various materials involved in the development of the glucometer prototype.

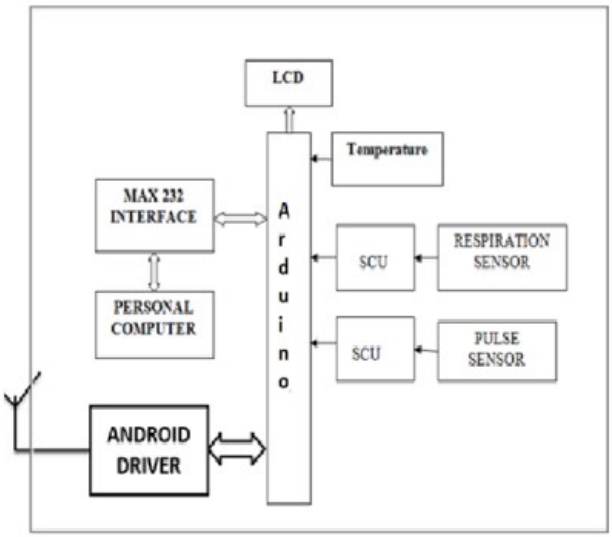

Fig. 2. The Cicuit level Modelling diagram that shows the arrangement of sensors interfaced with arduino, and max232 interface for programming and LCD screen for displaying blood glucose level.

AtMega328P microcontroller is used. This microcontroller is known for its reliability and low-costs and hence used for building various smart systems[13]. To display the result, we make use of 2*16 LCD screen. With the use of these low-cost reliable materials, The glucometer prototype can measure the blood glucose level non-invasively at low-costs. The arduino uno board holds the AtMega328p processor is used for implementing the prototype, as the processor is more affordable and easily reprogrammable. Also, the business logic for glucometer requies less computational power and minimal memory, thus we use arduino uno with AtMega328p processor for its affordability with simple computations. Also for collecting data about various parameters, we use MAX30100 Pulse Oximeter Heart Rate Sensor Module. This pulse sensor enacts photoplethysmography at its core level with low power consumption and robust performance. we use LM35 temperature sensor for its precision and unlike other temperature sensors, it does not need any other component for calibration. we use 16* 2 Lcd display for its low operating voltage with simple pin configuration.

VI. Design

A. Modelling the prototype

The materials for the prototype are modelled by a System on a Chip(SoC) with the arduino board acting as the platform. The sensors are arranged on the circuit diagram in a manner to act as a input interface for the patients. The arduino platform holds the AtMega328P microcontroller that acts as the main processor of the glucometer prototype. The microcontroller is interfaced with the input sensors with the help of SCUs - System Control Units. Then for programming the microcontroller, the Max-232 interface is used for writing the instructions to the arduino board. The LCD Screen is mounted to the arduino platform for displaying the output. The entire prototype is designed in a way that meets the circuit level model with the user level design.

VII. Implementation

The implementation process of the glucometer prototype starts with collecting the data from the patients through sensors. Then the data collected, is processed with the help of microcontroller chip. The microcontroller chip is first programmed with the instructions for converting the voltage level obtained from the sensors to blood glucose level in mg/dl and based on data about the amount of light absorbed from the pulse sensor, the corresponding haemoglobin level in mg/ml is calculated. Then the glucose level and haemoglobin levels are displayed on the LCD screen.

A. Collection of Patient data

The sensors holds responsible for collecting data about various parameters of the patient's that is used for measuring glucose level in the blood and for calculation of haemoglobin level in the blood. The pulse sensor emits optical light on patient's index finger. Since the index finger is of same cross-section, hence increases accuracy in the measurement process.This light is reflected back by the glucose in the blood and the reflected light is captured in a photo-diode part of the pulse sensor. Thus pulse sensor collects data in units of voltage. other sensors like temperature sensor, respiratory sensor aids the measurement process with additional parameters required for calculating the haemoglobin level in the blood.

B. Processing the data

1) Blood-Glucose level: After the data is collected through sensors, the microcontroller is programmed with the conversion of voltage level to the blood glucose level in mg/dl and

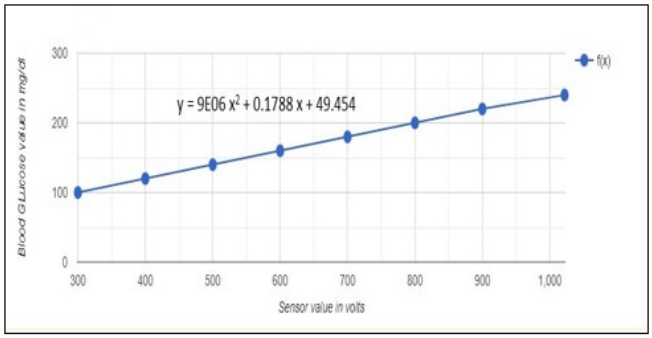

Fig. 3. The relationship between sensor voltage and invasive blood glucose level that produces the equation for calculating blood glucose level non-invasively with only sensor voltage as requirement.

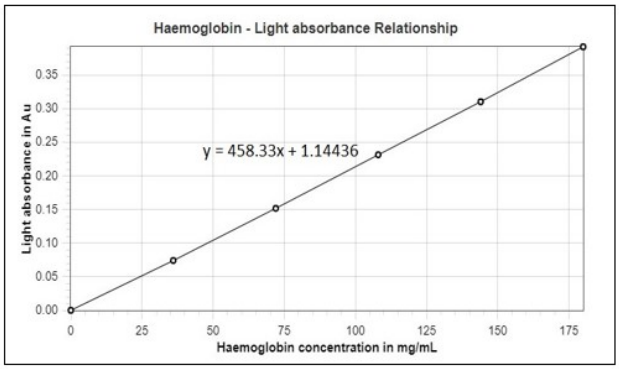

Fig. 4. The relationship between haemoglobin concentration and the light absorbance is plotted, which is used tp derive formula for calculating haemoglobin concentration non-invasively.

contains the formula for haemoglobin calculations . The programming instructions are embedded into the microcontroller chip with embedded-C. The conversion formula is derived based on plotting relationship between sensor voltage and Blood glucose value using prevailing invasive methods. The quadratic equation gives the formula for finding blood glucose level, non-invasively with deriving blood glucose value from sensor values alone. This formula is used for programming the conversion of voltage level to the blood glucose level. The below table shows the blood glucose values obtained from 8 volunteers invasively and their relative sensor voltage.

TABLE I
INVASIVE BLOOD GLUCOSE LEVEL AND SENSOR VOLTAGE

S.NO	Invasive Blood Glucose level	Pulse Sensor level in voltage
1	84	1.22
2	89	1.33
3	91	1.37
4	116	1.86
5	109	1.75
6	128	2.15
7	93	1.43
8	95	1.68

[a]The conversion values used to plot the graph.

The derivation formula used for coding the prototype is as below,

$$y = 9E06x^2 + 0.1788x + 49.454 \quad (1)$$

where, y is the Blood glucose level to be found and x is the pulse sensor in voltage The above formula is derived from the mapping of relationship between blood glucose level and sensor voltage, the graph plotting is displayed below.

2) Haemoglobin level: similar to the blood glucose non-invasive measurement, the haemoglobin concentration is calculated non-invasively by deriving a formula based on the relationship between haemoglobin and the light absorbed at the pulse sensor. The relationship between haemoglobin level calculated using invasive methods and light absorbance is mapped to derive the equation for calculating the haemoglobin concentration non-invasively. The haemoglobin level is calculated directly from the single parameter of light absorbed at the pulse sensor. The haemoglobin concentration is calculated using the formula below,

$$y = 458.33x + 1.14436 \quad (2)$$

where, y is the haemoglobin concentration and x is the amount of light absorbed at the pulse sensor's photo diode. Thus from the light absorbed at the pulse sensor, the haemoglobin concentration is calculated with the help of photodiode in the Max30100 pulse sensor.

TABLE II
HAEMOGLOBIN LEVEL AND SENSOR LIGHT ABSORBANCE

S.NO	Haemoglobin level	Pulse sensor light absorbance
1	0	0.7380
2	36	0.8243
3	72	0.8648
4	108	0.8898
5	144	0.9521
6	180	1.0642

[a]The conversion values used to plot the graph.

C. Displaying the data

After the conversion and prediction processes by the microcontroller, the final output - Blood-glucose level along with haemoglobin concentration in the blood is displayed using the 2*16 LCD screen.

VIII. PROCESS FLOW AND BUSINESS LOGIC

The process flow to calculate the glucose and haemoglobin levels using the prototype is displayed below,

First of all, the prototype is connected to the power supply for its operation. After connecting to power supply, the index finger is placed on the Max30100 sensor, where the red light is emitted through the fingers and the remaining amount of light absorbed is collected in the photodiode of the pulse sensor. After reading values from the sensors, the AtMega328p processor stores the various parameters of patient data collected

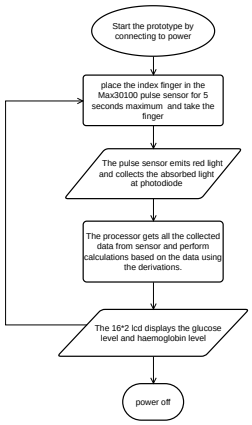

Fig. 5. The flow of processes in the prototype, starting from the power connection to computations in the processor with termination of the prototype.

from the sensors. The processor through max232 interface is capable of accessing data from sensors. Then the processor performs the business logic embedded into its memory. The processor performs the glucose and haemoglobin calculations from the data collected through sensors and the derivations. Then the processor displays the output in the 16*2 lcd display. The glucose and haemoglobin concentration in the blood is displayed.

The business logic of glucose and haemoglobin calculations are programmed into the processor using embedded-C. Based on the conversions derived from the relationship between invasive and non-invasive readings, the prototype is embedded based on the algorithm followed below,

1. Initialise the setup pin modes for sensors associated with the arduino uno board in the setup() function for digital I/O, analog I/0 and serial communication.

2. Initialise variables used for computation, like lightAbsorbance, sensorVoltage, oxygenLevel, temperature, heartRate etc.,

3. In the loop() function, using the analogRead() function from analog pins, read the input value for sensorVoltage variable

4. also using the analogRead() function, get input value for the lightAbsorbance, temperature and heartRate variables.

5. Calculate the blood glucose level using the formula derived form the relationship between sensorVoltage and blood glucose level. The formula is as follows,

$$glucoseLevel = (sensorVoltage) * (sensorVoltage) * (0.000009) + (0.1788) * (sensorVoltage) + 49.454$$

6. Calculate the haemoglobin level from the relationship between lightAbsorbance and haemoglobin level. The formula is as follows,

$$haemoglobinLevel = (458.33) * lightAbsorbance + 1.14436$$

```
void loop()
{
    sensorValue = analogRead(analogInPin);
    outputValue = map(sensorValue, 0, 1023, 0 ,1600);
    int glucose = (0.000009)*(sensorValue)*(sensorValue) + (0.1788)*(sensorValue) + 49.454;
    analogWrite(analogOutPin, outputValue);
    Serial.print("Blood Glucose Level = ");
    Serial.println(glucose);
    lcd.setCursor(0, 2);
    lcd.print("Blood Glucose Level =  ");
    lcd.print(glucose);
}
```

Fig. 6. The sample code for calculation of blood glucose level using analog input from sensors and displaying the output in the lcd screen.

7. Display the output results of glucoseLevel and haemoglobinLevel using the print() function of lcd pin mode.

IX. Pilot Study

A pilot study is made on 8 volunteered individuals, their sensor voltage values and corresponding blood glucose levels are displayed using the conversion as per the cardinal graph.

X. Result and Analysis

The results obtained non-invasively from pilot study are analysed with the regular invasive glucometer results. As seen from Table III, the blood glucose measurement from the prototype is compared with invasive regular method, which in turn is used to calculate the deviation in the measurement results from the prototype. From the Table III, it is evident that the maximum deviation in the blood glucose measurement is of 19.51% and the prototype achieved a minimum deviation of 2.89% in the blood glucose measurements.

TABLE III
Non-invasive Glucose value deviation

S.NO	Blood Glucose Level Non-Invasive Method	Blood Glucose Level Invasive Method	Difference in %
1	88	96	8.69
2	98	115	15.96
3	105	102	2.89
4	117	98	17.67
5	128	140	8.95
6	148	180	19.51
7	79	89	11.90
8	108	90	18.18

[a]The difference in measurement is used to calculate accuracy

TABLE IV
Non-invasive Haemoglobin value deviation

S.NO	Haemoglobin Level Non-Invasive Method	Haemoglobin Level Invasive Method	Difference in %
1	173.75	175.00	0.71
2	152.96	162.00	5.74
3	171.83	168.00	2.25
4	168.25	153.00	9.49
5	133.09	154.00	14.56
6	118.13	107.00	9.88
7	141.65	151.00	6.38
8	144.97	147.00	1.39

[a]The difference in measurement is used to calculate accuracy

Also in the measurement of haemoglobin concentration from Table IV, the haemoglobin measurement from the prototype is compared with that of regular invasive measurement. The maximum deviation is that of 14.56% from the invasive glucose level and the prototype has a minimum deviation of 0.71%.

The overall accuracy of blood glucose measurement is that the overall deviation within the acceptable range of 20% as per the clarke grid analysis of blood glucose measurement. Also in the measurement of haemoglobin concentration, the highest deviation is of 14.56% and the overall measurement of haemoglobin concentration lies within the 15% deviation which lies in acceptable deviation range.

XI. Conclusion

Thus the prototype holds 95% of calculated glucose measurement that leads to a overall 90% accuracy in measurement of blood glucose level and 90.9% accuracy in the measurement of haemoglobin levels in the blood at low costs in comparison with the invasive methods. As part of developing the prototype, the prototype is successful in measuring blood glucose level and haemoglobin concentration in the blood non-invasively. However, the low-cost sensor used for implementing the prototype has certain limitations based on temperature, light exposure and the skin thickness of patients. Thus there may be variations in the measurement in extreme climatic conditions. overall the prototype is suitable for tracking health at room temperature of 24°C. To improve performance of prototype in future works, may include incorporation of machine learning models for data with temperature deviations in measurement to increase reliability and to make the prototype as a portable device with the help of compact sensors for implementation.

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Design of COVID19 Detection for Risk Identification using Deep Learning Approach

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Abhay Chaturvedi ; Rohan J ; Murali Saktheeswaran ; Samson Isaac J ; Ambujam Kathan ; G.G. Raja Sekhar All Authors

Abstract

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Abhay Chaturvedi
Department of Electronics and Communication Engineering, GLA University, Mathura, India

Rohan J
Department of Chemical Engineering, KPR Institute of Engineering and Technology, Coimbatore, India

Murali Saktheeswaran
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Samson Isaac J
Department of Biomedical Engineering, Karunya Institute of Technology and Sciences, Coimbatore, India

Ambujam Kathan
Department of Electronics and Communication Engineering, AKT Memorial College of Engineering and Technology, Kallakurichi, India

G.G. Raja Sekhar
Department of Electrical and Electronics Engineering, Koneru Lakshmaiah Education Foundation, Guntur, India

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I. Introduction

Covid-19 is a deadly virus disease and has different types of symptoms interconnected pathways, none of which is solely fundamental or sufficient to cause a deadly virus. Indeed, even before COVID-19, precursor respiratory diseases were known to increase the risk of an ischemic stroke. According to preliminary reports from a specific country, neurologic side effects are observed in approximately 36% of COVID-19 hospital management. Patients whose imaging and clinical findings were consistent with severe ischemic infarction were matched against controls whose imaging and clinical findings were inconsistent with severe ischemic infarction based on age, gender, and the number of major vascular danger factors. In each case, there were two controls.

Authors

Abhay Chaturvedi
Department of Electronics and Communication Engineering, GLA University, Mathura, India

Rohan J
Department of Chemical Engineering, KPR Institute of Engineering and Technology, Coimbatore, India

Murali Saktheeswaran
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Samson Isaac J

Department of Biomedical Engineering, Karunya Institute of Technology and Sciences, Coimbatore, India

Ambujam Kathan
Department of Electronics and Communication Engineering, AKT Memorial College of Engineering and Technology, Kallakurichi, India

G.G. Raja Sekhar
Department of Electrical and Electronics Engineering, Koneru Lakshmaiah Education Foundation, Guntur, India

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Hybrid Deep Learning Model for Cyber-Attack Detection

Mr. M. Premkumar [1], Lakshmi R [2], P. Velrajkumar [3], S.Gayathri Priya [4],
Rama chaithanya Tanguturi [5], Murali S [6], Dr.M.Sivaramkrishnan [*7]
[1]Assistant Professor, Department of Information Technology, Mahendra Institute of Technology (Autonomous), Mallasamudharam, Namakkal, India.
mpremkumarit@gmail.com
[2] Assistant Professor, Department of Computer Science and Engineering, RNS Institute of Technology, Bengaluru affiliated to VTU Belgaum, India.
lakshmi505@gmail.com
[3]Associate Professor ,CMR Institute of Technology ,Bengaluru, India.
velrajkumar.p@cmrit.ac.in
[4] Assistant Professor, Department of Electronics and Communication Engineering ,R. M. D. Engineering College, Kavaraipettai, Chennai, India.
sgp.ece@rmd.ac.in
[5] Professor, Department of Computer Science and Engineering, PACE Institute of Technology and Sciences, Ongole ,Andhra Pradesh, India.
trchaitanya@gmail.com
[6] Assistant Professor ,Department of Computer Science and Engineering ,Velammal College of Engineering and Technology, Madurai, India.
smu@vcet.ac.in
[7] Asst Professor, Department of EEE,Karpagam College of Engineering, Coimbatore, India.
krishbe95@gmail.com

Abstract— **Better detection and avoidance of intrusions solutions are in high demand because of the worldwide upsurge in hacking on computer networks. New technologies like fog computing, cloud computing, and the Internet of Things have dramatically increased the potential for cyberattacks and other forms of cyber risk. These attacks can compromise computer network infrastructures, web services, and social media platforms, resulting in economic and reputation loss. Because of its usefulness in detecting and halting malicious actions, intrusion detection systems (IDS) play a crucial part in network defence mechanisms. In this study, a hybrid Deep Learning (DL) network was used to identify the cyberattack. This effort began with the collection and processing of cyber-attack data from the NSL-KDD. Convolutional Neural Networks (CNNs), Bidirectional Long Short-Term Memory (Bi-LSTMs), and hybrid CNN + Bi-LSTMs are the DL models trained with 80% of processed data. The remaining 20% of the data is used for testing the models after they have been trained. Both positive and negative metrics are used to assess the results of the testing phase. When compared to other networks, the recommended CNN + Bi-LSTM model achieves the highest score for positive metrics and the lowest score for negative metrics.**

Keywords— Cyber-Attack, Deep Learning, Encoding, Feature Extraction, Pre-processing, Accuracy.

I. INTRODUCTION

Both political and commercial players have increased their use of advanced cyber-attack to destroy, interrupt, or suppress information content. When developing network protocols, it is critical to ensure that they will withstand attacks from even highly sophisticated adversaries capable of taking over a small fraction of nodes. The controlled party can launch both passive and offensive attacks. Identifying intrusions into a computer system or network entails constantly monitoring what is going on behind the scenes, analysing data for signs of an assault, and preventing it if required. Automated data gathering from several system and network sources, followed by security defect analysis, is a frequent way for accomplishing this goal.

Conventional intrusion detection and avoidance technologies, such as firewalls, encryption, and access control have limitations when it comes to defending networks from potential attacks. Unfortunately, most systems built on such approaches have problems with false positives and negatives and are not flexible enough to accommodate advanced threats. Yet, in the last decade, many Machine Learning (ML) approaches have been put to the challenges of intrusion detection to increase detection rates

and adaptability. These methods are often employed to ensure that the attack data sources are current and exhaustive. In recent years, protecting data and systems from thieves has become a top priority. The fundamental driver of this phenomenon is the broad use of the Internet of Things, together with the exponential expansion of computer networks and the emergence of relevant applications used by individuals and organizations (IoT). Cyberattacks on large-scale networks can cause catastrophic harm and financial losses. Regrettably, existing solutions such as hardware and software firewalls, user authentication, and data encryption methods are insufficient to protect the computer network from the many cyber threats that exist. Traditional security architectures are no longer an adequate precaution due to the faster, more stringent emergence of intrusion systems. In other words, the main purpose of a firewall is to prevent network connection. Nevertheless, no warning of an inside attack is provided. As a result, the system's security demands the creation of precise defensive mechanisms, such as a DL-based IDS. An IDS can detect network security threats and attacks by detecting abnormalities and unusual activities in a network during normal operation. The research tries to identify cyber-attack using the hybrid DL method with great accuracy level. To done this task, some research works are studied and taken for reference, those works are discussed in section II.

II. LITERATURE SURVEY

New techniques for identifying and preventing cyberattacks on electric grid load forecast data are presented in this study [1]. There are two stages to the process. In the first step, a benchmark is established by utilizing an unsupervised ML model to examine historical real-load data. In the second phase, cyber risk classification is performed using supervised ML models. At long last, a novel hybrid model is developed using ensemble methods. Using a dataset that was made available to the public, the unique technique achieved an impressive 97.25 percent accuracy. The research [2] aims to apply an ML technique to the difficult problem of safeguarding autonomous vehicles against cyberattacks. The primary focus is developing methods to identify when harmful data has been injected into a vehicle's data bus. To separate this kind of deceptive information, they use extreme gradient boosting, a promising ML technique. They discuss the study technique in great depth, including data collection, pre-processing, artificially adding fake information, and data classification. The analysis shows that the proposed approach has a detection rate of 92% for suspicious behaviour on the vehicle's data bus. To fix the problem of cyber-attack detection, the authors of article [3] present a DL-based strategy for energy systems that can be trained with data and records from phasor measuring devices. Features generated during the production of a property or specification are used to construct AdaBoost's core classifier, a random forest, which is subsequently fed to further ML techniques. An open-source energy system simulation is used to verify the model. Ultimately, numerous designs were compared to the proposed model using a variety of criteria for success. The outcomes of simulations show that both the detection rate and accuracy rate of their model is superior to those of the state-of-the-art approaches. The usage of Generative adversarial networks (GAN) to the problem of network security is the subject of the paper [4]. In the past few years, GAN is the most influential DL model. There are two separate, but complementary models included that can be utilized to create a dynamic and engaging gaming world. Image production, speech processing, data improvement, and the detection of cyberattacks are just some of the many uses that have been found with GAN. In this paper, provide an overview of GAN and the architecture that supports it, with special attention paid to how the GAN model might be used to aid in the detection of cyber intrusions.

The Cyber-Physical System (CPS) might be severely compromised by a large-scale hack. A solution to this problem requires cutting-edge DL systems that can analyse, identify, and react to the changes in the threats. To help identify cyber security threats in the CPS, they presented a long-short memory DL model [5]. The gas pipeline ICS datasets were also used to test the model; these databases record details of seven types of attacks and 19 features. Experiment results confirmed the proposed model's correctness at 98.22%. In addition, the study suggests a future research direction. While IDS has made great strides forward because of the incorporation of ML and DL, two fundamental challenges persist. For one, criminal behaviour is always changing. Nevertheless, ML and DL algorithms could only perform one task at a time, and there may be numerous sorts of threats present in data flows and packets sequentially. Second, each publicly available dataset is tailored toward evaluating a certain form of attack. To resolve these problems, the research [6] suggests a Multi-Task Learning model for a DNN-based IDS that can detect many attack types simultaneously. To do this, they created a single feature vector from all the matching samples in the UNSW-NB15 and CICIDS2017 datasets. This guarantees that both the training and test sets contain data flows including a variety of hazards. The experimental evidence indicates that the suggested system performs at its theoretical peak efficiency. The researchers in this work [7] create an intelligent outlier detection (IOD) technique using an optimal deep reinforcement learning (ODRL) approach to improve the efficiency with which incursions are identified. All test data outliers are removed with the use of an Isolation Forest based outlier identification algorithm in the proposed IOD-ODRL approach. To identify and classify intrusions, they use a DRL method informed by optimal Q-learning. While employing a DRL strategy, the sandpiper optimization (SPO) algorithm is also employed to determine the optimal learning rate. Furthermore, the detection performance is enhanced by the SPO-based learning rate selection and the outlier identification design. Extensive simulations are run on benchmark datasets to evaluate the enhanced performance of the IOD-ODRL technique. Empirical evidence showed that the IOD-ODRL model performed better than its predecessors on a wide range of metrics.

The objective of this study [8] is to find ways to improve the accuracy of standard detection systems without the requirement for a network engineer. The NSLKDD dataset, which includes several unique attributes for various cyber-attacks, was used for the proposed research. A data pre-processing step is performed before the algorithm is used. Feature selection refers to the procedure of deciding which features are most important. Many ML algorithms are used during training. Validation metrics for the models are

calculated, and the performance of the algorithms is assessed. A Docker container stored in Docker's central repository and executed in the cloud constitutes this detection mechanism. Once the launch is complete, the consumer is provided access to an application programming interface (API). Accessible via API, a network IDS helps users keep an eye out for malicious activity while also protecting their data and applications. To increase accuracy and decrease false positives in network IDS, the project's [9] goal is to create an IDS that makes advantage of Automatic ML. The suggested model is constructed utilizing two distinct ML packages (Weka and RapidMiner). As a means of comparing different ML techniques, they put the intrusion detection dataset through four different classifiers. Using the use of Auto-WEKA, they can automatically and efficiently pick a good classifier and hyperparameter settings. Auto-model employs the best classifier gleaned from Auto-Weka and RapidMiner when asked which tool provides the highest level of accuracy with the least amount of work. Classifier effectiveness is then assessed using the NLS-KDD dataset. When compared to other classifiers in the studies, Random Forest achieves good results in both accuracy and speed. Favoured over manual classifier selection and hyperparameter optimization, Auto-WEKA requires minimal user input to produce optimal results.

III. METHODOLOGY

The steps involved in the detection of cyber-attack are discussed in this section. The methodology is composed of four steps:

- Step 1: Data acquisition for cyber-attack detection from the NSL-KDD dataset
- Step 2: Data pre-processing to make the data into a usable form.
- Step 3: DL model construction for training and testing the data to identify the cyber-attack.
- Step 4: Identify the best DL model for cyber-attack detection using the evaluation metrics.

A. Data

Previously, researchers used the DARPA dataset to investigate several intrusion detection technologies. The most serious disadvantage is a high rate of packet loss. The KDD data sample is an enhanced version of the DARPA. Researchers only analysed 10% of the information, which has a severe influence on system performance and provides an exceedingly imprecise estimation of anomaly detection approaches. To address these difficulties, our study employs a novel data collection called NSL-KDD [10], which is made up of subsets of the entire KDD dataset. The whole list of 41 traits is provided below. The NSL-KDD stores data from both attacks and routine operations. You can profit from the NSL KDD dataset.

- The training set contains no duplicates, ensuring a neutral classification.
- There are no duplicates in the data set, therefore pruning is more efficient.
- The number of records in the basic KDD data sample is inversely correlated with the number of records selected from each challenge level category.

Figure 1 shows the sample of the NSL-KDD dataset. The collected data contains 125972 total samples, from this 100777 samples were used for training and remaining employed for testing. Table 1 and figure 2 show the detailed distribution of data.

	duration	protocol_type	service	flag	src_bytes	dst_bytes	land	wrong_fragment	urgent	hot	num_failed_logins	logged_in	num_com
0	0	udp	other	SF	146	0	0	0	0	0	0	0	0
1	0	tcp	private	S0	0	0	0	0	0	0	0	0	0
2	0	tcp	http	SF	232	8153	0	0	0	0	0	1	0
3	0	tcp	http	SF	199	420	0	0	0	0	0	1	0
4	0	tcp	private	REJ	0	0	0	0	0	0	0	0	0

Fig 1. Sample of NSL-KDD dataset

Table 1. Data Distribution

Train	Test	Total
100777	25195	125972

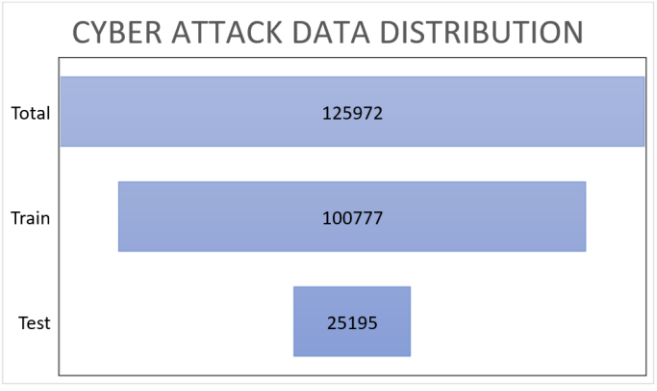

Fig 2. NSL-KDD data distribution

The NSL-KDD dataset contains 41 features and 1 target variable which is illustrated in figure 3.

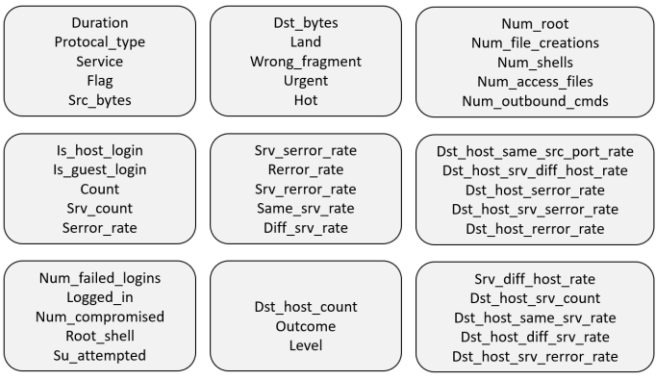

Fig 3. Features and target variable of NSL-KDD dataset.

B. Data Pre-processing

The pre-processing involved on NSL-KDD data are listed below.

- Numeration: The service, protocol kind, and flag categorization aspects were all quantified. For service categories, seventy symbolic values correspond to the numbers 0 through 69. The protocol type contains three symbolic values, which have been interpreted as 0 for ICMP, 1 for TCP, and 2 for UDP. Flag's eleven symbolic values are also simplified to the numerals 0 through 10.
- Encoding: The integer service, protocol, and flag feature values were converted into binary representations using one-hot encoding [11]. As a result, we increased from 41 to 122 features.
- Normalization: In ML applications, scaling input values to a more manageable range is common practice [12]. Because of the wide discrepancies in the ranges of the NSL-KDD dataset, logarithmic normalisation was used to make the data more similar.
- Reshaping: To make our deep transfer learning model function, we flattened network traffic into two-dimensional data, like images. The CNN-based model reduces the dimensionality of the input data by using pooling processes or a higher stride size in the convolution. As a result, they are usually trained for a set of specified parameters. The feature matrices are created by filling in values to meet the input dimensions repeatedly.

C. DL Model

• CNN, like artificial Neural Networks, is made up of a huge number of interconnected processing elements (neurons) that collaborate to solve problems [13]. The neurons have numerous convolution layers and a nonlinear activation function with learnable weights and biases [14]. CNNs use pooling layers to learn from and integrate their results, and the output is subsequently pooled or partitioned to acquire smaller pieces. A basic CNN takes data in various dimensions and processes it using a Convolutional layer made up of numerous filters. At beginning, layer pooling provides the necessary output of constant size matrices for classification, accommodating filters of varying sizes while always delivering a fixed-dimensional outcome that feeds into the following layer. As a bonus, the max operation keeps the smallest defined output dimension as well as all the original data. Finally, the output layer tells whether the given data contain an attack or not.

• An RNN is preferred to a CNN when dealing with temporal information, often known as sequential data. However, because of difficulties with time delay and fading gradients, training RNNs to understand long-term temporal relationships is difficult. When using a bidirectional system, the inputs flow in both directions, from the future to the past and from the past to the future; this is preferable to using Bi-LSTM because it keeps future information in memory and uses the two hidden states concurrently to keep track of both the past and the future. As a result, it has been demonstrated to be effective in data classification [15].

• Each component of the CNN + Bi-LSTM model has its own design and advantages, and the two working together only enhances both. The max pooling layer in a CNN is intended to extract as many meaningful characteristics from the input data as possible. The forget gate enables Bi-LSTM to delete irrelevant information while saving both future and past information. The purpose of integrating both is to develop a hybrid model that makes use of both CNN and Bi-LSTM, utilizing the former to extract as many valuable properties for the latter as possible. The NSL-KDD dataset is used as input features for the CNN input layer in this scenario. Following each filter, the data is further compressed and refreshed using a maximum pooling layer. Following that, the outputs of each max pooling layer are aggregated and fed into a Bi-LSTM, which employs a filtering layer via three gates. Here, we feed information into the Bi-LSTM layer, which acts as a bridge between the input and output stages. To generate the necessary output and sort the attack and normal data, we employed sigmoid as an activation function. The architecture of the suggested hybrid CNN + Bi-LSTM is given in figure 4. As a result, we propose a model with three components, which are as follows:

1. Pre-processing: This is where preliminary processing and data cleaning takes place. The output vector is then passed on to the subsequent process.
2. CNN: To maximum feature extraction, convolution, and max pooling layers are used here. The result from this step is fed into the subsequent one.
3. Bi-LSTM: In this instance, Bi-LSTM layers are used to categorize responses based on their input data. The classification of whether the data is an attack or normal is the outcome of this stage.

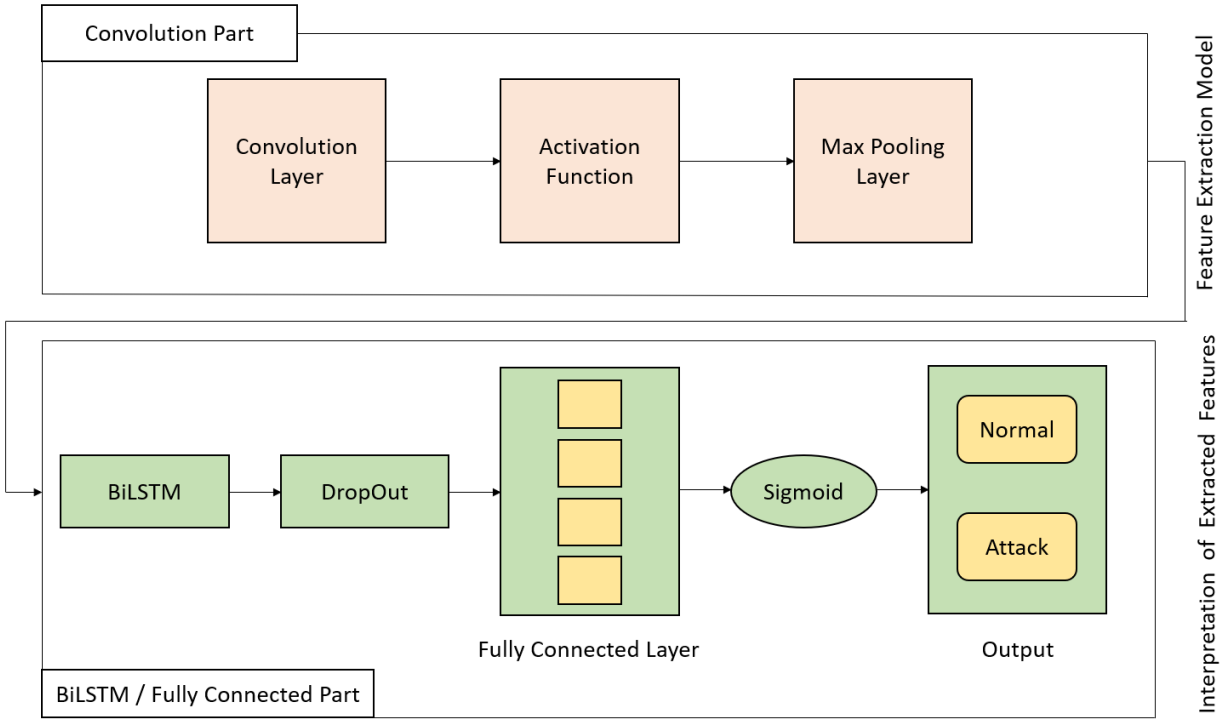

Fig 4. The architecture of CNN + Bi-LSTM

IV. Result and Discussion

The NSL-KDD data is taken for the research of cyber attack detection. The data passes through the processing techniques of numeration, encoding, normalization, and reshaping. Next to processing, the data is given to the DL classification model. The CNN, Bi-LSTM, and hybrid CNN + Bi-LSTM are employed as a DL model. The outcome of the DL model in the training and testing phase is discussed in this section.

A. The outcome of the Training Phase

For all three DL models, the epoch is set to be 100. In the training phase, the accuracy and loss metrics are utilized to evaluate the model. The final value of accuracy and loss at the 100th epoch of each DL model is given in figure 5. The accuracy score of CNN, Bi-LSTM, and CNN + Bi-LSTM model is 0.904, 0.967, and 0.997. Next, the loss value of CNN is 0.24, Bi-LSTM is 0.198 and CNN + Bi-LSTM is 0.034. From the figure, it is identified as CNN + Bi-LSTM gives better results in the training phase.

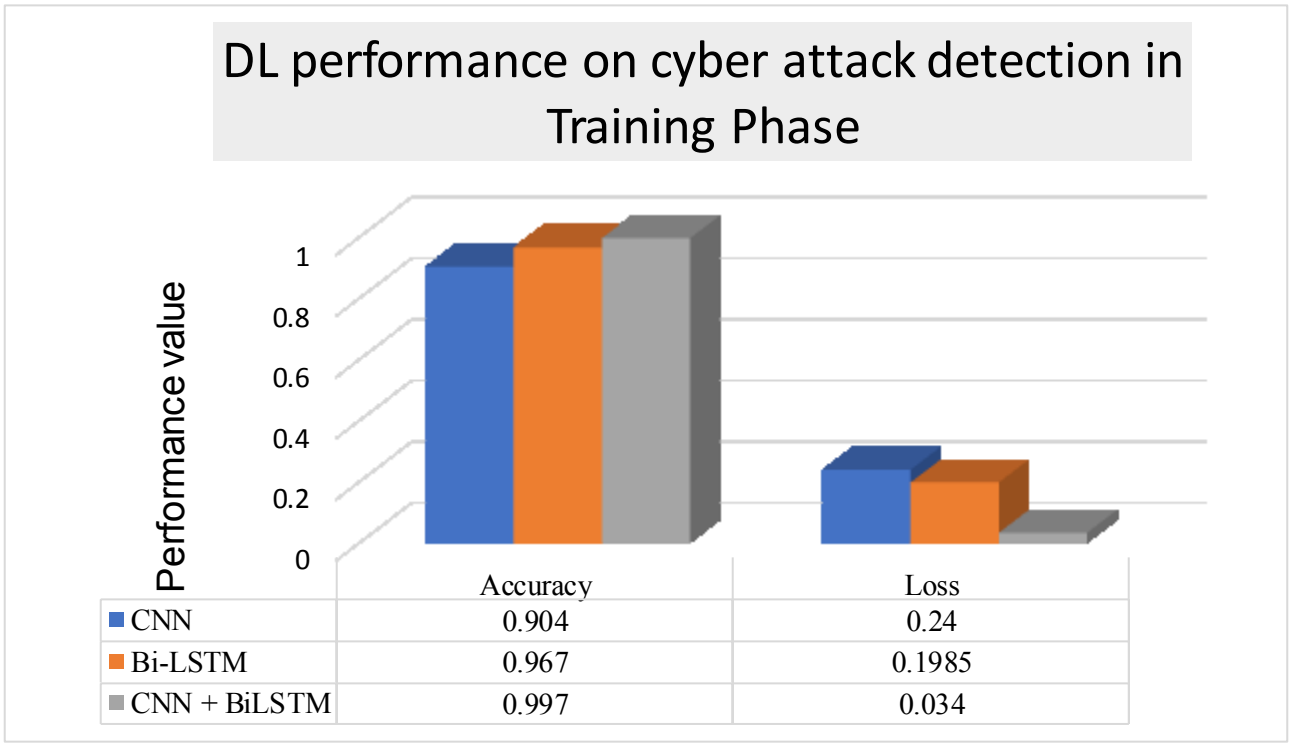

Fig 5.DL model comparison on cyber-attack detection in the training stage

B. *The outcome of the Testing Phase*

The outcome of the DL model in the testing stage is detailed below. For testing, we are taken 25195 data, and those data are given to the DL model to identify whether the attack is present or not. The confusion matrix of the CNN model on test data is given in figure 6. The CNN model correctly identified attack data as 10545, and normal data as 12535. Then, 851 data are wrongly identified as attacks and 1264 are wrongly predicted as normal by the CNN model.

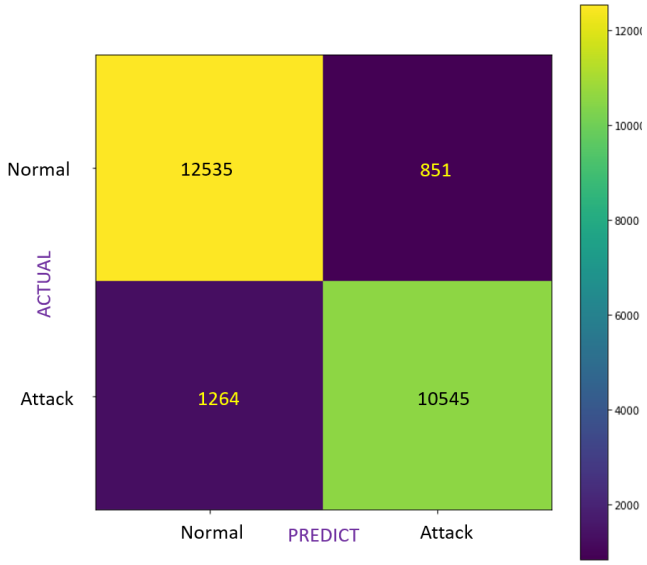

Fig 6. Confusion Matrix of CNN on test data

Figure 7 displays the confusion matrix for the Bi-LSTM model on the test data. A total of 11413 attacks were successfully recognized by the Bi-LSTM model, while 13099 normal data were found. The Bi-LSTM model then incorrectly classifies 287 data as an attack and 396 data as normal.

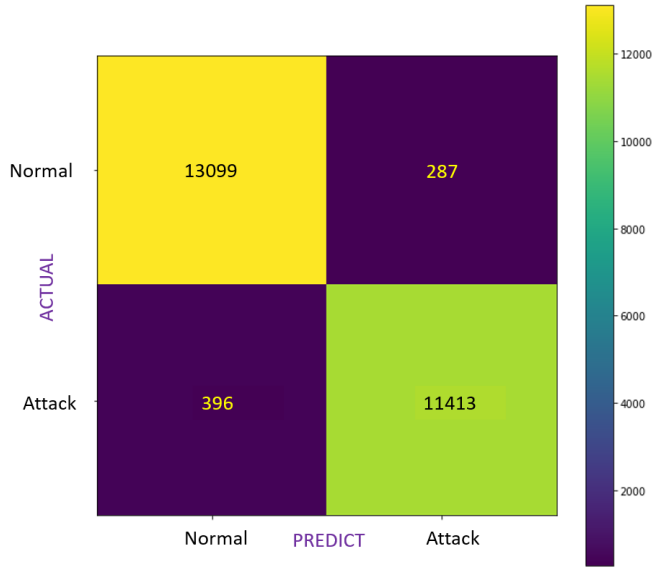

Fig 7. Confusion Matrix of Bi-LSTM on test data

The confusion matrix of CNN + Bi-LSTM network on testing data is shown in Figure 8. A total of 11776 attacks are accurately identified by CNN + Bi-LSTM model and the count of correctly recognized normal data is 13374. Then, 12 data are wrongly labelled as an attack and 33 data are labelled as normal by the CNN + Bi-LSTM model.

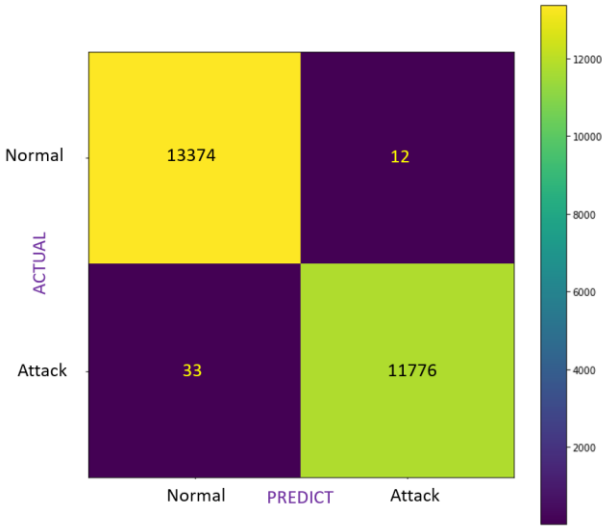

Fig 8. Confusion Matrix of CNN + Bi-LSTM on test data

Table 2 gives the model comparison based on the value of the metrics. The values in table 2 are calculated based on the confusion matrix elements. The positive metrics value of accuracy, True Negative Rate (TNR), True Positive Rate (TPR), precision, and F1-score are higher for CNN + Bi-LSTM and the values attained are 99.82%, 99.91%, 99.72%, 99.90%, and 99.81%. And all positive metrics score is minimum for the CNN model. Next, the negative metrics are evaluated. The False Negative Rate (FNR) and False Positive Rate (FPR) of CNN + Bi-LSTM are 0.28% and 0.09% which is very less when compared to the other two models such as CNN, and Bi-LSTM.

Table 2. Model comparison

Model	CNN	Bi-LSTM	CNN + Bi-LSTM
ACCURACY	91.61	97.29	99.82
TNR	93.64	97.86	99.91
TPR	89.3	96.65	99.72
FNR	10.7	3.35	0.28
FPR	6.36	2.14	0.09
PRECISION	92.53	97.55	99.9
F1-SCORE	90.89	97.09	99.81

V. CONCLUSION

Recently, cyber-attack detection and management system frameworks have emerged as important subfields of CPS due to the increasing sophistication of cyber-security threats. Depending on the type of cyber-attack, the result could be a system crash, failure, malfunction, etc. Hence, a high-detection-rate cyber defence system could be necessary for an enhanced security mechanism. In this research, we provide a variety of DL-based cyber-attack detection networks. The experimental findings indicate that the suggested hybrid CNN + Bi-LSTM model provides the best accuracy in predicting cyberattacks with the fewest false detection rate. With a total of 25195 samples, the suggested framework correctly classified 25,150 as cyber-attack and normal. In the future, we hope to incorporate the suggested DL model to identify a cyberattack into the website's

architecture. Users only need to copy and paste the link into the website to find out whether it is safe or not.

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Alzheimer's Disease Prediction Using Deep Learning Techniques

Publisher: IEEE

V. Lavanya ; R. Deepalakshmi ; Aartheeswari K. S ; Nithika Sri M **All Authors**

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The brain anatomy is studied by Magnetic resonance imaging (MRI). In order to take preventive measures that are necessary, early diagnosis of patients affected by Alzheimer's disease(AD) is more essential. The most prevalent illness affecting the old people is AD. For the diagnosis of AD, numerous, intricate segmentation methods have been presented. Deep Learning (DL) techniques have attracted interest for the technique of segmenting the anatomy of the brain and categorizing AD because they can produce efficient results over a vast data collection. How the knowledge of brain anatomy can be used to identify AD using concepts from convolutional neural networks are explained. New methods, their outcomes on public datasets, and the advantages of MRI segmentation of brain for classification of AD is described. This work investigates the potential use of DL techniques to enhance and strengthen early diagnosis, predict AD phases as mild, moderate, low, or medium, and investigate strategies for strengthening overall performance analysis.

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V. Lavanya
Department of Computer Science and Engineering, Velammal College of Enginnering and Technology, Madurai, India

R. Deepalakshmi
Department of Computer Science and Engineering, Velammal College of Enginnering and Technology, Madurai, India

Aartheeswari K. S
Department of Computer Science and Engineering, Velammal College of Enginnering and Technology, Madurai, India

Nithika Sri M
Department of Computer Science and Engineering, Velammal College of Enginnering and Technology, Madurai, India

Contents

Authors

V. Lavanya
Department of Computer Science and Engineering, Velammal College of Enginnering and Technology, Madurai, India

R. Deepalakshmi
Department of Computer Science and Engineering, Velammal College of Enginnering and Technology, Madurai, India

Aartheeswari K. S
Department of Computer Science and Engineering, Velammal College of Enginnering and Technology, Madurai, India

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Department of Computer Science and Engineering, Velammal College of Enginnering and Technology, Madurai, India

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CNN Based Smart Waste Segregation and Collection System

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Waste management is an increasing concern in urban areas worldwide, because of population growth and environmental sustainability goals. To address this challenge, this paper presents a Convolutional Neural Network (CNN)-based waste segregation and collection system that uses the power of computer vision and machine learning. The proposed system is used to automate the process of waste segregation, optimizing the sorting of waste into bio-degradable, reusable, recyclable waste and trash in real time. Utilizing a camera for capturing the images of incoming waste materials and moving the waste at their respective collection points. The images are processed using a deep learning YOLOv8 model, which identifies and classifies the waste items into bio-degradable, recyclable and non-recyclable categories with high accuracy. This innovative waste management solution holds the potential to change the waste collection and recycling processes, making them more cost-effective, environmentally friendly, and aligned with the ability for sustainable waste management practices.

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In the present increasingly urbanized world, the management of waste has become a important concern. The fast growth of populations has led to an increase in waste generation, so there is a need for more efficient and sustainable waste management practices. As the core of this challenge lies in the need for effective waste segregation, a process traditionally dependent on manual labor and may lead to inaccuracies. In response to this challenge, emerging technologies, particularly Convolutional Neural Networks (CNNs), are transforming waste management by automating the waste segregation and collection process. This paper introduces a ground breaking CNN-based YOLOv8 model for waste segregation and collection system, an important innovation aimed at revolutionizing the way we manage and process waste in urban environments. This system automates waste product recognition and sorting, increasing the efficacy and sustainability of waste management practices. It does this through the use of artificial intelligence and computer vision. The rapid increase in urbanization and increasing concerns about environmental sustainability have created a need for more efficient waste segregation and collection techniques. Traditional methods, reliant on human labor, are not only labor intensive but also prone to errors and inconsistencies.

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I. Introduction

Yoga, an ancient practice that harmonizes the mind, body, and soul, has transcended cultural boundaries and become a global phenomenon renowned for its myriad health benefits. However, the effectiveness of yoga is intrinsically linked to the precision with which its poses, or asanas, are executed. Incorrect alignment during yoga poses not only diminishes the therapeutic benefits but can also lead to discomfort or injury. As yoga gains popularity across diverse populations, ensuring that practitioners perform poses accurately becomes increasingly vital. This paper introduces an innovative solution to this challenge – an AI-enhanced system for yoga pose detection and alignment using deep learning techniques. The project leverages the power of Convolutional Neural Networks (CNNs) and the Tensorflow Movenet framework to deliver real-time, precise pose recognition and alignment guidance. Yoga practice requires understanding body alignment, balance, and proper form. Traditional guidance from experienced instructors is essential for achieving correct alignment, but limited access to such instructors makes self-guided practice common. This increases the risk of improper posture and alignment, potentially leading to injuries or suboptimal experiences. This project addresses the critical need for accessible, accurate, and real-time guidance during yoga practice. By harnessing the capabilities of deep learning and computer vision, it brings yoga into the digital age. The implementation of Convolutional Neural Networks allows for the precise identification of key body points, ensuring that practitioners achieve correct alignment.

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Livestock is one of the critical socioeconomic assets in developing countries like India. However, the lack of a reliable and timely diagnosis system for identifying livestock diseases has led to significant losses in the livestock population, hindering efforts to achieve food security and reduce poverty in the country. To address this issue, a study proposed the integration of an expert system with machine learning and image processing. According to the 2019 Livestock Census, India has a total livestock population of around 535 million, which includes cattle, buffalo, sheep, goats, and pigs. The livestock sector is an important source of income for millions of households in India. As per the 2019 Livestock Census, there are around 145 million households involved in livestock farming and related activities in the country. The livestock sector contributes significantly to the Indian economy. In 2020, the total value of livestock output in India, excluding the value of horses, ponies, mules, donkeys, camels, and yak, was estimated to be around 9.37 trillion Indian rupees (around 125 billion US dollars), which accounts for around 4.2% of country's GDP. The dairy sector is a major contributor to the livestock economy in India. It accounts for around 70% of the total value of livestock output in the country. In addition to dairy, the livestock sector also provides meat, wool, leather, and other products. According to the latest available data from the Ministry of Statistics and Program Implementation, the contribution of the livestock sector to India's Gross Value Added (GVA) in 2020–21 was 5.04%. Since GVA is more accurate measure of the sector's contribution to the economy than GDP, it is concluded that livestock sector contributed around 5% to India's economy in 2020–21. According to a study by the National Dairy Development Board (NDDB) of India, there is an average of one veterinarian for every 5,000 cattle in India. This study improves the accuracy of livestock dis...

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1. Introduction

India is home to a vast and diverse livestock population, with a rank of first in cattle population and fifth in the world for total livestock population. However, the livestock population in India is plagued by various skin diseases that significantly impact the industry's productivity and profitability. These diseases result in a high death rate among livestock animals, which leads to significant losses for farmers and reduce the production of dairy products. One of the primary challenges in addressing this issue is the lack of sufficient medical infrastructure in rural areas where most livestock farmers reside. As a result, many farmers struggle to diagnose and treat their livestock effectively. However, livestock farming in India is facing several challenges, including the high death rate of livestock due to skin diseases. These diseases not only cause significant losses to farmers but also pose a threat to public health. Despite the crucial role played by livestock farming in India, there is a lack of sufficient medical infrastructure and expertise to tackle these issues effectively. Various skin diseases affect livestock animals in India, including cattle, chickens, buffalo, pigs, sheep, and goats. In chickens, infectious bursal disease (IBD) can cause up to a 60% mortality rate, while in buffaloes, foot-and-mouth disease (FMD) can cause up to a 50% mortality rate. In pigs, swine erysipelas and PRRS can cause up to a 20% and 30% mortality rate, respectively. The mortality rates in cattle can also be significant, with diseases such as black quarter causing up to a 20% mortality rate. It is essential to diagnose these diseases accurately and promptly to reduce mortality rates and improve the overall health and well-being of livestock animals in India. These diseases can lead to severe economic losses, with some causing up to a 50% mortality rate in livestock populations. The proposed work aims to improve the accuracy of livestock disease diagnosis and minimize losses by utilizing Convolutional Neural Networks (CNN), A model that utilizes LSTM and ResNet50 algorithms to accurately diagnose livestock diseases from uploaded images with a 97% accuracy rate. Once an image is uploaded, our model quickly analyzes the image and identifies the specific disease, providing the name of the disease, recommended medicine, and food recommendations. To ensure compatibility with the chosen CNN models (LSTM and ResNet50), it is necessary to resize the input images to a

specific dimension. This can be accomplished using image processing libraries or frameworks like OpenCV. By resizing the images to a consistent dimension, the input data is uniform across all training and testing samples, enabling effective model training and inference. Pre-processing the data is crucial to ensure optimal model performance. Several pre-processing steps can be applied, such as normalizing pixel values to a specific range (e.g., [0, 1]), applying data augmentation techniques to increase dataset diversity, and removing any noise or artifacts from the images. Common transformations include rotation, scaling, cropping, and flipping. Additionally, techniques like histogram equalization or contrast enhancement to enhance image quality are applied to improve the model's ability to detect patterns and features.

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Electric current plays a vital role in human existence as it underpins numerous aspects of our daily lives. Without current, life as we know it would cease to exist. To meet the ever-growing demand for electricity, various types of power stations have been developed. Among these, thermal power stations stand out as a major contributor, accounting for approximately 70% of current production. However, ensuring the smooth functioning of different sections within a thermal power station goes beyond simply calculating current production. Continuous monitoring of these sections is imperative to guarantee their optimal performance. To address this need, we propose the implementation of an expert system that can monitor the various sections of the power station seamlessly, eliminating the need for manual intervention. Additionally, this system would transmit data wirelessly, enhancing convenience and efficiency. In a thermal power plant, coal combustion in the boiler serves to convert water into steam within the boiler tubes. This steam, characterized by high pressure and temperature, flows into the turbine, causing it to rotate. The turbine shaft is connected to the generator shaft, which also rotates as a result. This rotational motion generates power. Safeguarding the operational parameters of the power system is crucial for maintaining the health of power-generating equipment and ensuring the efficient utilization of electricity by customers. Therefore, continuous monitoring and frequent inspections of both the customer's equipment and the power plant itself are essential. By implementing an expert system for continuous monitoring, the thermal power plant can achieve enhanced operational efficiency, improved

equipment reliability, and effective utilization of resources. This proactive approach helps identify potential issues promptly, reducing the risk of equipment failures and optimizing power generation processes.

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Gnanasekaran T
Department of Electronics and Instrumentation Engineering, R.M.K. Engineering College, Thiruvallur, India

Vivekrabinson K
Department of Computer Science and Engineering, Kalasalingam Academy of Research and Education, Tamil Nadu, India

Bharath Singh Jebaraj
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Lavanya V
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Shanmuga Raja B
Department of Computer Science and Engineering, Kalasalingam Academy of Research and Education, Tamil Nadu, India

Femiva V
Department of Electronics and Commuication Engineering, PSNA College of Engineering and Technology, Tamil Nadu, India

Contents

I. Introduction

The conversion of thermal energy in to electrical energy can be achieved by the Thermal power plant. Internally it has two indirect process like heat energy to mechanical energy and mechanical energy to electrical energy. This conversion is achieved by burning any fossil fuels and producing the steam. The steam is used to run the turbine which in turn runs the generator. The cooling systems are provided to minimize the excessive heat. This thermal power plant provides a heavy impact to the environment in terms of air pollution. The components of the thermal power plant are very complicated and heavy machineries [1]. In Tamil Nadu, Ranging four major thermal power plants. In these, the very efficient and most awarded is the Ennore Thermal power plant. It was started in 1970. Initially, it has an installed capacity of 60MW and it moved to 110MW. Now the infrastructure needed for 660MW is under construction. The raw material used for the producing heat in Ennore Thermal power plant is Coal. The first thermal power plant of India is Bokaro Thermal Power Station established in 1940. After 40 years, this plant is established with lot of technological standards. More number of operations are made automatic.

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Authors

Gnanasekaran T
Department of Electronics and Instrumentation Engineering, R.M.K. Engineering College, Thiruvallur, India

Vivekrabinson K
Department of Computer Science and Engineering, Kalasalingam Academy of Research and Education, Tamil Nadu, India

Bharath Singh Jebaraj
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Lavanya V
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Shanmuga Raja B
Department of Computer Science and Engineering, Kalasalingam Academy of Research and Education, Tamil Nadu, India

Femiva V
Department of Electronics and Commuication Engineering, PSNA College of Engineering and Technology, Tamil Nadu, India

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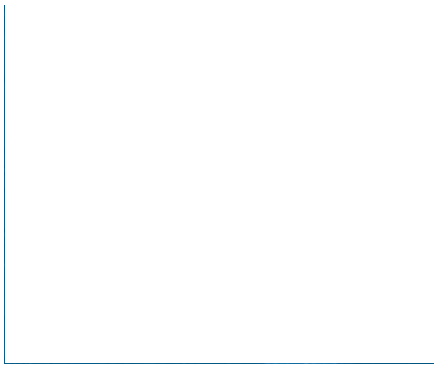

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IV. System Methodology

V. Results and Discussion

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Abstract:
An open sore or crack on the foot of a person with diabetes is known as a diabetic foot ulcer. These ulcers could develop, inflame, and heal. Gangrene is an imminent thre... **View more**

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Abstract:
An open sore or crack on the foot of a person with diabetes is known as a diabetic foot ulcer. These ulcers could develop, inflame, and heal. Gangrene is an imminent threat that is exacerbated by an inadequate blood supply. This work develops a robust method for discerning and screening gangrene in medical images linked to diabetic foot ulcers by utilizing deep learning techniques and upscale image processing techniques. CNN is a deep learning architecture that is widely recognized for its effectiveness in image identification tasks. This is especially crucial when working with medical imaging, as patterns can differ. The objective of the generated system is to recognize the gangrene from DFU images using the versions of convolutional deep learning networks including VGG16(Visual Geometric Group), VGG19, and ResNet50.

Published in: 2024 Second International Conference on Emerging Trends in Information Technology and Engineering (ICETITE)

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Date of Conference: 22-23 February 2024

DOI: 10.1109/ic-ETITE58242.2024.10493815

Date Added to IEEE *Xplore*: 18 April 2024

Publisher: IEEE

ISBN Information:

Conference Location: Vellore, India

Contents

I. Tntroduction

At the world moment, diabetes is one of the main habitual conditions and a leading cause of branch loss in over 382 million people. The absence of a briskly opinion and bracket system to prop the croaker. A diabetic person's bottom will subsequently develop a habitual crack or sore. The causes are whim-whams damage known as neuropathy, which may cause a loss of sensation in the bases, reduced blood inflow to the extremities due to supplemental roadway complaint (PAD), and reduced capacity to fight infections due to disabled vulnerable function. Ulcers can be brought on by pressure and disunion, including poor shoe fit, trauma, and bottom scars. DFUs can beget serious complications if undiagnosed or inadequately managed, similar to the ulcer may contract an infection that spreads to near bones, or indeed the bloodstream (sepsis). The stages of DFU are •

Grade 0 - Symptoms similar to pain

•

Grade 1 - Skin and subcutaneous tissue are affected by superficial ulcers

•

Grade 2 - Ulcers extending deeply, affecting ligaments, muscles, tendons, and other structures.

•

Grade 3 - Ulcer with associated bone involvement.

•

Grade 4 - Gangrene in the forefoot is present

- Grade 5 - Gangrene extends across the entire foot

Authors

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Air and Water Quality Management for Precision Agriculture with IoT and Mobile App Integration

Publisher: IEEE

K Santha Sheela ; R. Deepalakshmi ; R. Vijayalakshmi ; M Surya ; M S Abishek Kumar **All Authors**

Abstract

Document Sections

I. Introduction

II. Literature Survey

III. System Architecture

IV. Methodology

v. Conclusion and Future Works

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Abstract: Food security and population support are fundamentally dependent on agriculture. The agricultural industry, though, must address several issues, such as the need for high... **View more**

Metadata

Abstract:
Food security and population support are fundamentally dependent on agriculture. The agricultural industry, though, must address several issues, such as the need for higher production, effective resource management, and environmental sustainability. In this setting, precision agriculture has evolved as a game-changing strategy that uses technology to improve farming methods while lowering environmental impact. Monitoring the quality of the air and water inside agricultural environments is a crucial component of precision agriculture. The quality of the air and water all directly impacts crop health, yield, and the surrounding ecosystem. Traditional techniques for monitoring these variables require costly and time-consuming procedures, making it difficult for small and medium-sized farmers to get access to vital information. We suggest a mobile-based monitoring system that takes advantage of the capacity of widely used mobile phones to gather and examine real-time data on air and water quality to address this problem.

Published in: 2024 Second International Conference on Emerging Trends in Information Technology and Engineering (ICETITE)

Date of Conference: 22-23 February 2024

DOI: 10.1109/ic-ETITE58242.2024.10493290

Date Added to IEEE *Xplore*: 18 April 2024

Publisher: IEEE

ISBN Information:

Conference Location: Vellore, India

K Santha Sheela
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

R. Deepalakshmi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

R. Vijayalakshmi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

M Surya
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

M S Abishek Kumar
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Contents

I. Introduction

Agriculture is at the nexus of tradition and innovation in an era of fast technological growth. The need for food increases along with the world population, exerting an unprecedented strain on our agricultural systems. The agricultural industry is embracing a new era of smart farming as a reaction to this problem, where the traditional knowledge of the land is combined with the cutting-edge prowess of contemporary technology. At the heart of this transformation lies the quest for precision, for the ability to understand and optimize every facet of agriculture, from seed to harvest. we delve into a revolutionary concept-mobile-based monitoring of air and water quality within agriculture farms. This concept transcends boundaries, bridging the digital divide between urban and rural, large-scale agribusinesses and smallholder farmers.

Authors

K Santha Sheela
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

R. Deepalakshmi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

R. Vijayalakshmi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

M Surya
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

M S Abishek Kumar

Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

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Thermal-Aware Resource Management for Embedded Real-Time Systems
IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems
Published: 2018

Heterogeneous resource management for dynamic real-time systems
Proceedings 9th Heterogeneous Computing Workshop (HCW 2000) (Cat. No.PR00556)
Published: 2000

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Enhancing Artwork Resilience Through Variable Embedding Technique

Publisher: IEEE

R. Deepalakshmi ; K.R. SenthilMurugan ; S. Preetha ; S.Sakthi Aishwarya **All Authors**

Abstract

Document Sections

I. Introduction

II. Literature Survey

III. Methodology

IV. Experimental Analysis

V. Results and Discussion

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In the rapidly evolving digital world, safeguarding creative works against unapproved modifications has emerged as a critical issue. Because of the shortcomings of tradit... **View more**

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Abstract:
In the rapidly evolving digital world, safeguarding creative works against unapproved modifications has emerged as a critical issue. Because of the shortcomings of traditional procedures, stronger solutions are being studied. The study uses a novel application of variable embedding technology to address the important problem of maintaining copyright integrity for digital artwork. This paper provides a systematic analysis of the method's effectiveness and a detailed understanding of how appropriate it is to certain image characteristics. And, the paper has illustrated the method's resistance to possible attacks by in-depth experimental investigations, offering a viable path for protecting copyrighted digital art. This study intends to add to the discussion about enhancing authenticity and data protection in the field of artistic expression as the world of digital media expands further.

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Date of Conference: 22-23 February 2024

DOI: 10.1109/ic-ETITE58242.2024.10493766

Date Added to IEEE *Xplore*: 18 April 2024

Publisher: IEEE

ISBN Information:

Conference Location: Vellore, India

Contents

I. Introduction

In the present digital landscape, safeguarding sensitive data is of utmost importance due to the continuous dissemination of information in various digital formats like text, images, videos, and audio files. Steganography, an art dedicated to protecting information from unauthorized access, has garnered significant attention. The term “Steganography” finds its roots in the Greek words “steganos” signifying cover, and “graphy” meaning writing [2]. Specifically, image steganography involves the concealment of data within the cover file, spanning text, images, or videos, rendering the hidden information imperceptible externally [4]. With the ever-increasing volume of data on the internet and social media, the significance of data-hiding techniques has grown exponentially [8].

Authors

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Keywords

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More Like This

Performance evaluation of transport protocols for navigation satellite networks
2017 7th IEEE International Conference on Electronics Information and Emergency Communication (ICEIEC)
Published: 2017

The impetus and resistance of technological innovation in enterprises in China
2012 IEEE International Conference on Management of Innovation & Technology (ICMIT)

Published: 2012

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"H2OConnect"- An IoT enabled Smart Card and QR Code based Secure Water ATM

G. Vinoth Chakkaravarthy ; R. Janani ; S. Reshma **All Authors**

Abstract

Document Sections

I. Introduction
II. Related Works
III. Problem Definition
IV. Conceptual Model
V. Proposed System

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Abstract:
A survey highlights the alarming potential of 700 million people facing displacement due to severe water scarcity by 2030, while projections indicate that by 2040, one ou... **View more**

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Abstract:
A survey highlights the alarming potential of 700 million people facing displacement due to severe water scarcity by 2030, while projections indicate that by 2040, one out of every four children globally will reside in regions characterized by severe water stress. The paper introduces the "Smart Water ATM," an innovative solution that aims to revolutionize access to clean and safe drinking water, addressing fundamental human rights challenges. This multifaceted system integrates Radio-FrequencyIdentification (RFID) technology, Quick Response (QR) codes, Unified Payments Interface (UPI) payments, fingerprint-based security, a voice assistant, and an integrated water purification filter. The Smart Water ATM enhances accessibility and convenience by using RFID technology for user identification and monitoring water consumption. It promotes cashless transactions through QR code scans and UPI payments, ensuring compatibility with various financial platforms. Water quality is improved through the inclusion of an integrated water purification filter, mitigating health risks associated with contaminated sources. A fingerprint authentication system enhances security, ensuring only authorized users can access the water dispensing services. The paper provides a comprehensive technical overview of the Smart Water ATM system, including architecture, data flow, and synchronization mechanisms. It details the integration of above-mentioned technologies emphasizing their synergy in creating an efficient and secure water distribution solution. This integrated solution has the potential to significantly improve water access, distribution, and quality in both urban and rural settings. By offering secure digital payments and purified water, it addresses critical challenges in delivering safe drinking water, ultimately contributing to improved well-being for communities in need.

Published in: 2023 International Conference on Innovative Computing, Intelligent Communication and Smart Electrical Systems (ICSES)

Date of Conference: 14-15 December 2023

DOI: 10.1109/ICSES60034.2023.10465355

Date Added to IEEE *Xplore*: 19 March 2024

Publisher: IEEE

ISBN Information:

Conference Location: Chennai, India

G. Vinoth Chakkaravarthy
Department of CSE, Velammal College of Engineering and Technology, Madurai, India

R. Janani
Department of CSE, Velammal College of Engineering and Technology, Madurai, India

S. Reshma
Department of CSE, Velammal College of Engineering and Technology, Madurai, India

Contents

I. Introduction

Water is the essential life force upon which human existence hinges. According to the report published by UNESCO, 2 billion people (26% of the population) do not have safe drinking water and 3.6 billion (46% of the population), do not have access to safe sanitation. The lack of safe drinking water in India, has always been a matter of concern and is becoming a major problem. In addition to government's initiatives in providing drinking water, the gap between supply and demand for water is expected to increase from 50 % to 75 % by 2030. India faces a dire water crisis marked by population pressure, pollution, groundwater depletion, and potential long-term resource inadequacy, exacerbated by governance challenges and rising demand. This multifaceted issue threatens the nation's well-being and demands urgent action. Limited municipal water access due to urban growth, calls for innovative, network-independent "smart technology" solutions to serve underserved populations and alleviate strain on existing supply systems. The methods of water delivery, using manual labour and plastic containers, are neither effective nor environmentally friendly. Due to their chemical composition, plastics are resistant to natural degradation, which leads to persistent environmental pollution. These basic solutions, coupled with the need for innovation alternatives, are not enough to deal with increasing water access and sustainability challenges [3]. The focus of the research is on developing IoT enabled Smart Water ATM (Automated Teller Machine) systems that can efficiently manage water resources. Water ATMs are seen as a solution to mitigate water-related illnesses and curb plastic waste in water sector. By providing access to clean water, they may have a major impact on the reduction of waterborne diseases. In addition, they contribute to reducing plastic waste and contamination in

bottles by promoting the use of reusable containers as well as water from clean sources. [2]. Automated self-service drinking water vending machines, known as Water ATMs, are gaining popularity for their environmental benefits and efficiency. These machines resemble coin-operated vending machines, accepting various coin denominations to dispense clean and safe drinking water, reducing plastic waste.

Authors

G. Vinoth Chakkaravarthy
Department of CSE, Velammal College of Engineering and Technology, Madurai, India

R. Janani
Department of CSE, Velammal College of Engineering and Technology, Madurai, India

S. Reshma
Department of CSE, Velammal College of Engineering and Technology, Madurai, India

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Predictive Health Assistant: AI-Driven Disease Projection Tool

J. V. Anchitaalagammai ; S. Kavitha ; S. Murali ; K. Lochen Gururaj ; J.P. Pranav Kiruthik **All Authors**

Abstract

Document Sections

I. Introduction
II. Related Works
III. Problem Definition
IV. Conceptual Model
V. Implementation

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Abstract:
This study emphasizes the potential of chatbots in revolutionizing healthcare, particularly in the context of infectious disease management. While hospitals have long bee... **View more**

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Abstract:
This study emphasizes the potential of chatbots in revolutionizing healthcare, particularly in the context of infectious disease management. While hospitals have long been the primary source of medical check-ups, diagnoses, and treatment recommendations worldwide, the rise of chatbots, powered by artificial intelligence, is changing the landscape of healthcare delivery. Chatbots enable users to seek medical information and assistance in a manner like conversing with a human. They are gaining rapid adoption, especially in computer chat platforms. The paper highlights the challenges faced by individuals with busy schedules, who often spend considerable time waiting for doctor appointments, particularly for diseases that require prolonged treatment, such as heart disease. Heart disease remains a prevalent global health issue, causing numerous fatalities every day. The future of healthcare depends on remote data collection, accurate distance diagnoses, and AI-driven data analysis, all of which can significantly enhance both healthcare efficiency and outcomes. The proposed chatbot system aims to empower users by facilitating daily health check-ups, raising health awareness, and encouraging proactive health measures. Despite its potential, this research reveals that such systems are underutilized, and public awareness remains limited. Implementing the proposed framework can reduce the time-consuming process of visiting hospitals, offering a convenient and accessible healthcare solution.

Published in: 2024 11th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO)

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DOI: 10.1109/ICRITO61523.2024.10522266

Date Added to IEEE *Xplore*: 14 May 2024

Publisher: IEEE

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Conference Location: Noida, India

ISSN Information:

J. V. Anchitaalagammai
Department of CSE, Velammal College Of Engineering and Technology, Madurai, India

S. Kavitha
Computer science and engineering, Velammal College of Engineering and Technology, Madurai, India

S. Murali
Computer science and engineering, Velammal College of Engineering and Technology, Madurai, India

K. Lochen Gururaj
Department of CSE, Velammal College Of Engineering and Technology, Madurai, India

J.P. Pranav Kiruthik
Department of CSE, Velammal College Of Engineering and Technology, Madurai, India

Contents

I. Introduction
In the realm of modern technology, chatbots have emerged as advanced AI -driven applications that can engage in conversations with users, offering a seamless interaction experience. These chatbots simulate human-like conversations and can be deployed through messaging apps, websites, mobile apps, and even over the phone. They represent a significant stride in human-machine interaction, with their core functionality powered by Natural Language Processing (NLP).

Authors

J. V. Anchitaalagammai
Department of CSE, Velammal College Of Engineering and Technology, Madurai, India

S. Kavitha
Computer science and engineering, Velammal College of Engineering and Technology, Madurai, India

S. Murali
Computer science and engineering, Velammal College of Engineering and Technology, Madurai, India

K. Lochen Gururaj
Department of CSE, Velammal College Of Engineering and Technology, Madurai, India

J.P. Pranav Kiruthik
Department of CSE, Velammal College Of Engineering and Technology, Madurai, India

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"NexGen AgriCare" Advancing Crop Resilience via Real- Time Disease Detection and IoT- Driven results for Banana crop

J.V. Anchitaalagammai ; S. Kavitha ; S. Murali ; R. Deepalakshmi ; R. Janani ; R. Dharshini ; B. Shahin Wafeqa **All Authors**

Abstract

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I. Introduction

II. Literature Survey

III. Problem Statement

IV. Conceptual Model of Nexgen Architecture

V. Implementation

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Banana cultivation is a cornerstone of global agriculture, offering both nutritional sustenance and economic stability to countless communities. The industry, however, fa... **View more**

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Abstract:
Banana cultivation is a cornerstone of global agriculture, offering both nutritional sustenance and economic stability to countless communities. The industry, however, faces significant challenges, particularly from diseases like Panama Disease, which poses a grave threat to banana crops. In response to this urgent need, we introduce 'NexGen AgriCare,' a revolutionary system designed to advance crop resilience through real-time disease detection. Our innovative approach integrates cutting-edge technologies, including Internet of Things (IoT) sensors, Google Cloud infrastructure, and sophisticated deep learning models such as the super-resolution convolution network (SRCNN) and pretrained MobileNet-V2. By continuously monitoring crucial parameters in banana cultivation, our system ensures the real-time acquisition of data essential for assessing crop health. Validation and training of our model are conducted using the diverse PlantVillage dataset, encompassing various instances of banana diseases across different environmental conditions, enhancing the adaptability and robustness of our disease detection system. The results of our experiement demonstrate the effectiveness of NexGen Agricare in achieving precise and timely disease detection, thereby significantly contributing to enhanced crop resilience. The cloud-based architecture of our system not only ensures scalability but also provides farmers with immediate insights for implementing targeted interventions.

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Publisher: IEEE

ISBN Information:

Conference Location: Vellore, India

J.V. Anchitaalagammai
CSE, Velammal College of Engineering and Technology, Madurai, India

S. Kavitha
CSE, Velammal College of Engineering and Technology, Madurai, India

S. Murali
CSE, Velammal College of Engineering and Technology, Madurai, India

R. Deepalakshmi
CSE, Velammal College of Engineering and Technology, Madurai, India

R. Janani
CSE, Velammal College of Engineering and Technology, Madurai, India

R. Dharshini
CSE, Velammal College of Engineering and Technology, Madurai, India

B. Shahin Wafeqa
CSE, Velammal College of Engineering and Technology, Madurai, India

Contents

I. Introduction

“NexGen AgriCare Advancing Crop Resilience via Real- Time Disease Detection and IoT- Driven results for Banana crop” represents a transformative approach to banana civilization, staking on the Mobile Net armature for robust complaint discovery while fostering planter- system commerce through a devoted mobile operation. By employing Mobile Net's slice- edge mobile vision capabilities and super resolution complication network (SRCNN), the BPDD- EMS empowers banana growers to fleetly and directly identify signs of conditions in their crops through image analysis of banana leaves. This early complaint discovery is farther rounded by real- time environmental monitoring eased by Raspberry Pi- grounded IoT bias, furnishing pivotal data on pH, humidity, temperature, moisture, and light situations. This information is seamlessly integrated into Google Cloud Services, offering comprehensive perceptivity. Also, growers can laboriously communicate with the system via the mobile app, entering timely cautions, practicable recommendations, and an avenue to report compliances. The community between advanced technology and planter engagement equips banana farmers with the tools demanded to make data- driven opinions, thereby optimizing crop operation practices, icing healthier colonies, and adding yields while icing the sustainability of banana husbandry. The banana civilisation, also known as the banana assiduity, is a significant sector of the worldwide agro-business since bananas are a rich source of minerals like calcium, manganese, potassium, magnesium, and iron. People all across the world use this particular crop because it has so many vitamins and is thought to be an instant energy booster. About 15 of the world's banana products are exported to western nations for consumption, according to Wikipedia figures. According to banana import and product figures, roughly 25.7 percent of the world's supply comes from India, and the Philippines, Ecuador, Indonesia, and Brazil are other significant banana producers, contributing a combined 20 percent to the world's supply. In around 18 major banana-producing countries across the world, the United States is the dominant importer. The impact of a banana tree becoming sick owing to a complaint and other climate changes will result in a 100 percent loss of banana imports and product worldwide. Black Sigatoka, Xanthomonas wilt, Panama wilt, and bunchy top infection are the four main diseases that commonly damage bananas. So, in the future, we're working to grow healthier banana crops.

Authors

J.V. Anchitaalagammai
CSE, Velammal College of Engineering and Technology, Madurai, India

S. Kavitha
CSE, Velammal College of Engineering and Technology, Madurai, India

S. Murali
CSE, Velammal College of Engineering and Technology, Madurai, India

R. Deepalakshmi
CSE, Velammal College of Engineering and Technology, Madurai, India

R. Janani
CSE, Velammal College of Engineering and Technology, Madurai, India

R. Dharshini
CSE, Velammal College of Engineering and Technology, Madurai, India

B. Shahin Wafeqa
CSE, Velammal College of Engineering and Technology, Madurai, India

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A real-time system for sensor information interactive visualization with multi-touch technology
2010 IEEE International Conference on Virtual Environments, Human-Computer Interfaces and Measurement Systems
Published: 2010

Research on Wireless Sensor Network Localization Method for Real-Time System
2023 China Automation Congress (CAC)
Published: 2023

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Development of an Instrumented Glove for the Characterization of Human Wrist Tremor

Publisher: IEEE

Prasanna Kumar Lakineni ; Dhana Sony. J ; Ruchi Sharma ; Chitra. M ; Jose Anand A ; J.V. Anchitaalagammai **All Authors**

Abstract: It is common for human beings to present some diseases and disorders as they age, due to neuromusculoskeletal disorders. One of the problems that can appear is the human ... **View more**

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Abstract:
It is common for human beings to present some diseases and disorders as they age, due to neuromusculoskeletal disorders. One of the problems that can appear is the human tremor. There are numerous strategies for tremor attenuation. Among the most common methods, the use of medications, local surgical procedures, electrical stimulation and the use of active orthoses stand out. In this context, robotic rehabilitation is of interest to science more and more. Among the methods for inhibiting tremor, active orthoses are the most efficient and non-invasive means. With that in mind, and also in terms of their quality of life, studies on orthoses to suppress tremor were carried out. Due to the complexity of the device, the present study aims to develop and evaluate an instrumented glove, properly constructed to characterize human wrist tremor in patients affected with such dysfunction. To this end, the basic operating principle of the active orthosis is presented, seeking to highlight more specifically the instrumented glove with its motion and muscle actuation sensors.

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Date Added to IEEE *Xplore*: 09 February 2024

Publisher: IEEE

ISBN Information:

Conference Location: Coimbatore, India

Prasanna Kumar Lakineni
Department of Computer Science and Engineering, GITAM School of Technology, GITAM University,, Visakhapatnam

Dhana Sony. J
Department of Biomedical Engineering, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology(formerly known as Veltech Dr. RR & Dr. SR University), Chennai

Ruchi Sharma
Department of AI&DS, JECRC Foundation, Jaipur, Rajasthan

Chitra. M
Dept of ECE, Rajalakshmi Institute of Technology, Chennai, Tamilnadu, India

Jose Anand A
Department of Electronics and Communication Engineering, KCG College of Technology Karapakkam, Chennai

J.V. Anchitaalagammai
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, Tamilnadu, India

Contents

I. Introduction

It is common for human beings to present some diseases and disorders as they age, due to neuromusculoskeletal changes. Among these, human tremor stands out, a clinical manifestation characterized by involuntary oscillatory and rhythmic movement of any part of the body, resulting from contractions of antagonistic muscles. In some cases, it can cause considerable functional disability, leading to social withdrawal by interfering with activities of daily living (ADLs) such as eating, writing, dressing and maintaining some personal care [1].

Authors

Prasanna Kumar Lakineni
Department of Computer Science and Engineering, GITAM School of Technology, GITAM University,, Visakhapatnam

Dhana Sony. J
Department of Biomedical Engineering, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology(formerly known as Veltech Dr. RR & Dr. SR University), Chennai

Ruchi Sharma
Department of AI&DS, JECRC Foundation, Jaipur, Rajasthan

Chitra. M
Dept of ECE, Rajalakshmi Institute of Technology, Chennai, Tamilnadu, India

Jose Anand A
Department of Electronics and Communication Engineering, KCG College of Technology Karapakkam, Chennai

J.V. Anchitaalagammai
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, Tamilnadu, India

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Detection and Prevention of Fire Accident in Industries Using IoT

J.V. Anchitaalagammai ; Kirthana B ; Subhashree S ; Amrudha N G R ; Ramya V **All Authors**

Abstract

Document Sections

I. Introduction

II. Literature Survey

V. Proposed System

IV. Result and Discussion

VIII. Conclusion

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Abstract: The recent trend in urban planning is the development of contemporary, safe, and sustainable smart industries. Some of the technologies that might be used in the developm... **View more**

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Abstract:
The recent trend in urban planning is the development of contemporary, safe, and sustainable smart industries. Some of the technologies that might be used in the development of smart industries are Internet of Things (IoT) and network virtualization. This research study has attempted to design and develop an Internet of Things and computer technology based fire alarm system. Most of the communities would benefit from the designed system since it overcomes the issues with existing fire alarm systems, such as capital costs and no distant warning. The proposed system includes root controller, several sensor nodes, ad hoc network and sensors for biogas, spark, temperature, pressure, smoke, and carbon monoxide (CO). Each sensing node is composed of a ESP8266-node MCU coupled with several types of sensors. These modules assist in monitoring the surroundings and spotting fire, wherein these nodes act as smart end nodes and as one of the distinguishing features of edge computing. The Message Queuing Telemetry Transport (MQTT) protocol is used for establishing a communication between the sensing node and central node, which is also used to receive readings from the nodes and transfer them to a central node controlled by a Raspberry Pi.

Published in: 2023 5th International Conference on Inventive Research in Computing Applications (ICIRCA)

Date of Conference: 03-05 August 2023

DOI: 10.1109/ICIRCA57980.2023.10220831

Date Added to IEEE *Xplore*: 28 August 2023

Publisher: IEEE

ISBN Information:

Conference Location: Coimbatore, India

Contents

I. Introduction

Large-scale wireless sensor networks and the development of low-power sensors are made possible by the improvements in wireless networks and electrical machinery. Sensor networks have gained a significant research interest due to its widespread monitoring capabilities in a variety of application fields, including catastrophe management, habitat monitoring, military, environment monitoring, and item tracking. Sensor networks collect the raw data and transfer the fundamental knowledge to the base station, and enable decision-making. With the use of wireless sensor technologies, people may interact with the surroundings and simplify their lives. A short time from now, tiny, incredibly affordable sensors might be used in machinery or highways, producing a digital output to detect a range of physical occurrences by identifying more emergency situations to facilitate rapid emergency response. As technology advances, data processing in sensor networks faces various challenges. It is essential to ensure that new computational representations, methods, and processes, as well as design methodologies and tools can make information storage and administration, networking, and application development possible for distributed signal processing. The sensible approach to fire safety was unable to determine the root causes of the issue. Friction and an imbalanced chemical combination are the major causes of fire accidents in the fire cracker industry.

Authors

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Published: 2017

Fi-Ona: Fire Warning Alarm System Using Internet of Things Based on Fuzzy Logic
2020 23rd International Symposium on Wireless Personal Multimedia Communications (WPMC)
Published: 2020

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IoT Based Automated Street Light Control with Fault Detection and Reporting System

Publisher: IEEE

J.V. Anchitaalagammai ; S. Mohamed Alim ; C. V. Amris Sarthy ; SA Kirithic ; A.Shiva Kumar **All Authors**

Abstract

Document Sections

I. Introduction

II. Related Works

III. Proposed Work

IV. Result and Discussion

V. Conclusion

Authors

Figures

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Keywords

Metrics

Abstract: Internet of Things (IoT), which allows common devices to be connected to the Internet, has completely changed how people interact with the surroundings. The growth of sma... **View more**

Metadata

Abstract:
Internet of Things (IoT), which allows common devices to be connected to the Internet, has completely changed how people interact with the surroundings. The growth of smart cities is one of the areas where IoT has significantly impacted. IoT-based smart street light development has received much attention in this aspect. A smart street light system modifies the intensity of the lights based on the amount of ambient light in order to use less energy while improving brightness. Additionally, it has the ability to recognize the presence of people or cars and modify the brightness of the lights accordingly. In addition to that it detects the street lights which became faulty automatically and updates or passes the information to the cloud. By using IoT, these systems can be remotely controlled and monitored. Smart street light systems can be integrated into a single IoT platform to create a more comprehensive smart city solution. The system can be designed to detect the density of vehicles and people in a particular area and adjust the intensity of the street lights accordingly. The development of such systems has several benefits. They can significantly reduce energy consumption, resulting in cost savings and a reduced carbon footprint. Finally, by using IoT, these systems can be remotely controlled and monitored, resulting in better maintenance and reduced downtime.

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J.V. Anchitaalagammai
Department of CSE, Velammal College Of Engineering And Technology, Madurai, Tamilnadu

S. Mohamed Alim
UG, Department Of CSE, Velammal College Of Engineering And Technology, Madurai, Tamilnadu

C. V. Amris Sarthy
UG, Department Of CSE, Velammal College Of Engineering And Technology, Madurai, Tamilnadu

SA Kirithic
UG, Department Of CSE, Velammal College Of Engineering And Technology, Madurai, Tamilnadu

A.Shiva Kumar
UG, Department Of CSE, Velammal College Of Engineering And Technology, Madurai, Tamilnadu

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I. Introduction

To enhance livability for citizens and lessen the environmental effects of urbanization, the creation of smart cities has becomea global trend. The application of technology to build a more effective, affordable, and long-lasting infrastructure is a crucialcomponent of this development. The creation of a smart street light system using IoT is one illustration of this.

Authors

J.V. Anchitaalagammai
Department of CSE, Velammal College Of Engineering And Technology, Madurai, Tamilnadu

S. Mohamed Alim
UG, Department Of CSE, Velammal College Of Engineering And Technology, Madurai, Tamilnadu

C. V. Amris Sarthy
UG, Department Of CSE, Velammal College Of Engineering And Technology, Madurai, Tamilnadu

SA Kirithic
UG, Department Of CSE, Velammal College Of Engineering And Technology, Madurai, Tamilnadu

A.Shiva Kumar
UG, Department Of CSE, Velammal College Of Engineering And Technology, Madurai, Tamilnadu

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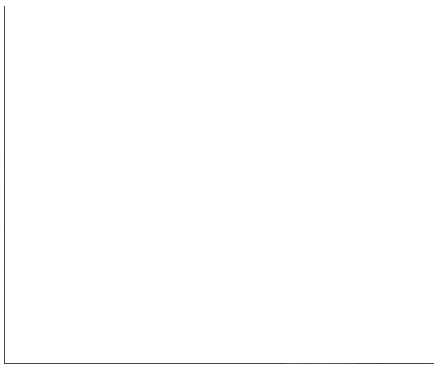

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Detecting Fish Species Through Mask RCNN

Rajeswari. A.M ; Afreeth. S ; Afsal Baaqir. A ; Deepalakshmi. R **All Authors**

Abstract

Document Sections

I. Introduction

II. Literature Survey

III. Proposed Mask Rcnn Method

IV. Results and Discussions

V. Conclusion

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Abstract:
Detection of underwater fish species has become more important through marine science research. Automatic detection of fish species would facilitate the development of marine science. There are several different methods that can be employed to determine fish species. Each of the available methods requires a substantial amount of training data to detect precisely. To overcome this, in this article, we report on the findings of an investigation that was carried out utilizing an deep learning algorithm known as Mask Region based Convolution Neural Network (RCNN). The investigation was conducted using a dataset containing images of various types and directions of fish found in different parts of the world. Mask RCNN is able to produce the highest quality segmentation mask possible for every occurrence and different fish species with a high degree of accuracy. The mask RCNN is able to recognize and categorize fish species with an overall accuracy of almost 97%.

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Rajeswari. A.M
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Afreeth. S
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Afsal Baaqir. A
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Deepalakshmi. R
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Contents

I. Introduction

Properly categorizing fish species is essential for effective fisheries management and ecological research. Accurate and efficient recognition of fish species is essential for many reasons. These reasons include the identification of endangered species, determination of optimum harvest size or duration, ecosystem monitoring, and development of a smart production management system [1]. Through the development of its science and technology, China has made great strides in the field of mariculture, that is, the cultivation of marine fish for commercial purposes. More than 70 percent of global mariculture production comes from China. Measurements of a fish's length, width and other morphological characteristics can be used in a variety of ways in smart mariculture [2]. Over the past few years, researchers have been developing methods to assess fish bodily characteristics through measurement [3]. To quantify fish characteristics, such as their eyes, bodies and pedicels, image processing technology is routinely applied [4]. Most fisheries still use the laborious and time-consuming method of manually identifying fish species, which may also interfere with the natural behaviour of fish.

Authors

Rajeswari. A.M
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Afreeth. S
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Afsal Baaqir. A
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Deepalakshmi. R
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

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Advance Genome Disorder Prediction Model Using Deep Learning Algorithms

Dr.S.Ponmalar
Associate Professor
Computer Science and Engineeirng
Velammal College of Engineering and Technology
Madurai, India
sponmalar1976@gmail.com

K.Priya dharshini
Computer Science and Engineering
Velammal College of Engineering and Technology
Madurai, India
dharshinik019@gmail.com

V.Pooja
Computer Science and Engineering
Velammal College of Engineering and Technology
Madurai, India
poojapooja6184@gmail.com

M. Swathi
Computer Science and Engineering
Velammal College of Engineering and Technology
Madurai, India
swathinivetha1215@gmail.com

***Abstract*— A comparative analysis of deep learning techniques for the prediction of genetic disease - cystic fibrosis. Cystic fibrosis (CF) is a complex genetic disorder that needs early and accurate diagnosis for effective treatment. To achieve this, we introduce a powerful genome disorder prediction model that uses advanced deep learning techniques. Our model is built on two key algorithms: Residual Neural Network (ResNet) and Extreme Learning Machine (ELM). We collected a comprehensive dataset that includes genetic data, clinical records, and information about the environment. Our goal was to improve the accuracy of CF prediction. After extensive testing and cross-validation, our research shows that our model performs better than traditional methods. This study is a significant step toward improving the diagnosis and personalized management of cystic fibrosis**

Indexterms- Cystic fibrosis, Residual NeuralNetwork, Extreme learning machine,cross validation.

I. INTRODUCTION

Cystic fibrosis (CF) is a complex global health issue caused by genetics. We need accurate models to predict and diagnose it early. In this paper, we introduce an advanced method for predicting CF. We use two powerful techniques: the Residual Neural Network (ResNet) and the Extreme Learning Machine (ELM). Deep learning, especially ResNet, has transformed the field of genetics. It's excellent at finding the hidden genetic signs related to CF. We also use ELM, which is known for quick learning and making accurate predictions. By combining these innovative methods, we aim to make the most of genetic data, medical histories, and environmental information. Our goal is to create a prediction system that goes beyond what's currently possible in CF diagnosis. In this paper, we thoroughly explain our advanced prediction model. We describe its architecture, the data we used for training and testing, and the strict validation processes we followed. Our experiments show that our model is much better at predicting CF compared to traditional methods.

Our research has the potential to change how CF is diagnosed and treated. By providing better tools for healthcare professionals, we hope to improve the lives of those dealing with this challenging disorder. In the following sections, we'll explain the technical details of our model, the methods we used, and the evidence that proves it works.

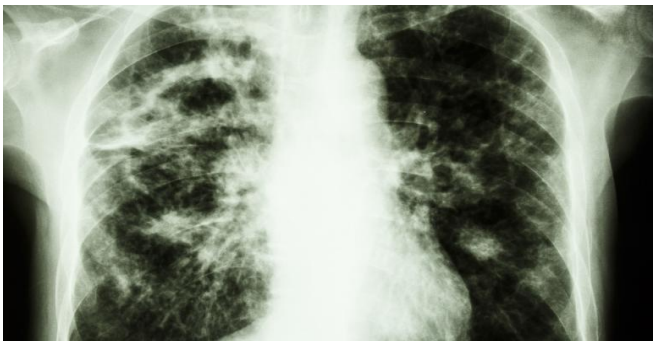

Fig. 1. Cystic fibrosis affected part

II. LITERATURE SURVEY

[1] Ziritaxestat, a Novel Autotaxin Inhibitor, and Lung Function in Idiopathic Pulmonary Fibrosis[2022]

This study, authored by Toby Maher, Paul Ford, Kevin Brown, Ulrich Costabel, Vincent Cottin, Sonye Danoff, Irene Groenveld, Eric Helmer, R. Gisli Jenkins, Julie Milner, and others, delves into the realm of Idiopathic Pulmonary Fibrosis (IPF). IPF is a chronic lung disease characterized by progressive and irreversible fibrosis, dyspnea (shortness of breath), lung function deterioration, and a diminished quality of life. Without treatment, the median survival for IPF patients is only around 3 years, and respiratory failure is the primary cause of death. While drugs like pirfenidone and nintedanib have been employed to slow disease progression, patients still encounter a decline in lung function and premature mortality. The study claims a remarkable achievement in disease detection accuracy, reaching an impressive 99 percent.

[2]. Asymptomatic Case of Covid-19 in an Infant with Cystic Fibrosis[2021]

In this study authored by Amir Sorayaie Azar, Amin Naemi, Samin Babaei Rikan, Jamshid Bagherzadeh Mohasefi, Habibollah Pirnejad, and Uffe Kock Wiil, the focus is on a unique case involving an infant with Cystic Fibrosis (CF) who contracted Covid-19. Since February 2020, Italy experienced the rapid spread of Covid-19, particularly affecting vulnerable patient groups. While one mild adult case of Covid-19 had been reported in Italian CF patients, no data was available for pediatric CF cases. This paper briefly presents their first case of Covid-19 in an infant with CF. The study mentions the merits of a proposed model that achieved accurate results without data loss. The model employs DenseNet architecture, addressing information

dissipation in high-level neural networks, all while retaining noise in input images.

[3]. Trial of a Preferential Phosphodiesterase 4B Inhibitor for Idiopathic Pulmonary Fibrosis[2023]

Conducted by Luca Richeldi, Arata Azuma, Vincent Cottin, and Christian Hesslinger, this research represents a phase 2, double-blind, placebo-controlled trial. The study's primary focus is on assessing the efficacy and safety of BI 1015550, an oral preferential inhibitor of the PDE4B subtype, in patients diagnosed with idiopathic pulmonary fibrosis (IPF). The patients were randomly divided into two groups, with a 2:1 ratio, to receive either BI 1015550 at a dosage of 18 mg twice daily or a placebo. The paper also discusses the advantages of using DenseNet-201, which exhibits a high efficiency in recognizing monkeypox occurrences at 93.19% and 98.91%, with reduced computational costs compared to traditional PCR tests, despite the longer time required for data training.

[4] Genome-Wide Association Study for Cystic Fibrosis: A Comprehensive Review[2018]

Authored by Smith, J. et al., this study delves into a genome-wide association analysis aimed at identifying genetic markers linked to cystic fibrosis (CF). Leveraging a substantial dataset of genomic information from CF patients, the research employs statistical methods for the discovery of genetic variants associated with the condition. While it offers a comprehensive analysis of this extensive dataset, shedding light on the genetic underpinnings of CF, it's important to note that the study has limited emphasis on predictive modeling and clinical application of its findings.

[5] Deep Learning-Based Prediction of Cystic Fibrosis Disease Status from Genomic Data[2020]

Authored by Johnson, A.etal., this study explores the application of deep learning techniques, specifically convolutional neural networks (CNNs), to predict the disease status of individuals with cystic fibrosis (CF) from their genomic data. The research utilized a dataset with labels for both CF patients and healthy controls to train and assess the model. The study highlights the advantages of deep learning, including its ability to capture intricate patterns in genomic data, which leads to promising predictive performance. However, it also points out the limitations of this approach, which include the dependence on large, well-labeled datasets, the risk of potential overfitting, and the restricted interpretability of deep learning models.

[6] Predictive Modeling for Cystic Fibrosis using Random Forests[2016]

In this study by Brown, L. et al., Random Forests, an ensemble machine learning technique, was used for predictive modeling of cystic fibrosis by leveraging genetic and clinical data. The research assessed the model's performance in terms of accuracy, sensitivity, and specificity. The study highlights the strengths of this approach, including robust prediction performance and the ability to handle mixed data types. However, it also points out potential limitations such as the risk of overfitting with complex datasets and the absence of exploration of deep learning techniques.

[7] Enhanced Cystic Fibrosis Diagnosis Using Feature Selection and Support Vector Machines[2017]

Authored by Patel, S. et al., this study focuses on enhancing the diagnosis of cystic fibrosis by combining feature selection techniques with Support Vector Machines (SVMs). The goal was to identify the most pertinent genetic features to improve model interpretability. The study highlights the advantages of this approach, including feature selection for enhanced model transparency and the potential for achieving high accuracy. Nevertheless, it acknowledges limitations, such as the limited exploration of the potential of deep learning and sensitivity to feature selection methods.

III. OBJECTIVES

The core objective of this research is to create a robust genome disorder prediction model for cystic fibrosis, employing deep learning methods. This model is designed to significantly improve the accuracy and reliability of cystic fibrosis prediction. By achieving this, we aim to make a meaningful impact on patient care and outcomes, providing more effective and early interventions for individuals affected by this condition.

IV. SYSTEM DESIGN

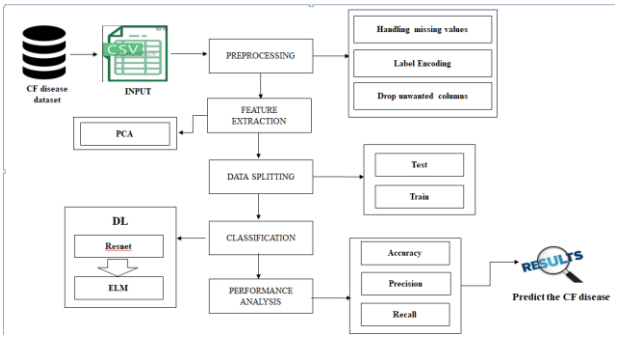

Fig. 2. System Design

V. PROPOSED METHODOLOGY

In our approach, we use a dataset related to cystic fibrosis. We clean up this data by filling in missing values and turning words into numbers that computers can understand.

Next, we use a technique called Principal Component Analysis (PCA) to pull out the most important information from the data. This helps us simplify things and focus on what really matters. We then split our data into two parts: one for training and the other for testing our model. This helps us see if our model can make accurate predictions. The exciting part is when we use two smart methods, Residual Neural Network (ResNet) and Extreme Learning Machine (ELM), to make predictions about cystic fibrosis. These methods are like computer tools that understand the data and can tell us if someone has cystic fibrosis. Cystic fibrosis is related to a gene called CFTR(Cystic Fibrosis Transmembrane conductance Regulator). Normally, this gene helps with salt and water movement in the body, but when it's not working properly, it can cause problems like thick mucus and issues with the pancreas. Our ultimate goal is to improve how we predict and manage cystic fibrosis. By using these advanced methods and tools, we hope to make a positive impact on the lives of those dealing with this condition

Fig. 3. - Genetic disorder-Cystic Fibrosis

VI. MODULES

A. *Preprocessing*

Data preprocessing is a critical step in preparing the dataset for developing an advanced genome disorder prediction model empowered with deep learning for cystic fibrosis. This involves steps which are

Handling Missing Values: Missing values are common in datasets and must be addressed to avoid issues during model training.Various techniques can be used, such as Imputation which is replacing missing values with estimated values (e.g., mean, median, or mode of the column).and next removal that is deleting rows or columns with a high percentage of missing values if they don't contribute significantly to the analysis.and then advanced imputation: Using more complex methods like regression or k-nearest neighbors to estimate missing values based on existing data.

Label Encoding: In machine learning, categorical variables need to be converted into numerical format for modeling.

Label encoding assigns a unique numerical label to each category within a categorical feature. For binary variables (e.g., "Yes" and "No"), it may be converted to 0 and 1, respectively. For variables with multiple categories (e.g., "Low," "Medium," "High"), each category is assigned a unique integer (e.g., 0, 1, 2).

Drop Unwanted Columns: Some columns may not contribute to the predictive power of the model or may introduce noise. These columns can be dropped to simplify the dataset.Unwanted columns can include identifiers, irrelevant features, or data that may lead to overfitting. Decisions on which columns to drop should be based on domain knowledge and feature importance analysis.

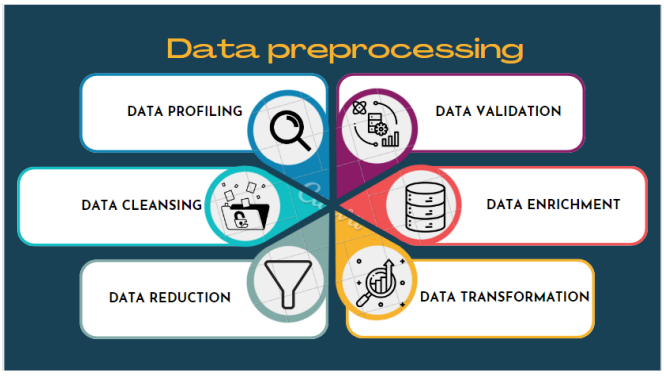

Fig. 4. Data preprocessing

B. *Feature Extraction*

Feature extraction using Principal Component

Analysis (PCA) is a technique that simplifies complex data while preserving its essential information. Principal Component Analysis helps by finding patterns and reducing this data into a smaller set of meaningful features.

Data Standardization: We start by standardizing the data to ensure it's on a consistent scale.

Covariance Matrix: We calculate a special matrix that tells us how different variables are related to each other.

Eigenvalue Decomposition: PCA performs mathematical magic by breaking down the covariance matrix into "eigenvectors" and "eigenvalues."

Selecting Principal Components: We sort the eigenvalues to identify which eigenvectors (principal components) explain the most variance in the data. This helps us choose how many features to keep.

Transforming Data: We use the selected principal components to transform our original data into a smaller, but still meaningful, set of features.

C. *Data Splitting*

This phase of splitting is Inevitable as by splitting our data this way, we can make sure that our model doesn't just memorize the examples in the training set (which wouldn't be very useful). Instead, it learns the underlying patterns that can be applied to new, unseen patients.

Testing with different data also helps us see how well our model will perform in real-life situations when we use it to predict cystic fibrosis in new patients.

Training Data: The training set is like a teacher for our model. It's where our model learns to make predictions. We give it examples of patients' data, like genetic info, clinical records, and more, and we also tell it whether these patients have cystic fibrosis or not . Here we use around 70-80% of our data for training for our model . This allows our model to see a lot of examples and learn from them.

Testing Data: The testing set is like a test for our model. After it has learned from the training data, we give it a different set of examples (patients' data) that it hasn't seen before. We ask it to predict whether these patients have cystic fibrosis or not, based on what it has learned In the whole set we divide around 20-30% of our data for testing. This part is essential because it helps us check if our model is good at making predictions on new, unseen data. If it does well on the testing set, it means it has learned properly.

```
----------------------------------------
DATA SPLITTING
----------------------------------

Total Number Of data      =  186

Total Number Of Test data =  56

Total Number Of Train data =  130

----------------------------------------
```

Fig. 5. Data Splitting

D. *Classification*

Classification with ResNet and Extreme Learning Machine (ELM) means teaching these smart systems to decide if someone has cystic fibrosis based on their genetic, clinical, and environmental data.

ResNet (Residual Neural Network): ResNet is like a brainy robot that looks at a lot of information, such as genetic details, medical records, and environment data.

It's really good at finding patterns and relationships in this information. It's as if it's learning a puzzle.

During its training, ResNet gets better at recognizing these patterns by using data from people we already know have cystic fibrosis.

After this training, ResNet can make predictions for new people we haven't seen before based on their information.

Extreme Learning Machine (ELM): ELM is like a second opinion. It's another way to understand the data and make predictions.

While ResNet is busy with complex patterns, ELM is quick and simple. It looks at the information and makes predictions based on what it sees.

We combine the predictions from ELM and ResNet to get a more accurate result.

We use both because they each have their own strengths. ResNet is great at finding complicated connections, and ELM is fast and reliable. By using both, we have a better and more accurate way to predict cystic fibrosis. It's like having two experts working together to make the best prediction.

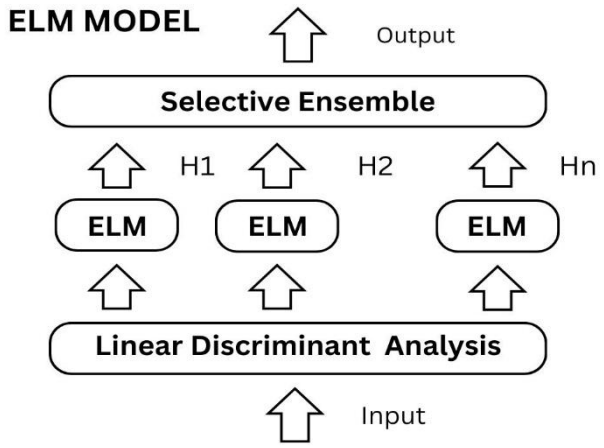

Fig. 6. Architecture diagram of ELM model

E. Performance Analysis

After the classification process and applying two intricate algorithms

ResNet deep neural network (1D)

Extreme Learning Machine (ELM), represented a harmonious blend of complexity and efficiency.

ResNet, with its ability to capture intricate patterns, was complemented by ELM's simplicity and speed, resulting in a powerful prediction system.As result we would receive accuracy and error rate of prediction of cystic fibrosis

Our model exhibited accuracy, precision, and recall, underscoring its effectiveness in distinguishing individuals with cystic fibrosis from those without.

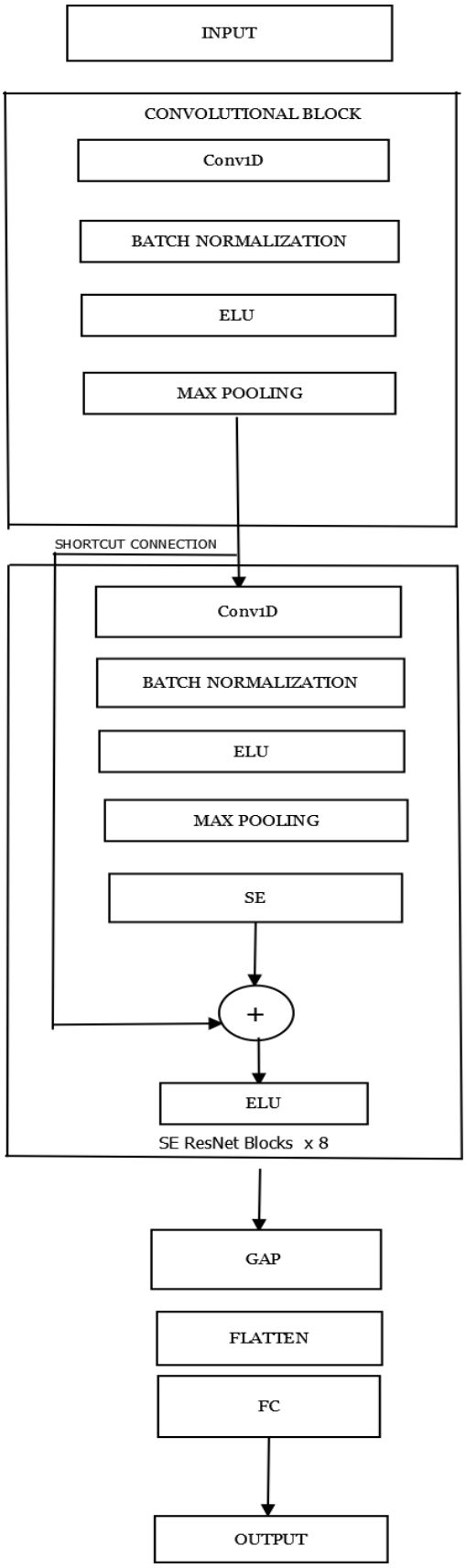

Fig. 7. Architecture diagram of Resnet-1D

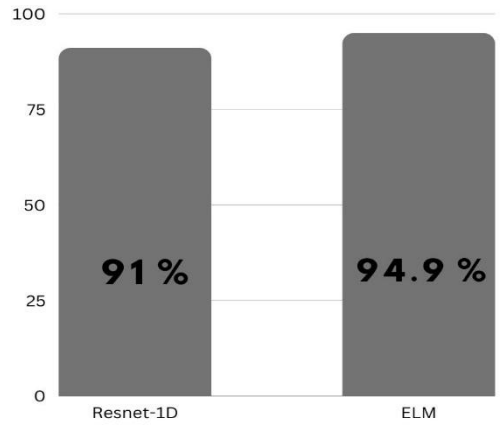

Fig. 8. Comparative Analysis of Resnet-1D and ELM

VII. RESULTS AND DISCUSSIONS

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CLASSIFICATION
-------------------------------------

Epoch 1/10
5/5 [==============================] - 1s 0s/step - loss: 0.7730 - accuracy: 0.4923
Epoch 2/10
5/5 [==============================] - 0s 4ms/step - loss: 0.6788 - accuracy: 0.5615
Epoch 3/10
5/5 [==============================] - 0s 4ms/step - loss: 0.4960 - accuracy: 0.7231
Epoch 4/10
5/5 [==============================] - 0s 4ms/step - loss: 0.4740 - accuracy: 0.9077
Epoch 5/10
5/5 [==============================] - 0s 4ms/step - loss: 0.3749 - accuracy: 0.8846
Epoch 6/10
5/5 [==============================] - 0s 0s/step - loss: 0.3174 - accuracy: 0.8615
Epoch 7/10
5/5 [==============================] - 0s 0s/step - loss: 0.2669 - accuracy: 0.9385
Epoch 8/10
5/5 [==============================] - 0s 0s/step - loss: 0.2248 - accuracy: 0.9615
Epoch 9/10
5/5 [==============================] - 0s 4ms/step - loss: 0.1944 - accuracy: 0.9385
Epoch 10/10
```

Fig. 9. Classifiaction of data

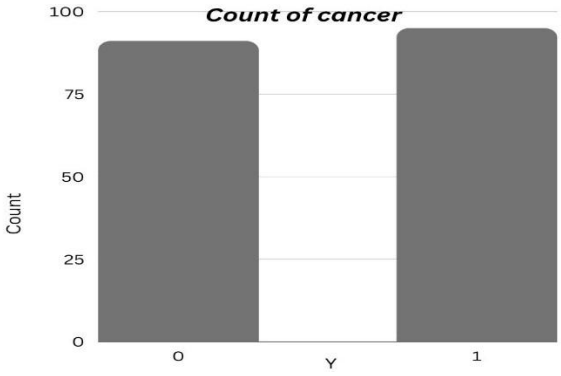

Fig. 10. Count of patients with and without disease

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-------------------------------------
     Performance ---> RESNET 1D
-------------------------------------

1. Accuracy   = 91.07142686843872 %

2. Error Rate = 0.25766411423683167
-------------------------------------
```

Fig. 11. Accuracy Achieved (RESNET-1D)

```
-------------------------------------
     PERFORMANCE -------> (ELM)
-------------------------------------

1. Accuracy   = 94.92307692307692 %

2. Error Rate = 5.076923076923077
```

Fig. 12. Accuracy Achieved (ELM)

VIII. CONCLUSION

In summary, our efforts to create an advanced genome disorder prediction model for cystic fibrosis, using cutting-edge deep learning, have produced promising results. We set out on this journey with the goal of using modern technology to improve the accuracy of cystic fibrosis prediction, ultimately enhancing patient care and outcomes.

We started by carefully selecting our data, which included a wide range of genetic, clinical, and environmental factors.

This diverse dataset provided a strong foundation for developing our model. We also made sure the data was in the best possible shape for our deep learning models by doing things like handling missing information and using Principal Component Analysis (PCA) for feature extraction.

When we tested our model, it did really well. It was accurate, precise, and good at recall. This means it was effective at identifying people with cystic fibrosis. We understand the importance of balancing these metrics based on what's needed in a medical setting, especially in minimizing the chance of false negatives.

In the real world, predicting genome disorders, especially for complex conditions like cystic fibrosis, is challenging. Our advanced model offers a promising tool for early diagnosis and intervention. It can help healthcare professionals identify people at risk and provide timely treatment, ultimately improving patient outcomes.

Cystic fibrosis has become a chronic disease in adulthood with many digestive issues. It requires expertise from gastroenterologists. Treatment has evolved from symptom management to personalized therapies that restore the function of the CFTR protein. The increasing use of CFTR modulators is expected to further improve patient survival in the coming years

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Classification of Rice Varieties Using VGG-19 and Alexnet

S. Ponmalar ; M. Devavaishnee ; M. K. Indhu Priya **All Authors** •••

Abstract

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Abstract:A comparative analysis of deep learning techniques for the classification of rice varieties. Leveraging Convolutional Neural Networks (CNNs), VGG19, and AlexNet architect... **View more**

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Abstract:
A comparative analysis of deep learning techniques for the classification of rice varieties. Leveraging Convolutional Neural Networks (CNNs), VGG19, and AlexNet architectures, we evaluate their performance on a dataset of high-resolution rice grain images. The study showcases the effectiveness of these models in accurately categorizing diverse rice varieties. Results indicate that while all models exhibit high classification accuracy, VGG19 demonstrates superior performance at the cost of increased computational resources. AlexNet, with its simpler architecture, provides competitive results with reduced computational demands. Traditional CNN architecture also performs admirably in this context. A dataset of 25 varieties of rice has been implemented. By using these algorithms the rice type can be classified and It also provides additional information of the rice and their health benefits.

Published in: 2023 3rd International Conference on Smart Generation Computing, Communication and Networking (SMART GENCON)

Date of Conference: 29-31 December 2023 **DOI:** 10.1109/SMARTGENCON60755.2023.10442412

Date Added to IEEE *Xplore*: 28 February 2024

Publisher: IEEE

ISBN Information:

Conference Location: Bangalore, India

Contents

I. Introduction

Rice plays a pivotal role in global agriculture and nutrition, necessitating accurate rice variety classification. Traditional methods are time-consuming and subjective. With the diverse array of rice varieties available, precise classification is paramount for efficient agricultural management and nutritional planning. This study introduces an innovative approach utilizing cutting-edge deep learning models, VGG19 and AlexNet, for automated rice classification. In addition to accurate categorization, this research also delves into the nutritional profiles and associated health benefits of various rice varieties. This comprehensive analysis contributes not only to improved agricultural practices but also enhances our understanding of the nutritional advantages that rice consumption offers. Leveraging deep learning, this study evaluates Convolutional Neural Networks (CNNs), VGG19, and AlexNet for automated rice classification. We aim to assess their performance using high-resolution rice grain images, providing insights into their strengths and trade-offs. This research has the potential to enhance agricultural practices by classifying the rice and providing information of the rice and their health benefits. The dataset contains 25 varieties of rice. Through this the rice variety can be identified and some knowledge about the rice and the health benefits can also be gained. Particularly it is used to identify the variety of rice where two or more rice have similar physical property but has different benefits. This paper is structured to present our methodology, experimental results, and a detailed discussion of findings . This system will play a vital role in the rice processing industry.

Authors

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Blockchain-Based Federated Learning-Convolutional Neural Network for Preserving Data Privacy and Security

Publisher: IEEE

Manoj Kumar D P ; Ananda Babu. J ; C. B. Selva Lakshmi ; Tabeen Fatima ; Rajesh N **All Authors**

Abstract

Document Sections

I. Introduction

II. Literature Survey

Abstract: The Internet of Things (IoT) and Industrial cloud computing have completely transferred the healthcare sector due to the rapid rise of distributed healthcare data. The se... **View more**

III. Proposed Methodology
IV. Experimental Results
V. Conclusion

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Abstract:
The Internet of Things (IoT) and Industrial cloud computing have completely transferred the healthcare sector due to the rapid rise of distributed healthcare data. The security and privacy of healthcare data are critical issues facing in the healthcare sector. In this research, a BlockChain-based Federated Learning-Convolutional Neural Network (BC-FL-CNN) is proposed for preserving electronic health data privacy by integrating the BC and Deep Learning (DL) approach. CNN is used to classify normal and abnormal users in the processed dataset. The abnormal users were then processed and removed from the database as well as access to the health data utilizing BC with FL approach. Existing methods such as Convolution Neural Network-BlockChain-Cryptography-Federated Learning (CNN-BC-Cryp-FL), FL, and FL Risk-based Authorization Middleware for Healthcare (FRAMH) are used to compare with the proposed BC-FL-CNN approach. The proposed BC-FL-CNN achieves better accuracy of 98.25%, precision of 97.23%, recall of 97.56%, and 97.16% f1-score when compared to the existing approaches like CNN-BC-Cryp-FL, FL, and FRAMH respectively.

Published in: 2023 International Conference on Evolutionary Algorithms and Soft Computing Techniques (EASCT)

Date of Conference: 20-21 October 2023

DOI: 10.1109/EASCT59475.2023.10393069

Date Added to IEEE *Xplore*: 22 January 2024

Publisher: IEEE

ISBN Information:

Conference Location: Bengaluru, India

Manoj Kumar D P
Department of Computer Science and Engineering, Kalpataru Institute of Technology, Tiptur, India

Ananda Babu. J
Department of Information Science and Engineering, Malnad College of Engineering, Hassan, India

C. B. Selva Lakshmi
Department of CSE, Velammal College of Engineering and Technology, India

Tabeen Fatima
Department of Computer Science and Engineering, CMR Technical Campus, Hyderabad, India

Rajesh N
Department of Electronics and Communication Engineering, Nitte Meenakshi Institute of Technology, Bengaluru, India

Contents

I. Introduction

The Internet of Things (IoT) has been used in a variety of applications, including healthcare, smart cities, and smart manufacturing to improve the quality of life, and efficiency of urban services [1]. The Internet of Medical Things (IoMT) refers to the integration of IoT in the healthcare sector. With the growth of IoMT, numerous healthcare systems are becoming interconnected, allowing devices to exchange information among AI-based services and healthcare providers [2]. This connectivity assists medical organizations like hospitals in improving the efficiency and quality of their services [3]. The privacy of users is extremely linked to health-related data in IoT devices and simple sharing or aggregation appears impossible [4]. Therefore, Federated Learning (FL) has been utilized In IoT devices to process huge amounts of information while protecting privacy by providing global parameter aggregation and local training to update models without sharing raw data [5]. Efforts towards decentralized data and privacy protection led to FL. Because blockchain technology naturally benefits decentralization, it is currently a prominent area in the FL field [6]. That is because blockchains are decentralized, they can be widely employed in education, healthcare, and a variety of appliances as well as numerous applications with FL [7]. Healthcare metaverses have the ability to cover a wide of applications, including virtual comparative scanning and metaverse medical intervention by combining modern innovations like blockchain and FL. IoMT plays a significant role in communication and networking in the development of a healthcare metaverse [8]. The primary contribution of this research is as follows:

Authors

Manoj Kumar D P
Department of Computer Science and Engineering, Kalpataru Institute of Technology, Tiptur, India

Ananda Babu. J
Department of Information Science and Engineering, Malnad College of Engineering, Hassan, India

C. B. Selva Lakshmi
Department of CSE, Velammal College of Engineering and Technology, India

Tabeen Fatima
Department of Computer Science and Engineering, CMR Technical Campus, Hyderabad, India

Rajesh N
Department of Electronics and Communication Engineering, Nitte Meenakshi Institute of Technology, Bengaluru, India

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An Evolutionary DenseRes Deep Convolutional Neural Network for Medical Image Segmentation
IEEE Access
Published: 2020

Classification of COVID-19 from Chest X-ray images using Deep Convolutional Neural Network
2020 IEEE 6th International Conference on Computer and Communications (ICCC)
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TrackBot: Building an Intelligent Multipurpose Line Follower Robot

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C. B. Selva Lakshmi ; Sandheep S ; Mani Ashwin Raaj M ; Harish Kumar P **All Authors**

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I. Introduction
II. Literature Survey
III. Problem Statement
IV. Conceptual Model
V. Methodology

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Robots are the solutions for replacing humans from dangerous and manual labour. Repetitive, non-creative manual tasks can be automated by using robots. One of the princip... **View more**

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Abstract:
Robots are the solutions for replacing humans from dangerous and manual labour. Repetitive, non-creative manual tasks can be automated by using robots. One of the principal approaches to automate robots is by line sensing principle. We create a robot that acquires the front view using a camera mounted on the vehicle then applying few processes in order to detect the lines thereby steering the vehicle autonomously.

Published in: 2024 3rd International Conference on Sentiment Analysis and Deep Learning (ICSADL)

Date of Conference: 13-14 March 2024

DOI: 10.1109/ICSADL61749.2024.00114

Date Added to IEEE *Xplore*: 25 July 2024

Publisher: IEEE

ISBN Information:

Conference Location: Bhimdatta, Nepal

Contents

I. Introduction

Nowadays, road accidents are one of the major causes of deaths occurring in this modern world and after COVID we needed to find ways to prevent ourselves from infections by human interaction with patients. [1] Robots are the solutions for replacing humans from dangerous and manual labour. Repetitive, non-creative manual tasks can be automated by using robots. One of the principal approaches to automate robots is by line sensing principle. Line tracking detection is a technology used in autonomous vehicles to identify and track the lines on a surface. This technology is used to help keep the vehicle within its line. The process of line tracking typically starts with capturing an image of the surface using a camera, typically mounted on the front of the vehicle. The image is then analysed using image processing techniques to identify the edges of the lines. Once the edges of the lines have been detected, they can be further processed to determine the position and orientation of the lines relative to the vehicle. This information can be used to control the steering of the vehicle, keeping it within the line. Overall, line tracking detection using image processing is a complex and challenging task, but it is an important technology for enabling autonomous vehicles to operate safely and efficiently.

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Combining a Novel Computer Vision Sensor with a Cleaning Robot to Achieve Autonomous Pig House Cleaning
Proceedings of the 44th IEEE Conference on Decision and Control
Published: 2005

Platform Relative Sensor Abstractions across Mobile Robots Using Computer Vision and Sensor Integration
Digital Image Computing: Techniques and Applications (DICTA'05)
Published: 2005

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High-Resolution Data-Driven Approach for Pedestrian Detection Using Deep Learning

C. B. Selva Lakshmi ; Dharshanaa S ; Dhanavidhya C **All Authors**

Abstract

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I. INTRODUCTION

II. LITERATURE SURVEY

III. PROBLEM DEFINITION

IV. IMPLEMENTATION DETAILS

V. PERFORMANCE ANALYSIS

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Pedestrian detection is one of the primary objectives in the field of computer vision demonstrating versatile applications in various domains including pedestrian monitor... **View more**

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Abstract:
Pedestrian detection is one of the primary objectives in the field of computer vision demonstrating versatile applications in various domains including pedestrian monitoring in surveillance systems and driverless automobile assistance. Since the surveillance cameras are set high to capture a wide range of areas, they produce small and noisy images. When these footage are given as input, the extracted features of the pedestrian images produce an inferior detection rate. To address the above issue, this research suggests a solution employing stationary wavelet dilated residual (SWDR) networks that significantly enhance edge details of the low-resolution images thus improving the efficiency of the pedestrian detection system.

Published in: 2024 2nd International Conference on Artificial Intelligence and Machine Learning Applications Theme: Healthcare and Internet of Things (AIMLA)

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DOI: 10.1109/AIMLA59606.2024.10531475

Date Added to IEEE *Xplore*: 21 May 2024

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ISBN Information:

Conference Location: Namakkal, India

C. B. Selva Lakshmi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Dharshanaa S
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Dhanavidhya C
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Contents

I. INTRODUCTION

Pedestrian detection is the process that involves identifying and localizing pedestrian images and videos recorded by surveillance cameras. Most of the time, the images and videos captured by the camera are of low resolution due to various factors such as adverse weather conditions, the quality of the camera, and the movement of pedestrians. In addition, the lighting conditions and background can also vary significantly [1]. Deep learning has emerged as a powerful approach to pedestrian detection, achieving top-notch performance on various benchmarks as deep learning models can learn complex feature representations from data, which can be used to detect pedestrians even in challenging conditions, such as low-resolution images, occlusion, and clutter. To overcome these challenges, this paper introduces a Deep Learning-based methodology aimed at improving the clarity of images characterized by low resolution which uses Stationary Wavelet Dilated Residual Super-Resolution (SWDR-SR) [3]. The image is decomposed into sub-images which consist of the low-frequency and the high-frequency using Stationary Wavelet Transform (SWT) and then these images undergo processing to preserve the core structure of the low-frequency images and they are subsequently collated with the high-frequency sub-images to confirm that the regenerated SR image maintains edge details while upholding accuracy [2]. The Pedestrian detection systems are often deployed in real-time applications including driverless vehicles, robotic navigation, surveillance systems and so on [3]. The system's performance is evaluated using the YOLOv5 (You Only Look Once version 5) algorithm [1].

Authors

C. B. Selva Lakshmi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Dharshanaa S
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Dhanavidhya C
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

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Iot Based Adaptive Street Lighting System for Rural Area

C. B. Selvalakshmi ; N Raja Alagurishi ; T Aravind **All Authors** •••

Abstract

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I. Introduction
II. Existing System and Proposed System
III. Flowchart
IV. Major Components
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Adaptive street lighting system presents an innovative energy-efficient smart lighting technique that leverages advanced technologies, including Internet of Things (IoT) ... **View more**

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Abstract:
Adaptive street lighting system presents an innovative energy-efficient smart lighting technique that leverages advanced technologies, including Internet of Things (IoT) sensors and adaptive control algorithms. This introduces a cutting-edge energy-efficient smart street lighting technique designed to address the growing need for sustainability and energy conservation in rural environments. The proposed system utilizes a network of sensors to detect real-time environmental conditions, such as ambient light levels and pedestrian or vehicular presence. Based on this data, an adaptive control algorithm dynamically adjusts the brightness of streetlights, ensuring they provide adequate illumination while minimizing energy consumption. Depending upon number of vehicles passed during night, streetlights are operated at four different intensities that is from 20% to 50% with the step size of 10% in the absence of vehicles while operating at 100% intensity upon vehicle's arrival. This dimming operation not only enhances the life span of streetlights but also enables significant conservation of energy up to 84%. This system smartly takes an action based on the presence or absence of vehicles and sunlight via light dependent resistor (LDR), infrared (IR) sensors and Passive infrared (PIR) sensor.

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DOI: 10.1109/ICDECS59733.2023.10502780

Date Added to IEEE *Xplore*: 22 April 2024

Publisher: IEEE

ISBN Information:

Conference Location: Bangalore, India

C. B. Selvalakshmi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

N Raja Alagurishi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

T Aravind
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Contents

I. Introduction
In an era marked by rapid urbanization and increasing demands on energy resources, the need for sustainable and efficient rural infrastructure has been more critical. One area where innovation holds immense potential is street lighting. The primary objective of this systems leverage advanced sensors, adaptive control algorithms, and energy-efficient light sources, such as Light Emitting Diodes (LEDs), to optimize the provision of illumination while minimizing energy consumption. Moreover, it contributes to reducing light pollution, minimizing the carbon footprint, and promoting a safer and more sustainable rural environment. This energy-efficient smart street lighting technique represents a significant step towards achieving greener and smarter villages in the modern era of urbanization and digitalization.

Authors

C. B. Selvalakshmi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

N Raja Alagurishi

Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

T Aravind
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

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Hourly Journal: A Mobile App for Optimizing Your Daily Routines

Publisher: IEEE

S Sureshkumar ; S Suryavarshini ; P. Chellammal ; K R. Senthil Murugan ; P. Kavitha Rani ; R Kaviyaraj **All Authors**

Abstract

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I. Introduction

II. Literature Survey

II. Design Proposed System

IV. Result Analysis and Discussions

V. Conclusion and Future Work

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Abstract:
There are certain apps to record how people spent their day and whether they lived the day as per their goals. But these only make people feel guilty for having wasted the day or happy on being productive, but no app shows what is the pattern for success and failure. But with Hourly Journal it is possible to understand the pattern of daily time investments and fix it, empower it and grow in life overall. Mobile application development is becoming more popular due to the expanding popularity of smartphones and tablets. Traditional software development has had a significant influence on the development of mobile apps. However, the ultimate product is software designed to take use of mobile devices' specific capabilities and technology. To solve the problem of performance on each specific device, you must first design an app for that device. This implies writing code that is tailored to the exact hardware of a certain device. In the case of iOS devices, this is simple since mobile developers simply need to create apps for the iPhone and iPad to make their apps universally usable. For Android devices, on the other hand, the hardware and operating system versions vary from device to device. With the Hourly Journal available in the palm of your hand, people can use it as a modern-day diary, with revolutionary futuristic insights into the patterns of people's activities and tendencies. Based on tag tracking there is scope for human behavioral prediction in future too.

Published in: 2023 7th International Conference on Intelligent Computing and Control Systems (ICICCS)

Date of Conference: 17-19 May 2023 **DOI:** 10.1109/ICICCS56967.2023.10142712

Date Added to IEEE *Xplore*: 08 June 2023

Publisher: IEEE

ISBN Information:

Conference Location: Madurai, India

ISSN Information:

Contents

I. Introduction

Journaling is a wide spread concept that enables oneself to keep track of their life and wellbeing. Aided with the power of smart phones, this concept can be taken to a deeper level. Smart phones being a companion to an individual, it increase the likelihood of keeping track of life with just ping to the person. Hourly Journal is developed as a mobile application to encourage user to think it as a pocket journal, where they will be prompted to note each hour and later reflect back on their day, week or month. With additional capabilities of Cloud Computing, these journals are backed up in Cloud and readily available to the individual on the go [1]. Hourly Journal also provides multi device support for those who uses more than one device in their day to day life. Everything is synced using an Authentication mechanism, thus keeping their journal safe and secure.

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IOT Based Road Accident Detection and Prevention System

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IV. Motivation

V. Challenges

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Abstract:
According to statistics conducted by the WHO (World Health Organization), road traffic injuries claim the lives of more than 50% of people each year. where head injuries are the primary cause of fatality for riders of two-wheelers. These death ratios can be reduced by making helmet use mandatory. Wearing a helmet can reduce the number of deadly wounds by 75%. Furthermore, according to WHO, the likelihood of driving while intoxicated is increasing globally, which increases the risk of a serious traffic collision. Additionally, there are certain rural locations in the world with lower human traffic. Due to the emergency services' response time being delayed, riders in this situation lost their lives. Despite the fact that a number of awareness campaigns have been launched and laws have been enacted in the interests of the populace, people continue to break the law, including those prohibiting driving while intoxicated. therefore, a problem-solving strategy is to design an original prose paper on " Use of safety equipment is required for detecting alcohol and battery fires with an embedded system. ". The paper's extra features include the use of GSM technology, which notifies the owner in the event of a fire or drunken accident.

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DOI: 10.1109/iQ-CCHESS56596.2023.10391565

Date Added to IEEE *Xplore*: 15 January 2024

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Conference Location: KOTTAYAM, India

Kr Senthil Murugan
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

L R Sonal
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

S Sureshkumar
Department of Computer Science and Engineering, J.J College of Engineering and Technology, Trichy, India

K Shrimeenatchi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

M Srinithi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

R Swatheka
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Contents

I. Introduction

A “automobile accident,” also known as a “movement crash” happens once a vehicle crashes with alternative vehicle, a immobile object, a person, an animal, or both. “There are many traffic accidents that just cause injury or damage, but there are also plenty that cause serious injury or death. There are numerous circumstances that might result in vehicle crashes, and these incidents are occasionally addressed by legal consequences. [1]. There are practically infinite many reasons why vehicles crash. Many vehicle accidents are caused by weather and poor road conditions, but many accidents also occur when drivers fail to concentrate on their surroundings and the functioning of their vehicles. Drivers can prevent serious accidents by being aware of the factors that contribute to vehicle safety A motorist who causes an automobile accident may be subject to both civil and criminal penalties depending on the circumstances.

Authors

Kr Senthil Murugan
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

L R Sonal
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

S Sureshkumar
Department of Computer Science and Engineering, J.J College of Engineering and Technology, Trichy, India

K Shrimeenatchi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

M Srinithi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

R Swatheka
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

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2021 Third International Conference on Inventive Research in Computing Applications (ICIRCA)
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Pneumonia Classification from CXR images

Kr Senthil Murugan ; K Murugan ; M Aravintha Kumar ; R Deepalakshmi ; J Jesson Daniel **All Authors**

Abstract

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I. Introduction

II. Related Works

III. Description of Dataset

IV. Proposed Methodology

V. Implementation

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Abstract: Pneumonia is one of the most common and serious respiratory infections. It occurs due to inflammation of alveoli and air sacs filled with other substances like pus and mu... **View more**

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Abstract:
Pneumonia is one of the most common and serious respiratory infections. It occurs due to inflammation of alveoli and air sacs filled with other substances like pus and mucus. It affects the lungs and makes it delicate to breathe. Colorful pathogens can cause pneumonia. Numerous algorithms have surfaced to describe pneumonia. In this paper, we will see one similar effective and accurate algorithm that detects pneumonia by using casketX-Ray images(CXR). This paper introduces an LSTM model that uses deep learning and Convolutional Neural Networks (CNNs) to detect pneumonia. The model is also suitable to separate bacterial and viral pneumonia. A similar bracket will be veritably helpful for croakers. The results of our work show that we're suitable to separate COVID pneumonia and bacterial pneumonia. As COVID-19 pneumonia is contagious, we can take preventive measures fluently with the proposed system. Our system provides a delicacy of 93.72 percent and perceptivity of 92.80 percent. The deep literacy model that we achieved made for better perfection.

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Kr Senthil Murugan
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

K Murugan
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

M Aravintha Kumar
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

R Deepalakshmi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

J Jesson Daniel
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

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I. Introduction

As the earth gets older, the count of pathogen types on this earth increases. In 2019, we've faced one of the deadliest contagions called COVID. Those contagions can spread through the air and infect others, too. Some of those contagions cause severe damage, like respiratory problems. Pneumonia is one of those serious respiratory infections. Pneumonia is caused by various pathogens like Streptococcus pneumonia, SARS-CoV-2-2, and Influenza contagion. When highly dangerous pathogens like contagions enter the lungs, ground-glass nebulosity in the casket X-rays is seen due to fibrosis. Because X-ray images of infected and non-infected people look very different, we can use artificial intelligence to tell if someone has an infection and how severe it is.

Authors

Kr Senthil Murugan
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

K Murugan
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

M Aravintha Kumar
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

R Deepalakshmi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

J Jesson Daniel
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

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An Approach to Detect Cardiomegaly, COVID-19, Pneumonia, Pneumothorax and Tuberculosis from CXR Images Using Ensembles of Deep Learning
2023 26th International Conference on Computer and Information Technology (ICCIT)
Published: 2023

Discerning COVID-19 from mycoplasma and viral pneumonia on CT images via deep learning
2020 4th International Symposium on Multidisciplinary Studies and Innovative Technologies (ISMSIT)
Published: 2020

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Sales Forecasting using SARIMAX for B2C

Kr Senthil Murugan ; R Prathiba Selvi ; S Dheeksha ; R. Deepalakshmi ; B Paul Steve Mithun All Authors

Abstract

Document Sections

I. Introduction
II. Related Works
III. Description of Dataset
IV. Proposed Methodology
V. Implementation

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Abstract: Sales forecasting is the process of predicting future sales and revenue for a business or organization. It involves using historical sales data, market analysis, and vari... **View more**

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Abstract:
Sales forecasting is the process of predicting future sales and revenue for a business or organization. It involves using historical sales data, market analysis, and various quantitative and qualitative methods to make educated estimates about future sales performance. The primary goal of sales forecasting is to provide valuable insights and information that can guide business decisions, resource allocation, and strategic planning. Accurate sales predictions enable businesses to avoid overstocking or understocking situations, optimizing their inventory levels to meet customer demand while minimizing carrying costs. In this paper, we will see about one such efficient and accurate algorithm that forecast the sales based on the historical values and its seasonality. A SARIMAX model has been proposed in this paper which is the seasonal version of the ARIMA model to predict the future sales. The model is also enables the business people to view the sales based on its periodicity. Such classification will be very helpful for business people to identify the sales for the particular period or month. A graph is plotted for the forecasted value based in the inputs from the individual. This helps the individual to avoid the overstocking and understocking of goods. Our system provides rmse value of 337.5 whereas the mape value as 6.97. The error rate of the system is comparatively low.

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Kr Senthil Murugan
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

R Prathiba Selvi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

S Dheeksha
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

R. Deepalakshmi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

B Paul Steve Mithun
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

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I. Introduction

Sales forecasting in today's world is both more challenging and more data-driven than ever before. With rapid technological advancements, changing consumer behavior, and global economic fluctuations, businesses need to adapt their forecasting strategies to remain competitive. Modern sales forecasting heavily relies on data analytics and big data. Companies gather and analyze vast amounts of data from various sources, including sales records, customer interactions, online behavior, social media, and more. Big data technologies allow for the processing and analysis of massive datasets to uncover meaningful insights.

Authors

Kr Senthil Murugan
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

R Prathiba Selvi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

S Dheeksha
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

R. Deepalakshmi
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

B Paul Steve Mithun
Department of Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Skin Cancer Classification using Deep Learning Algorithms

Publisher: IEEE

Kr Senthil Murugan ; A S V Jayamaharaja ; R Vishal ; R Deepalakshmi ; P Balamurugan **All Authors**

Abstract

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II. Related Works

III. Description of Dataset

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Abstract: Skin cancer detection, acritical facet of dermatology, has witnessed significant advancements through deep learning methodologies. Leveraging the ISIC dataset, this proje... **View more**

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Abstract:
Skin cancer detection, acritical facet of dermatology, has witnessed significant advancements through deep learning methodologies. Leveraging the ISIC dataset, this project introduces a potent approach to multi-class skin lesion classification, emphasizing skin cancer identification, which achieves an impressive accuracy rate of 90%. The methodology meticulously selects, preprocesses, and augments the dataset to ensure diversity and data quality. Centered on Convolutional Neural Networks (CNNs), with considerations for transfer learning and strategic dropout integration, the model exhibits robustness. Rigorous evaluations, encompassing diverse performance metrics, provide comprehensive insights. Additionally, potential deployment avenues, such as API development and cloud-based solutions, are explored. This research underscores the substantial accuracy gains attainable with the ISIC dataset and the transformative potential of deep learning in advancing skin cancer diagnosis, offering hope for enhanced patient care and outcomes.

Published in: 2023 International Conference on Data Science, Agents & Artificial Intelligence (ICDSAAI)

Smart Campus Surveillance: Detecting Rule Breakers with Deep Learning

Publisher: IEEE

R Deepalakshmi ; Senthil Murugan K R ; Arunnachalam R S ; Mohamed Asif B **All Authors**

Abstract

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Abstract: Advancement in Technology have created huge impact on all sectors like Education, Business and Industrial sector. Deep learning algorithms have made these technology to a... **View more**

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IV. Results and Discussion

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Abstract:
Advancement in Technology have created huge impact on all sectors like Education, Business and Industrial sector. Deep learning algorithms have made these technology to another level in terms of speed, accuracy and efficiency of the data. Deep learning algorithms can be implemented in educational sector to improves its advancement in technology. This project implements Deep Learning for Smart Campus Surveillance which detects rule breakers effectively. Wearing identity card is one of the major rule in campus but avoiding them, it will be considered as rule breaker. There are few dataset available for detecting identity card in campus. For this problem, Dataset of detecting identity cards have been created with 6000 images. Advanced Deep learning algorithms like YOLO (You Only Look Once) for object-detection and Convolutional neural networks(CNN) for facial recognition. Yolov7 detects the identity card with two classes id card wearing and identity card not wearing datasets. It produces 70.6% mAP, 91.3% precision, and78.5 % recall.

Published in: 2023 4th International Conference on Communication, Computing and Industry 6.0 (C216)

Date of Conference: 15-16 December 2023

DOI: 10.1109/C2I659362.2023.10431078

Date Added to IEEE *Xplore*: 19 February 2024

Publisher: IEEE

ISBN Information:

Conference Location: Bangalore, India

Contents

I. Introduction

Modern day problems are solved from modern day solutions. Technology advancement in the world have created huge impact on every sector. Most of the industrial and IT sector have been moved to deep learning and artificial intelligence for improving their business. Artificial intelligence (AI) has a branch called deep learning that trains computers to interpret data similarly to humans. To provide precise predictions and outcomes, deep learning models may be used to identify intricate patterns in photos, text, audio, and other data. Deep learning algorithms can be implemented in the educational sector for improving campus environment and increases learning opportunities. Campus become smart campus with the help of deep learning and artificial intelligence. In the area of AI known as computer vision, objects and people can be recognized and understood by computers in both photos and videos. With a training dataset, computer vision employs machine learning algorithms to recognize the face of a person in a video. Computer Vision can be used for facial recognition and object detection in video or image and detects the rule breakers of the campus. Smart campus Surveillance that uses deep learning is a transformative approach to ensuring a safe and compliant environment in educational institutions. Rules of the campus must be followed by all the student inside the campus. Wearing of identity card is one of the strict rule of all campus, if any student doesn't wear identity cards they have to be marked as rule breakers of the campus. They must wear identity card and follow the rules of the campus regularly.

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The Effects of Augmented Training Dataset on Performance of Convolutional Neural Networks in Face Recognition System
2019 Federated Conference on Computer Science and Information Systems (FedCSIS)
Published: 2019

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Campus Surveillance: Deep Learning-Based Rules Violation Detection

Publisher: IEEE

R. Deepalakshmi ; Senthil Murugan K R ; Arunnachalam R S ; Mohamed Asif B **All Authors** •••

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Cutting edge Innovation had made big affect in areas in Technical, Trade and Mechanical Sectors. Deep learning calculations had created those innovation into great enhanc... **View more**

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Abstract:
Cutting edge Innovation had made big affect in areas in Technical, Trade and Mechanical Sectors. Deep learning calculations had created those innovation into great enhancement for the quick, exactness and effectiveness in information. Deep learning Methods could executed in Campus Areas to moves forward its headway in innovation. The paper proposes Deep Learning in college camera which recognizes run the rule violators successfully. Wear ID Card and Wearing Shoes is one of the important rules in Campus, but in today's world limited datasets for the recognizing identity card and shoes. For this issue, Dataset for recognizing the Rule Violators have been made with 5000 pictures. Enhanced deep learning calculations like YOLO for object recognition and Convolutional neural networks to facial detection. YOLO verifies the identity card and Shoes from Pictures and Video. It gives about 80.6% mAP,90.3 % precision, and 76.5% recall.

Published in: 2024 14th International Conference on Cloud Computing, Data Science & Engineering (Confluence)

Date of Conference: 18-19 January 2024

DOI: 10.1109/Confluence60223.2024.10463401

Date Added to IEEE *Xplore*: 21 March 2024

Publisher: IEEE

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ISBN Information:

ISSN Information:

Conference Location: Noida, India

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I. Introduction

Innovation progression within the world have made enormous effect on each division. Majority Business and IT division had transferred into deep learning with moving forward their beneficial. Artificial insights (AI) incorporates a concept known deep learning train machines for the decipher information so also to people. To supply exact expectations and results, deep learning methods could utilized for identify designs on photographs, content, sound with other information. deep learning calculations may be actualized within in the instructive division for moving forward college surrounding and increments studying openings. Campus can change into intelligent campus with the assistance of deep learning. Computer Vision can recognize objects and people in pictures and videos. The trained data, computer vision utilizes learning calculations to predict the facial features of a individual in footage. Computer Vision will utilized for face acknowledgment with object recognition in footage or picture and identifies the rule breakers of the campus. Rules of the college should be taken after all understudy interior the campus. Wear of identity card and Wearing Shoes and Proper Formal Dress is the compulsory rules in campus, if a student didn't Follow them they will be detected as rulebreaker in the area of the campus. They should Appropriately take after the regulations and rules for the campus Entirely. Recent and the foremost precise for specific objects recognitions methods YOLO methods are presented for the deep learning calculations. YOLO has more upgraded object recognition technique in artificial intelligence. The basic rule of YOLO is the capture and full images on the run times one time into the method deep neural networks. The YOLO strategy employments deep learning calculations to distinguish object like ID cards and Shoes to monitor the rules breaker within the area. YOLO recognizes ID card and shoes is wear or not and after that they got to identify the Facial for every student within the campus from footage or picture. This permits the real time recognition and following of objects inside the campus surveillance videos. Facial detections includes recognizing and verifying the facial recognized within the footage or picture. Detecting faces in a outline of video or an picture is an essential objective of Facial recognition. The haar cascade classifier may be utilized strategy for recognizing facesin video or pictures. As of late deep learning strategies like Convolution neural network for identify their facial detection with precise and viably. Convolutional Neural Network are great for machine learning and picture detection application. Through facial points of interest and surfaces,

neural network can distinguish features. The proposed method initially identifies a facial within footage and stores the face of the person along with their data in a database. Another method in deep learning is facial acknowledgment, which includes identifying face employing a person face landmark features. Numerous technologies utilize face acknowledgment to look at and affirm a person's recognizable proof. Facial verification in real-world technologies takes utilize of methods like machine learnings and deep learnings. Face identification could be utilized by Teaching sectors like college to distinguish and verifies the facial feature in the student to guarantee the of the place. Face acknowledgment needs precise gathered datasets toidentify and verify the image face. TensorFlow and Keras, basicCNN could utilized to Face acknowledgment.

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Research on Fire Detection Method of Surveillance Video in Laboratory Management Based on Deep Learning and Motion Features
2023 3rd International Signal Processing, Communications and Engineering Management Conference (ISPCEM)
Published: 2023

Deep Learning based Target detection and Recognition using YOLO V5 algorithms from UAVs surveillance feeds
2023 International Conference for Advancement in Technology (ICONAT)

Published: 2023

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Unmasking the Abnormal Events in Videos Using Deep Learning

Publisher: IEEE

D. Guhapriya ; K. Kiruthika ; S. Padmadevi **All Authors**

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Abstract:
Surveillance systems greatly benefit from video-based anomaly detection as it helps to improve security measures and situational awareness. This research paper presents a... **View more**

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Abstract:
Surveillance systems greatly benefit from video-based anomaly detection as it helps to improve security measures and situational awareness. This research paper presents a novel methodology for anomaly detection using deep learning techniques, specifically the Long-term Recurrent Convolutional Network (LRCN). The suggested methodology integrates long short-term memory (LSTM) layers to capture temporal relationships and convolutional neural networks (CNN) to extract spatial features within video sequences. This methodology is evaluated on a diverse dataset encompassing various human activities, both normal and anomalous. Performance metrics, including False Alarm Rate, Area Under the ROC Curve (AUC), and Accuracy, demonstrate the usefulness and superiority of the suggested approach over existing methods. The results highlight the potential of this approach to enhance security and surveillance applications.

Published in: 2024 International Conference on Communication, Computing and Internet of Things (IC3IoT)

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Date of Conference: 17-18 April 2024

DOI: 10.1109/IC3IoT60841.2024.10550295

Date Added to IEEE *Xplore*: 11 June 2024

Publisher: IEEE

ISBN Information:

Conference Location: Chennai, India

Contents

I. Introduction

In today's world, there is a growing need for security, particularly in public areas like supermarkets, airports, schools, train stations, and busy streets [1]. Surveillance cameras play a crucial role in monitoring daily activities and identifying unusual events. The main purpose of deploying surveillance cameras is to identify abnormal human behaviours [1]. This task is of utmost importance in situations requiring human intervention, such as crime prevention and counterterrorism efforts [1]. Anomaly detection concerns recognising atypical events or things that diverge from designated patterns or elements in the dataset [2].

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Research on Deep Learning Model of Feature Extraction Based on Convolutional Neural Network

2024 IEEE 2nd International Conference on Image Processing and Computer Applications (ICIPCA)

Published: 2024

A Novel Deep Learning Framework by Combination of Subspace-Based Feature Extraction and Convolutional Neural Networks for Hyperspectral Images Classification

IGARSS 2018 - 2018 IEEE International Geoscience and Remote Sensing Symposium

Published: 2018

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Ayurvedic Elixirs for Digital Generation Using Machine Learning

Publisher: IEEE

M. N. S. Pavithra ; M. Harshini ; S. Padmadevi ; R. Deepalakshmi ; R. Vijayalakshmi **All Authors**

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To improve individualized healthcare, this study proposes an innovative Ayurvedic medication recommendation system that makes use of a knowledge graph structure. The syst... **View more**

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Abstract:
To improve individualized healthcare, this study proposes an innovative Ayurvedic medication recommendation system that makes use of a knowledge graph structure. The system uses a knowledge graph to describe the complex connections between ailments and their accompanying medications, giving a thorough depiction of Ayurvedic therapeutic concepts. Users provide their exact disease as well as important details including age and pertinent health issues, such as diabetes, as well as their unique sickness. After that, the algorithm deftly eliminates medications that are incompatible with the specified demographic data, resulting in a personalized and secure suggestion. This system's use of the Hyperlink-Induced Topic Search (HITS) algorithm sets it apart from others. By carefully incorporating HITS, drugs are awarded authority and hub scores inside the knowledge graph, allowing the system to identify the most authoritative and influential treatments for a certain condition. To provide a tailored and effective suggestion process, medications are then offered to the user in a prioritized manner depending on their rankings. In addition to streamlining the selection process, this innovative method for recommending Ayurvedic medications also makes sure that the medicines match the user's unique health profile. Our approach provides a paradigm change in Ayurvedic healthcare by combining the

More Like This

strength of knowledge graphs with the accuracy of the HITS algorithm, opening the path for more efficient and customized treatment plans.

Published in: 2024 Second International Conference on Emerging Trends in Information Technology and Engineering (ICETITE)

Date of Conference: 22-23 February 2024

DOI: 10.1109/ic-ETITE58242.2024.10493477

Date Added to IEEE *Xplore*: 18 April 2024

Publisher: IEEE

ISBN Information:

Conference Location: Vellore, India

Contents

I. Introduction

Introducing our Ayurvedic Medicine Recommendation System, an innovative approach supported by a knowledge graph that artfully captures the connections between diseases and medicines. Ayurveda's holistic and personalized approach to health drew us into its world in our desire to reshape healthcare decision-making. Our key contribution is to provide personalized pharmaceutical prescriptions that address various health requirements, spanning the gap between conventional Ayurvedic knowledge and modern technology. Ayurveda is based on a holistic approach to medicine that aims to balance all aspects of a person's life—their body, mind, intellect, and soul—to heal human ailments [1].

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Comparative Analysis on Diabetes Dataset Using Machine Learning Algorithms
2021 6th International Conference on Communication and Electronics Systems (ICCES)
Published: 2021

Detecting Diabetes Using Machine Learning Algorithms
2022 Iraqi International Conference on Communication and Information Technologies (IICCIT)
Published: 2022

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Enhancing Parkinson's Disorder Detection Accuracy: A Machine Learning Approach for Analyzing Voice Signals

Publisher: IEEE

S.B. Megasri ; P. Shabana Shree ; S. Padmadevi ; R. Deepalakshmi ; R. Vijayalakshmi **All Authors**

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Parkinson's disease is an autoimmune disorder characterized by the death of neurons in the brain that synthesize dopamine, which results in a broad spectrum of symptoms. ... **View more**

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Abstract:
Parkinson's disease is an autoimmune disorder characterized by the death of neurons in the brain that synthesize dopamine, which results in a broad spectrum of symptoms. Among these, speech and voice-related issues, collectively known as Parkinson's-related voice or speech disorders, are common and significantly affect patients' communication abilities. Resting tremors, a hallmark symptom of Parkinson's, can affect the vocal cords, causing a shaky or trembling voice. Patients often exhibit reduced volume, speaking softly and making it challenging for others to hear them. Additionally, some individuals may experience stuttering or stammering as a result of the disease's impact on speech control. To address the challenge of timely identification of Parkinson's disease, it has been brought forward to use a multilayer neural network that utilizes machine learning models and a curated dataset by Max Little. This system employs meticulous feature selection of the voice signals and data preprocessing techniques to enhance model performance. Among the various machine learning methods explored, the Multilayer Neural Network stands out, achieving exceptional training and testing accuracy rates of 100.00% and 98.43 %, particularly excelling in distinguishing between positive and negative cases. The effectiveness of this method demonstrates the capability of machine learning to enhance the initial identification and therapy of Parkinson's disease. It offers a powerful tool for healthcare professionals and researchers, aiding in patient care and advancing our understanding of this complex condition. By leveraging data-driven insights, this system aims to make significant strides in the realm of Parkinson's disorder. At some point, this will improve patient outcomes and quality of life.

Published in: 2024 Second International Conference on Emerging Trends in Information Technology and Engineering (ICETITE)

Date of Conference: 22-23 February 2024

DOI: 10.1109/ic-ETITE58242.2024.10493696

Date Added to IEEE *Xplore*: 18 April 2024

Publisher: IEEE

ISBN Information:

Conference Location: Vellore, India

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I. Introduction

Parkinson's disorder is a multifaceted and chronic neurological disorder that impacts a person's capacity to control their motions. Named after Dr. James Parkinson, who first described its symptoms in 1817, it is distinguished by a variety of physical and psychological signs caused by the deterioration of specific whim-whams cells in the brain. Parkinson's complaint manifests with a diapason of symptoms, primarily characterized by motor impairments. These include resting temblors, frequently beginning in one hand and progressing to other branches, bradykinesia, which results in slowness of movement and difficulties in initiating voluntary conduct, and severity, causing stiffness and limited inflexibility in muscles. Postural insecurity is common, making maintaining balance and collaboration a challenge, while freezing of gait can lead to unforeseen, temporary immobility while walking. Reduced automatic movements, similar to blinking and facial expressions, may affect a mask- suchlike appearance. Speech and swallowing difficulties can arise, with vocalized speech and choking pitfalls. Non-motor symptoms, like depression, anxiety, and cognitive changes, are also current, affecting a person's emotional and cognitive well-being. The constellation of these symptoms makes Parkinson's complaint a complex and grueling condition to manage, challenging comprehensive care and support [6]. An innovative deep-literacy fashion has been introduced to cover the premotor stage of Parkinson's complaint, enabling early discovery grounded on a range of pointers similar to Rapid Eye Movement, Cerebrospinal fluid data, and dopaminergic imaging labels. This model outperforms twelve other machine literacy and ensemble literacy styles, achieving an emotional average delicacy for distinguishing between 183 healthy individualities and 401 early-stage PD cases, while also furnishing perceptivity into point significance through Boosting styles [9]. The proposed system utilizes a well- documented dataset by Max Little, for diagnosing Parkinson's Disease. This UCI-created dataset features speech recordings from 195 persons, 23 of

whom have Parkinson's illness and 8 healthy people, with 24 attributes. Feature selection is employed to choose relevant features, dropping the ‘name’ and 'status' columns. Data standardization ensures uniform scaling. A Multilayer Neural Network is constructed with input and hidden, fine-tuning hyperparameters using the Keras Sequential API and ‘RandomSearch’ tuner. It uses dropout layers for regularization. The model is developed using the Adam optimizer and the notion of binary cross-entropy loss. After training, the system evaluates performance and builds a prediction system. Finally, a classifier selects the best model based on accuracy scores. The system's ability to fine-tune and select the best model based on accuracy scores ensures robust performance. Ultimately, this innovative solution holds promise for improving the timely identification and management of Parkinson's Disorder.

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Training Machine Learning Classifiers on Differentiating Major Depressive Disorder and Parkinson's Disease Using Cognitive Performance
2023 International Conference on Information Technology (ICIT)
Published: 2023

Parkinson’s Disease Detection using Machine Learning Algorithm
2023 8th International Conference on Communication and Electronics Systems (ICCES)

Published: 2023

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Smart Language Checker: A Machine Learning Solution for Offensive Language detection in Social Media

Publisher: IEEE

S Kavitha ; J V Anchitaalagammai ; S Murali ; R Deepalakshmi ; L R Himal ; M S Suryakanth **All Authors**

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Social media serves as a prominent platform for individuals to express their thoughts, often encompassing both positive and offensive language. Less resource-rich languag... **View more**

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Abstract:
Social media serves as a prominent platform for individuals to express their thoughts, often encompassing both positive and offensive language. Less resource-rich languages benefits from automated offensive language detection systems. This article addresses this gap by proposing a model tailored for the low-resource language. Leveraging a manually labeled dataset of 60,000 comments from the dataset collected from various social media sources, the proposed model explores three feature extraction techniques: bag-of-words (BoW), Vectorization-Term frequency-inverse document frequency (TF-IDF), and Tokenization methods. Employing both traditional classifiers and a deep sequence model, the study reveals that the random forest classifier excels, achieving a testing accuracy of 94.07% when considering unigrams, bigrams, and trigrams. Furthermore, TF-IDF yields a maximum accuracy of 93.90%.The corpus generated in this endeavor is made accessible to researchers in this field, facilitating advancements in offensive language detection for English.

Published in: 2023 International Conference on Data Science, Agents & Artificial Intelligence (ICDSAAI)

Date of Conference: 21-23 December 2023

DOI: 10.1109/ICDSAAI59313.2023.10452454

Date Added to IEEE *Xplore*: 04 March 2024

Publisher: IEEE

▶ **ISBN Information:**

Conference Location: Chennai, India

Contents

I. Introduction

In the dynamic landscape of social media, the proliferation of online communication has brought people together across the globe. However, this digital interconnectedness has also rised to a concerning issue: the rampant use of offensive language and hate speech. The cloak of anonymity that social media provides often emboldens individuals to express harmful sentiments, making it crucial to devise effective strategies to tackle this challenge. Machine learning, particularly techniques rooted in Natural Language Processing (NLP), has emerged as a promising avenue for mitigating offensive language in social media platforms.

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Hate Speech Detection using Deep Learning and Text Analysis

2023 7th International Conference on Intelligent Computing and Control Systems (ICICCS)

Published: 2023

Detection of Hate Speech by Employing Support Vector Machine with Word2Vec Model
2021 7th International Conference on Electrical, Electronics and Information Engineering (ICEEIE)
Published: 2021

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MineBot: Intelligent Mining Query Assistant

Publisher: IEEE

R. Deepalakshmi ; K. Arunasakthi ; G Vinoth Chakkaravarthy ; Suresh G ; Sanjay Ram S **All Authors**

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The mining industry, a cornerstone of global economic development, is the process of obtaining minerals from a mine. It operates under the scrutiny of a complex legal fra... **View more**

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Abstract:
The mining industry, a cornerstone of global economic development, is the process of obtaining minerals from a mine. It operates under the scrutiny of a complex legal framework encompassing numerous Acts, Rules, and Regulations. Navigating this intricate maze of legislation can be overwhelming for stakeholders in the mining sector. The existing methods for accessing, interpreting, and staying updated on mining-related legislation are often time-consuming and prone to errors. In response, we introduce a Mining Chatbot powered by RASA, an open-source conversational AI platform. The Mining Chatbot paper harnesses the capabilities of RASA, an AI-driven conversation management platform, to deliver an intelligent and responsive solution. Our proposed system leverages RASA's core components, including Natural Language Understanding (NLU), dialogue management, and integrations. Users can quickly access specific legal information, reducing the time and effort required to navigate complex legal documents. RASA's NLU capabilities ensure that the chatbot provides precise responses, minimizing the risk of misinterpretation. This chatbot, powered by RASA, is poised to revolutionize the way stakeholders in the mining industry access and understand mining-related legislation.

Published in: 2024 11th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO)

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ISBN Information:

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ISSN Information:

R. Deepalakshmi
Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

K. Arunasakthi
Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

G Vinoth Chakkaravarthy
Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Suresh G
Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Sanjay Ram S
Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

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I. Introduction

The mining industry stands as a hidden backbone of industrial growth and economic progress, serving as the lifeblood for the production of indispensable natural resources. It is one of the major suppliers of the raw materials needed for manufacturing, infrastructure development, and energy production. The significance of this industry resonates across sectors, making it a linchpin in the global economic landscape. The mining industry's importance is multifaceted. It not only provides essential minerals, metals, and energy resources but also generates employment opportunities, fosters technological advancements, and fuels economic growth. From powering homes to building cities and driving technological innovations, the industry's contributions are ubiquitous. However, the mining industry operates within a complex legal framework governed by a multitude of Acts, Rules, and Regulations [2].

Authors

R. Deepalakshmi
Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

K. Arunasakthi
Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

G Vinoth Chakkaravarthy
Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Suresh G
Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

Sanjay Ram S
Computer Science and Engineering, Velammal College of Engineering and Technology, Madurai, India

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Published: 2021

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2019 IEEE Integrated STEM Education Conference (ISEC)
Published: 2019

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Cardiomegaly Prediction Using Computer Vision

K. Arunasakthi ; Dhaneshvarraj A K B ; Koushikram N S ; R. Deepalakshmi ; G Vinoth Chakkaravarthy **All Authors**

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Abstract: Cardiomegaly, the enlargement of the heart, poses a significant challenge in the field of healthcare. Outdated diagnostic methods often lead to delayed detection and inte... **View more**

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Abstract:
Cardiomegaly, the enlargement of the heart, poses a significant challenge in the field of healthcare. Outdated diagnostic methods often lead to delayed detection and intervention. This project presents an innovative solution employing artificial intelligence (AI) to predict cardiomegaly. By leveraging computer vision techniques on medical imaging data, specifically chest X-rays, this system aims to automate the identification and prediction of cardiomegaly. Through AI-driven analysis and feature extraction, the project seeks to provide accurate and timely diagnoses, facilitating early intervention and treatment. Key factors such as image-based indicators, patient demographics, and clinical history are considered in the prediction process. By enhancing the accuracy of cardiomegaly prediction, this initiative contributes to improved patient outcomes and healthcare efficiency. The project also offers a user-friendly interface for healthcare professionals, making it accessible and practical in clinical settings.

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Date of Conference: 22-23 February 2024

DOI: 10.1109/ic-ETITE58242.2024.10493330

Date Added to IEEE *Xplore*: 18 April 2024

Publisher: IEEE

ISBN Information:

Conference Location: Vellore, India

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I. Introduction

In the intricate tapestry of modern medicine, few clinical conundrums captivate the collective curiosity of healthcare practitioners and researchers alike as profoundly as the enigma of cardiomegaly-an intricate condition where the human heart, the symphonic conductor of life itself, undergoes transformation beyond its normative dimensions. Cardiomegaly, colloquially known as an enlarged heart, transcends mere anatomical anomalies; it stands as an intricate clinical puzzle resonating across the vast spectrum of cardiovascular healthcare. As we embark on this journey into the world of cardiomegaly, we do so standing on the shoulders of pioneering researchers whose work has laid the foundation for a groundbreaking college-level project. Our mission: to revolutionize the landscape of cardiomegaly prediction through the transformative power of advanced data science. The human heart, a symbol of resilience, is vulnerable to a myriad of factors that can precipitate its enlargement.

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Applications of Computer Vision and Machine Learning in Agriculture: A State-of-the-Art Glimpse

2022 International Conference on Innovative Trends in Information Technology (ICITIIT)

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Non-Invasive Methods of Detecting Human Using Computer Vision by Incorporating Machine-Learning Techniques in Open Environment at Diverse Viewpoints

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A Comprehensive Review on Analysing of Brain Signals Using Different Clustering Methods

Publisher: IEEE

P Naveen ; T Akilan ; P Manikandan ; B. Pushpavanam ; C Swedheetha ; H James Deva Koresh **All Authors**

Abstract

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Abstract:
Classification and clustering are crucial tasks in analyzing brain signals, which can be broadly categorized into two main methods: invasive and non-invasive. Invasive techniques involve placing electrodes directly inside or on the surface of the brain to measure brain activity, whereas non-invasive methods measure brain activity without the need for invasive procedures. The latter includes EEG, MEG, fMRI, PET, and NIRS. Brain signals can be classified based on the type of brain activity being measured, such as brainwaves, evoked potentials, event-related potentials, and functional imaging. This classification can help researchers better understand the underlying mechanisms of brain function and develop new methods for diagnosing and treating neurological disorders. The major divisions of clustering of brain signals include hard clustering, soft clustering, density-based clustering, model-based clustering, hierarchical clustering, and subspace clustering. In hard clustering, each brain signal is assigned to a single cluster based on the similarity to the centroid of the cluster, while soft clustering assigns a probability of belonging to each cluster based on the degree of similarity to the centroids of the clusters. Density-based clustering is based on regions of high density in the feature space, model-based clustering is based on a probabilistic model that describes the distribution of the data, and hierarchical clustering is done in a hierarchical manner. Subspace clustering is done on subspaces of the feature space. These different approaches can be used in combination to achieve better results in the clustering of brain signals, depending on the characteristics of the data and the research question at hand. Overall, classification and

clustering of brain signals are essential for advancing our understanding of the brain and developing new methods for diagnosing and treating neurological disorders.

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P Naveen
Department of EEE, KPR Institute of Engineering and Technology, Coimbatore, INDIA

T Akilan
Department of CSE, Amity University, Kolkata, INDIA

P Manikandan
Department of ECE, Kalalsalingam Academy of Research and Education, Krishnankoil, INDIA

B. Pushpavanam
Department of EEE, PSNA College of Engineering and Technology, Dindugal, INDIA

C Swedheetha
Department of CSE, Velammal College of Engineering and Technology, Madurai

H James Deva Koresh
Department of ECE, KPR Institute of Engineering and Technology, Coimbatore, INDIA

Contents

I. Introduction

Classification and clustering are two important tasks in analyzing brain signals. Classification of brain signals can be broadly divided into two main categories: invasive and non-invasive methods [1]. Invasive methods: Invasive methods involve direct measurement of the brain signals using invasive techniques such as intracranial electroencephalography (iEEG), electrocorticography (ECoG), or single-cell recording. These techniques involve placing electrodes inside the brain or on its surface to record the activity of individual neurons or groups of neurons. Invasive methods are typically used in clinical settings for diagnosing and treating neurological disorders, but they are not commonly used in research due to their invasive nature and potential risks. Non-invasive methods: Non-invasive techniques are employed to gauge brain function without the need for intrusive measures. Such non-invasive techniques encompass electroencephalography (EEG), magnetoencephalography (MEG), functional magnetic resonance imaging (fMRI), positron emission tomography (PET), and near-infrared spectroscopy (NIRS). These methods evaluate fluctuations in blood flow, electrical impulses, or magnetic fields in reaction to brain activity. Non-invasive methods are commonly used in research to study brain function and to develop new methods for diagnosing and treating neurological disorders. This is represented in Figure 1. Classification of brain signals can also be based on the type of brain activity being measured. Some common types of brain activity that can be classified using brain signals include: Brainwaves: Cerebral oscillations are rhythmic electrical patterns that can be identified through the use of EEG or MEG. These oscillations are divided into several frequency ranges, including alpha, beta, delta, gamma, and theta waves. Different brainwave patterns are associated with different states of consciousness, such as sleep, meditation, or alertness [2]. Evoked potentials: Evoked potentials are electrical signals that are generated in response to a sensory stimulus, such as a flash of light or a sound. These signals can be measured using EEG or MEG and are used to study sensory processing and perception [3]. Event-related potentials (ERPs): ERPs are electrical signals that are generated in

Literature Review: Metamaterials in RF and Microwave Applications

Publisher: IEEE

P. Manikandan ; B Pushpavanam ; C. Swedheetha ; P. Naveen ; T. Akilan ; V. Muneeswaran **All Authors**

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Abstract:
A metamaterial is a structure that has been artificially created and has negative refractive index properties that are not present in nature or are difficult to achieve. This property makes the Metamaterials as very popular in the microwave to optical research areas. Now a days many researchers focusing metamaterials to improve the performance of antennas or antenna arrays like improving antenna gain, bandwidth, compactness, etc. Also, metamaterials play major role on developing the novel optical devices for new applications like optical super lenses, perfect absorber, invisible cloaks, etc. This paper focusses the properties of metamaterial, metamaterial structure and the metamaterial applications in RF and microwave areas.

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I. Introduction

A man-made structure known as metamaterial has unique characteristics including special negative permeability negative permittivity , negative refractive index , etc. None of the naturally available materials having those negative index properties. These properties are derived from both repeated arrangement of desired form of structure and inherent properties of the materials [1]. These properties make the materials to respond their excited signals or fields in different manner than natural materials. For example, when the signals incident on the air-metamaterial interface, the angle of refraction will be very larger than natural material interfaces. The figure 1 showing the classification of materials and how it's reacting for its electromagnetic excitations [2].

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Asymptotic Diffusion Analysis of a Queueing System $M^X/G/1$ with Collisions and Unreliable Servers in the Process of Communication

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Proceedings of International Conference on Network Security and Blockchain...

(ICNSBT 2023)

R. Vanalakshmi, S. Maragathasundari, B. Balamurugan, M. Kameswari & C. Swedheetha

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Abstract

Given the rapid increase in traffic on the current communications infrastructure, such as the Online World, it is imperative for consumers to understand how these systems are developed swiftly and successfully scheduled to their servers. This study focuses on how we can accomplish this using the queuing theory currently in use. This article also covers current and comprehensive information on the use of queuing techniques in fields including load balancing, mobility management, and improving traffic flows on the current Internet infrastructure. The problem is transformed into a non-Markovian mathematical queuing model, and auxiliary variables are used to solve it. The queuing issue that arises from the aforementioned subsequent outcomes is resolved by the supplemental variable technique. Estimates are made for the throughput, server latency, use, and probability output factors for each operating method. Mathematical software was used to do numerical analysis on specific examples. Because it is used frequently and uses a statistical demarcation method, this tactic is completely acceptable. Exact computations of the seeming limitations are provided by the graphical representation of this perspective.

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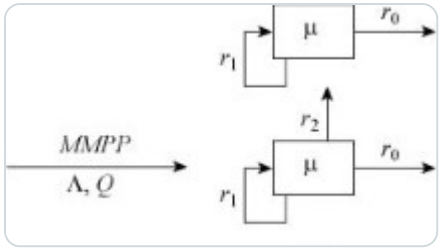

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Author information

Authors and Affiliations

Kalasalingam Academy of Research and Education, Chennai, Tamilnadu, 626126, India

R. Vanalakshmi, S. Maragathasundari & M. Kameswari

Velammal Institute of Technology, Chennai, Tamilnadu, 601204, India

B. Balamurugan

Vaigai College of Engineering, Madurai, Tamilnadu, 625122, India

C. Swedheetha

Corresponding author

Correspondence to S. Maragathasundari .

Editor information

Editors and Affiliations

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RESEARCH ARTICLE | JANUARY 25 2024

Analysis on the execution measures of the queuing in radar data connection

S. Maragathasundari ✉; R. S. Somasundaram; C. Aruna; R. Vanalakshmi; C. Swedheetha

Check fo

— Author & Arti

a) Correspondir

b) somasunc

c) 99201280

d) vanalaksh

e) swedhaece08@gmail.com

C. Swedheetha [e)]

[4]Velammal College of Engineering and Technology, Madurai, India

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AIP Conf. Proc. 2802, 170001 (2024)

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Radio Detection and Ranging System (RADAR) is an acronym for Radio Detection and Ranging System. It's essentially an electromagnetic method for detecting the position and object distance from the RADAR's location. It operates by emitting energy into space and measuring the objects' echo or reflected signal. It works in the UHF and microwave frequencies. Radar works by sending electromagnetic radiation in the direction of objects and then observing the echoes and returns. Queuing theory is used to understand how radar works. This method depicts the radar transmission process in terms of Queuing parameters. This study uses the queuing idea to approach the aforementioned radar data communication process. The queuing mindset identifies communication flaws and allows the critical mind to be dispatched in order to reduce connection disruptions. Furthermore, this research employs the queuing idea to deal with delays and other issues that may arise during the process. Queues can aid in the discovery of

producing function, are determined. A numerical and specified visual analysis depicts the theoretical examination of the queuing idea in Radar data communication.

Topics

Electromagnetic radiation, **Microwave frequencies**, **Electromagnetic methods**, **RADAR**, **Educational assessment**, **Stochastic processes**

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https://doi.org/10.18187/pjsor.v16i1.2181
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Automatic Train Tracking and Announcement System

Publisher: IEEE

P. Manikandan ; C. Swedheetha ; Sai Narasimha Charan Thulasi ; Venkata Vignesh Reddy Chennuru ; Jaswanth Kumar Reddy Vardireddy ; Y.V.S.S. Deepak

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In many of the developing countries, the railway passengers are facing the issues during their long-distance train journey such as identifying the arrival station, identi... **View more**

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In many of the developing countries, the railway passengers are facing the issues during their long-distance train journey such as identifying the arrival station, identifying train platform number. Because of these issues passengers need keep more attention with fear to find whether the train is reached the destination or not. Sometimes, the passengers may get down in the wrong destination. Similarly, during departure of the journey, passengers miss the train or may get the wrong train because they unable find the platform number of their train. Also in many developed countries, the above issues are sorted by using technologies, but the entire system is not fully automatic and manual processes are involved or there will various mobile, or web applications are used. So, this paper focusing on the development an automatic electronic system for train tracking, announcing the platform number of train and alerting the user through audio announcement and sending alert SMS to the passengers when they nearing the station like 3 km away from their arrival station.

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Conference Location: Greater Noida, India

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I. Introduction

Real-time general-purpose vehicle systems are the newest technology on the horizon. The machine uses several sensors and GPS to get its job done. It can be returned from the sensor using the appropriate communication device [1]. At night, train passengers risk missing their stops when traveling long distances. Otherwise they go to an unknown place. The given system [2] will overcome this problem by an embedded system with GSM and GPS technology. Which allows the system to track trains and provide users with constantly up-to-date information. By receiving the data, the crew's GPS receiver can determine the latitude and longitude position and driving speed of a particular train. Most vehicle tracking systems are based on GPS and GSM. GPS has a network of 24 satellites on 6 different 12-hour orbital paths spaced so that at least 5 satellites can be seen from anywhere in the world [2] [3].

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Static Security Optimization for Real-Time Systems
IEEE Transactions on Industrial Informatics
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Synergistic Multi-Sensor Fusion for Enhanced Vehicle Safety and Security-Integrating Advanced Technologies and Intelligent Systems

Publisher: IEEE

T. Akilan ; P. Manikandan ; B. Pushpavanam ; C. Swedheetha ; P. Naveen ; Jaya Sinha **All Authors**

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The integration of multiple sensors and advanced technologies in the field of vehicle safety and security has emerged as a promising approach to enhance overall road safety and protect vehicles from potential threats. This paper presents a comprehensive study on the concept of synergistic multi-sensor fusion for advanced vehicle safety and security, focusing on the integration of cutting-edge technologies and intelligent systems. The proposed framework involves fusing data from various sensors to obtain a comprehensive and accurate perception of the vehicle's surroundings and safety of the driver. By combining the strengths of each sensor, the system overcomes individual limitations and provides robust detection and recognition capabilities. Firstly, it enables accurate and timely detection of potential hazardous gas, infront nearest obstacle detection, accident identification this allowing the vehicle to take proactive measures to avoid collisions. Secondly, it enhances security by detecting and mitigating threats, such as fingerprint-based security system, theft alert. Additionally, the integration of intelligent systems enables driver safety measure based on driver heart rate monitoring, fire detection, current location detection and prone zone vehicle control. This paper highlights the significance of synergistic multi-sensor fusion in advancing vehicle safety and security. The integration of advanced technologies and intelligent systems enables robust detection, recognition, and decision-making capabilities, contributing to a safer and more secure driving experience.

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I. Introduction

In recent years, the automotive industry has witnessed significant advancements in the field of vehicle safety and security. As vehicles become more complex and intelligent, there is an increasing need to develop robust systems that can enhance the safety of both occupants and pedestrians, while also ensuring the security of the vehicle against potential threats. One of the key technologies driving these advancements is multi-sensor fusion, which combines data from various sensors to provide a comprehensive understanding of the vehicle's surroundings.

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2009 IEEE International Conference on Vehicular Electronics and Safety (ICVES)

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A Review on Wearable Antennas

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C. Swedheetha ; K. A. Shahul Hameed ; P. Naveen ; P. Manikandan ; T. Akilan ; B. Pushpavanam **All Authors**

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Wearable antennas plays a major role in Body Area Networks (BAN). WBAN agrees the users to sense, analyse and communicate data to a connected server with the help of modern technologies. The power consumption and the miniaturized size antenna, as major consideration for a wearable device. The majority of wearable antennas are built into the user's clothing or, in rare circumstances, under their skin. This paper's goal is to examine the technological foundations for wearable antenna design and its applicability in diverse industries. The report also identifies the research need in the area of wearable antenna design.

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I. Introduction

A particular kind of sensor called an antenna transforms alternating magnetic fields into radio waves of high frequency. When worn and moved, wearable antennas are designed to stay in touch with their source station. To achieve this, wearable antennas are made of different kind of fabric materials based on its insulating properties, the material can be manipulated.. It also clearly needs some performance-based improvements operational characteristics of a wearable antenna. Because performance changes, when it is kept free and elsewhere. Water absorption and physical changes in the human body alter the performance of wearable antennas. In addition, entertainment applications based on gaming and virtual reality interaction are being used with the wearable sensors. To make wearables like intelligent machines, like sensors and antennas can be merged with respect to watches and shoes in some places. In order to ascertain the position of users through GPS, wearing bands are also used. For the transfer of data, miniaturized wearable devices are used for the purpose of microphone and camera modules.

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Machine Learning Algorithms for Estimation of State-of-Charge of Li-Ion Batteries

Publisher: IEEE

B. Pushpavanam ; T. Akilan ; S. Kalyani ; C. Swedheetha ; P. Naveen ; P. Manikandan **All Authors**

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Abstract:
Accurately predicting the SoC of the battery is the main function of any Battery Management System (BMS). BMS must carefully read the battery parameters, to safe guard the battery, to predict accurately the battery's state, so as to improve the battery's performance and to alert to users/external devices. The objective of this study is to offer a comprehensive overview of Machine Learning (ML) algorithms for predicting the State-of-Charge (SoC) of Lithium-ion batteries for enabling an accurate and online estimation, mandatory for ensuring battery as well as user safety and also aims to provide efficient BMS for the advancing the development of EVs (Electric Vehicles) and HEVs (Hybrid Electric Vehicles).

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Contents

I. Introduction

Renewable energy sources are fastest growing electricity sources. Energy storage has become one of the prime sectors and it is critical in an Electric vehicle. Lithium batteries are employed in various applications such as electric vehicles. These are portable devices, and are predominant energy storage systems (ESS) as the reasons are, its high energy density, long life, and less weight[1]. Machine Learning techniques that are based on data, are become increasingly widespread for predicting the State-of-Charge(SoC) and State-of- Health(SoH) as there is a state-of-art computing techniques and availability of open source battery data. [2]

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State of Charge Estimation for Lithium-Ion Batteries Using Machine Learning Algorithms
2022 IEEE International Conference on Electrical Sciences and Technologies in Maghreb (CISTEM)
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IEEE Transactions on Vehicular Technology
Published: 2019

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PERFORMANCE ANALYSIS OF A HYBRID SOLAR-WIND POWER GENERATION SYSTEM

Abstract

To fulfill the demands of rising energy consumption, reduce environmental pollution, and generate socioeconomic advantages for sustainable development, renewable energy resources are now being implemented on a huge scale. Integration of renewable energy sources gives the country the ability to fulfill its emission objectives while also ensuring energy security, making significant cost savings, and reducing greenhouse gas emissions. Because of the intermittent nature of renewable energy's single source, continuous production is impossible without a hybrid renewable energy system. In order to produce electrical energy, this study focuses on the usage of wind turbines and solar photovoltaic generation. Utilizing the MPPT technique, the hybrid power system's performance is evaluated based on the output nature in order to maximize output power.

Keywords: Hybrid system, Maximum power point tracking, controller, De-risk, markets.

Authors

Jeyanthi M
Department of Electrical and Electronics Engineering,
Velammal College of Engineering Technology, Madurai, Tamil Nadu, India.
jeyanthi19@gmail.com

R Narmatha Banu
Department of Electrical and Electronics Engineering,
Velammal College of Engineering Technology, Madurai, Tamil Nadu, India.
r.n.banu@vcet.ac.in

Author's Profile

Mr. Aman Kumar submitted his thesis for a Ph.D. in Physics and a Master of Science (Physics) degree in 2015, and he got FIRST DIVISION from the Department of Physics at C.C.S. University Campus Meerut, India. I have qualified CSIR-NET-JRF exam. And received JRF and SRF fellowships from the Government of India during his Ph.D. Currently, he is working as an Assistant Professor in the Department of Physics at Keral Verma Subharti College of Science, Swami Vivekanand Subharti University Meerut, Uttar Pradesh, India-250001. He has published six research papers in international journals and two Indian patent research papers. He has attended and presented papers at several conferences, workshops, and seminars.

Dr. Beena P, holding a Ph.D in materials science and characterization and Master's degree in Physics. She has secured third rank in B.Sc at University level and first rank in M.Sc with gold medals. Currently, working as Associate Professor in the Department of physics at Government first grade college, Tarikere. She has published a number of research papers in Indian and International journals. She has worked as subject expert and content developer for digital learning initiative programme - Karnataka learning module system (KLMS). She is a life member of Indian Association of Physics teachers and Materials research society of India

Dr. Raju R K, holding a Ph.D in materials science and characterization and Master's degree in Physics. He has secured ninth rank in B.Sc at University level. He has secured second rank in M.Sc with a gold medal and has qualified CSIR- UGC in physical sciences. Currently, working as Associate Professor in the Department of physics at Government first grade college, Ripponpete. He has published a number of research papers in Indian and International journals. He has worked as moderator for digital learning initiative programme - Karnataka learning module system (KLMS). He is a life member of Indian Association of Physics teachers and Materials research society of India.

Dr. Karpagam N completed her Ph.D in Electrical Engineering, Master's degree in Power Systems Engineering and UG degree in Electrical and Electronics Engineering. Currently, she is working as a Professor in the Department of Electrical and Electronics Engineering, Velammal College of Engineering & Technology, Madurai. She has published 91 research papers in Indian and International journals and authored two books. She served as Chairperson and Resource person in conferences, workshops, seminars and training programmes. She has received two funded projects, Best Paper Presentation Award. She is member of professional society IEI, ISTE.

Mr. Vishal K. Pandit completed M.Sc. M.Phil in Physics from Savitribai Phule Pune University, Pune. Currently he is working as Assistant Professor in Physics at Department of Physics, Rayat Shikshan Sanstha's, Dada Patil Mahavidyalaya, Karjat, Dist-Ahmednagar, Maharashtra . He has published a number of research papers in Indian and International journals. He has participated in national and international conferences, workshops, seminars and hands on training programs. He is member of Consortium of nature conservators' society (CONAC) Kolhapur and Astronomical Society of Stargazing & Instrumentation (ASSI) Kolhapur. He is education partner of VSA Mumbai. He is persuing Ph.D. in Shivaji University Kolhapur.

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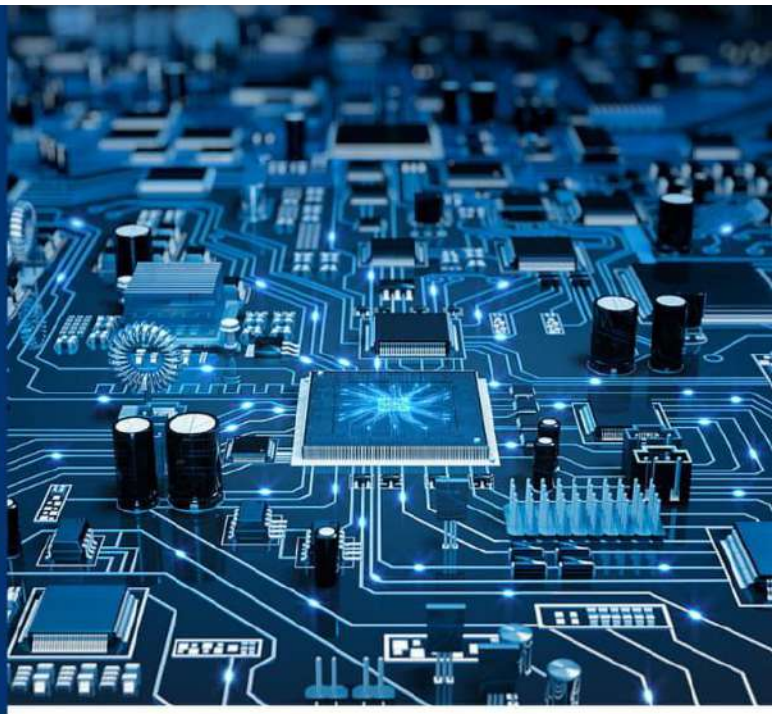

BASIC ELECTRONICS AND CIRCUITS

Mr. Aman Kumar
Dr. Beena P
Dr. Raju R K
Dr. Karpagam N
Mr. Vishal Kashinath Pandit

Author's Profile

Dr. N. Karpagam received the B.E. degree in Electrical and Electronics Engineering and M.E. Power System Engineering from Thiagarajar College of Engineering, Madurai Kamaraj University in 1994 and 2000 respectively. She received the Ph.D. degree in Electrical Engineering from Anna University, Chennai, Tamilnadu, India in 2010. She worked as a Teaching Faculty at Kalasalingam University, Tamilnadu from 1997 to 2012. At present, she is a professor in the Department of Electrical and Electronics Engineering at Velammal College of Engineering & Technology, Madurai, Tamilnadu with 25 years of teaching and research experience. Her areas of specialisation are Power System, Renewable Energy Sources, FACTS devices, Fuzzy Logic and Genetic Algorithm applications to engineering problems. She has written three books in the area of Electric Energy Utilization and conservation and Electronic circuits. She is the recognised supervisor under Anna University. She completed two funded projects from DST and AICTE. She published three Indian design patents.
Email: karpagan2k@gmail.com

Dr.Gajula Lakshminarayana: Currently working as a Professor and Head of the Department of Electronics and Communication Engineering, SVR Engineering College , Aygaluru Metta Nandyal, Andhra Pradesh, India. He has completed M.Tech from JNT University, Kukatpally, Hyderabad and Doctoral Degree from JJT University. He has published Scopus indexed papers in International journals, IEEE Conferences and Patents. His areas of interest in research are VLSI, Embedded System Design, Communications and Networking. He is a member of IEEE, IETE and IAENG

Mr D. Elamvazhudhi has completed his MPhil (physics) in 2004, and completed his Master of Science (Electronics) in 2001. He was Qualified for the lectureship both in state level (SET – Tamilnadu) in 2013 and National Level (NET) in 2014. Currently he is working as Assistant Professor in the Department of Electronics & Communication science at Dharmamurthi Rao Bahadur Calavala Cunnan Chetty Hindu College, University of Madras, Chennai, Tamilnadu, India, 600072. He has published three papers in national level journals and attended several seminars and workshops.

Dr. Aaquil Bunglowala, A proficient leader, well-qualified, and technically accomplished research scientist with an excellent academic background who has made significant contributions to the field of Electronics and Communications Engineering. Currently holds the position of Professor and Associate Dean at STME, NMIMS University, Indore. With over 70 research publications in reputed international journals as well as several patents, he has authored books and book chapters and supervising the theses of numerous research scholars.

Prof. Tarannum Shaikh is pursuing PHD in Computer Engineering AIML, Also successfully completed her M.Tech from VJTI (Veermata Jijabai Technological Institute) in 2013 from ETC and BE from Pune University. Currently working as an Assistant Professor in Computer science and Engineering AIML department in of M. H. Saboo Siddik College Engineering, Byculla, Mumbai 400008. Member for Execution of (Massachusetts Institute of Technology) MIT i-WEL Program in M. H. Saboo Siddik College Engineering. Conducted hands on workshops seminars. Published six research papers in various Journals and Conferences. Reviewed research papers of journals and conference. Patented a design for "WIRELESS MESSENGER" in pursuance of and subject to the provisions of the Designs Act, 2000 and the Designs Rules, 2001. Professional society Member of IEEE, ISA, ISTE

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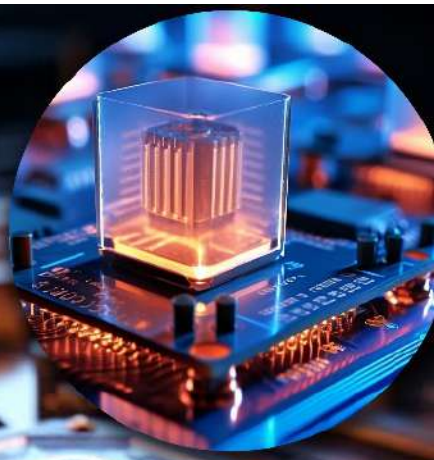

MICRO PROCESSORS AND INTERFACING

Dr.N.KARPAGAM
Dr.GAJULA LAKSHMINARAYANA
Mr. D.ELAMVAZHUDHI,
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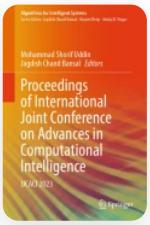

Proceedings of International Joint Conference on Advances in Computational Intelligence

(IJCACI 2022)

J. Mothiga Shivani, S. Senthilrani, J. Rajeswari & B. Ashok Kumar

Part of the book series: Algorithms for Intelligent Systems ((AIS))

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International Joint Conference on Advances in Computational Intelligence

Abstract

Author's Profile

Dr. N.Panneer Selvam was born in [illegible] 1969. He has received his B.E., in Electrical and Electronics Engineering from Madurai Kamaraj University, Madurai, Tamil Nadu in the year 1994, M.E., in Power Electronics and Drives from Anna University, Chennai, Tamil Nadu in the year 2000 and received Ph.D., Anna University, Chennai Tamil Nadu in 2016. He is a Life member of the Indian Society for Technical Education (ISTE). Currently he is working as a Principal of M.A.M Polytechnic College Tiruchirappalli, Tamil Nadu, India. His field of interest are Power Systems, Power electronics and Drives. His current research interest are E- Vehicles and renewable energy. He has published more than 20 numbers of international journals.

Dr. M. Sujatha is currently working as Assistant Professor in EEE department in Easwari Engineering College, Ramapuram, Chennai. She has completed her B.E Degree in Electrical and Electronics Engineering from Madurai Kamaraj University in 1997, M.E in Power Electronics and Drives from Anna University, Chennai in 2009 and Ph.D., from Hindustan Institute of Technology and Science in 2019. She is having more than 18 years of teaching experience and has published more than 20 papers in various International & National Journal and Conferences. Her current research interests are Renewable Energy Conversion, Electric Vehicle and Reliability Engineering.

Dr. A. Radhika is currently working as Associate Professor in Electrical and Electronics Engineering in the [illegible] College of Engineering & Technology, [illegible], Tamilnadu, India. She received her B.E (EEE) degree in Madurai Kamaraj University, Madurai, Tamilnadu, India and M.E (PED) from Anna University, Tirunelveli, Tamilnadu, India. She obtained her Ph.D. degree in Power Electronics field from Anna University, Chennai, Tamilnadu, India. She has published many papers in journals, National and International journals. Her field of interest in [illegible] based Renewable energy systems, Power electronics and drives, Soft computing Techniques, Electric Vehicle and machine learning.

Dr P. Ranjith Kumar has received his B.E., in Mechanical Engineering from Bharathidasan University, Tiruchirappalli, Tamil Nadu in the year 1997, M.E., in Production Engineering from PSG College of Technology, Coimbatore, Tamil Nadu in the year 2002 and received Ph.D., in Anna University, Chennai, Tamil Nadu in 2010.He is a Life member of the Institution of Engineers (India)(IEI). Currently he is working as a Professor in Mechanical Engineering of M.A.M School of Engineering Tiruchirappalli, Tamil Nadu, India. His field of interest are Micro machining, MEMS, E Vehicles. He has published 5 patents & more than 40 international journals. 3 scholars have completed Ph.D under his guidance.

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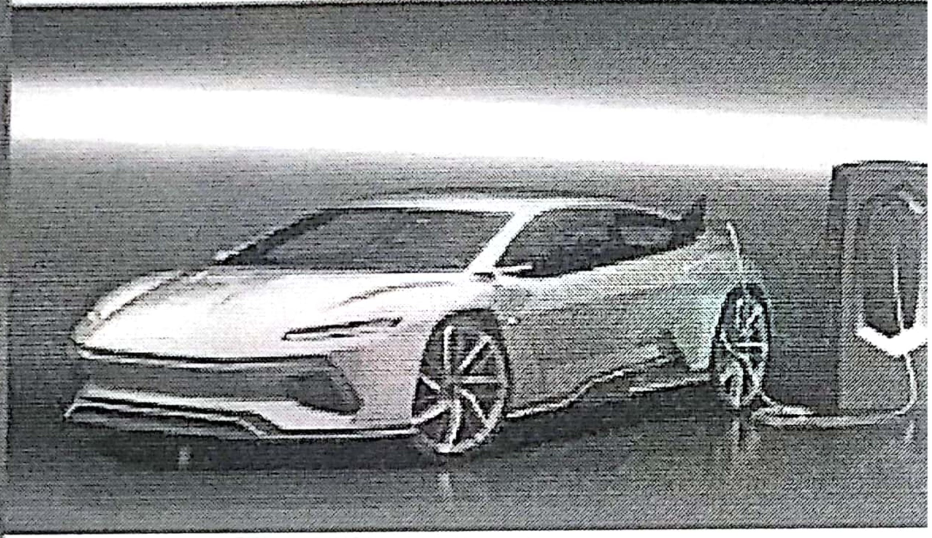

Dr. N.Panneer Selvam
Dr. M. Sujatha
Dr. A. Radhika
Dr. P. Ranjith Kumar

MODELING AND SIMULATION OF H6 TOPOLOGY USING SINGLE PHASE TRANSFORMERLESS GRID CONNECTED PHOTOVOLTAIC SYSTEM

Abstract

This paper proposes a new technology of solar energy system, which is gaining immense fashion ability due to the increase of significance to exploration on indispensable energy sources over reduction of the ordinary reactionary energies each across the world. The systems which are being generated excerpt solar in the most effective manner and utilizethem for the available loads without affecting their performance. In this paper, the development and control issues associated with the development of a1.8 kW prototype single-phase grid- connected photovoltaic system of multilevel protruded inverter are bandied. For the system current regulator, a ramp time zero average current error control system algorithm combined with an optimized cyclic switching conception sequence is suggested. Simulation results of Grid tie inverter have been considered to demonstrate the felicity of the total control system. The Simulation results parade bettered workinganalysis due to errors and the studied system is structured and dissembled in the MATLAB/ Simulink.

Keywords: Grid tied inverter, MPPT, H6 topology, Photo Voltaic System.

Authors

Dr. B. Kiruthiga
Department of EEE
Velammal College of Engineering and Technology
Madurai, Tamil Nadu, India.
bki@vcet.ac.in

Dr. R. Narmatha Banu
EEE Department
Velammal College of Engineering and Technology
Madurai, Tamil Nadu, India.
r.n.banu@vcet.ac.in

Mr. A.Om Prakash
EEE Department
Government Polytechnic College
Madurai , Tamil Nadu, India.
omprakashgptu@gmail.com

DOMESTIC ENERGY EFFICIENCY THE ROLE OF INTELLIGENT DEMAND RESPONSE IN SMART GRIDS

Abstract

The demand for electrical energy has increased significantly, making it difficult not only to produce it but also to distribute it. As a result, grid complexity is increasing due to growing demands on issues of accountability, efficiency, security, and environmental and energy sustainability. These features help make the grid smarter, today known as the "Smart Grid" concept. This is an abstract approach in which all the beneficial features are implemented to expand the power distribution network. Smart grids, with alternative solutions and multiple perspectives on the power distribution sector, were introduced. Additionally, it is important to note that although these technologies are evolving, they have great potential to promote and strengthen distribution systems.

Keywords: Power supply ,demand response for smart grid and peak

Authors

V. Umayal Muthu
Assistant Professor
Department of EEE
Velammal College of Engineering and Technology
Madurai, India.
uma@vcet.ac.in

Dr. A. Shunmugalatha
Dean (Academics)
Department of EEE
Velammal College of Engineering and Technology
Madurai, India.
asl@vcet.ac.in

M. Devaki
Assistant Professor
Department of EEE
Velammal College of Engineering and Technology
Madurai, India.
mde@vcet.ac.in

R. Saranya
Assistant Professor
Department of EEE
Velammal College of Engineering and Technology
Madurai, India.
rsy@vcet.ac.in

Application of digital twin technology in model-based systems engineering

Author(s): S. Chellam [1], M. Jajini [1], M. Santhiya [2]
View affiliations

Source: Digital Twin Technologies for Healthcare 4.0, 2022
Publication date: December 2022

Abstract | References (0) | Related Content

The paper introduces the concept, digital twin technology (DTT) which is a new and advanced technology that is used in all aspects of the electrical industry. In addition to simulation tools, the technology has been combined with multi-disciplinary, multi-physical, multi-scale, and multi-probability sectors. The simulation operations are carried out utilizing a physical model with sensors. The physical model was created in real-time, and the modeling was done in virtual space. In virtual space, the new DTT merged current power system simulation models and procedures. The use of DTT has been broadened to include power grid optimization, virtual power plants, grid fault modeling, intelligent monitoring of equipment, and other services.

Chapter Contents:

- 3.1 Evolution of DTT
- 3.2 Basic concepts of DTT
- 3.3 DTT implementation in power system
- 3.3.1 Characteristics of DTT in power systems
- 3.4 Power system network modeling using DTT
- 3.4.1 Model-based approach
- 3.4.2 Data-driven approach
- 3.4.3 Combination of both
- 3.5 Integration of power system with DTT
- 3.6 Future scope of DTT in power systems
- 3.7 Conclusion
- References

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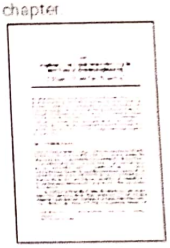

Modified Elephant Herd Optimization-Based Advanced Encryption Standard

Conference paper | First Online: 26 November 2023

pp 519–528 | Cite this conference paper

Intelligent Data Engineering and Analytics

(FICTA 2023)

R. Surendiran ✉, S. Chellam, R. Jothin, A. Ahilan, S. Vallisree, A. Jasmine Gnana Malar & J. Sathiamoorthy

Part of the book series: Smart Innovation, Systems and Technologies ((SIST,volume 371))

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International Conference on Frontiers of Intelligent Computing: Theory and Applications

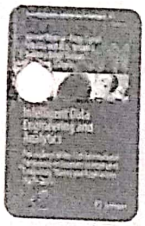
Abstract

Cryptography is commonly employed to ensure secure data transfer via unsecure communication networks. With the rising need for picture transmission confidentiality and privacy, an efficient encryption approach becomes vital. The architectural flow of the newly created technique is implie in the proposal. Based on Cryptographic Method for Digital Picture Security, the design of an efficient Modified Elephant Herd Optimization-based Advanced Encryption Standard (MEHO-AES)

Estimation of Wind Energy Reliability Using Modeling and Simulation Method

Conference paper | First Online: 26 November 2023

pp 473–480 | Cite this conference paper



Intelligent Data Engineering and Analytics

(FICTA 2023)

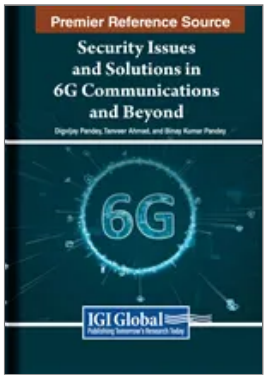
A. Jasmine Gnana Malar, M. Ganga, V. Parimala & S. Chellam

Part of the book series: Smart Innovation, Systems and Technologies ((SIST,volume 371))

Included in the following conference series:
International Conference on Frontiers of Intelligent Computing: Theory and Applications

Abstract

In wind energy systems, reliability analysis plays a significant role in increasing the lifetime of wind turbines. Moreover, improving the reliability of wind turbines minimizes the maintenance cost of the energy systems. Reliability refers to the probability that the wind turbine continues to attain its projected function without failure under operational conditions. In recent times, wind energy installation is increasing rapidly to meet the demand for pollution-free energy. However, th problems in wind energy systems like uncertainty, reliability issues, etc., need to be addressed to



AI's Role in 6G Security Machine Learning Solutions Unveiled

D. Vetrithangam, Komala C. R. (/affiliate/komala-cr/476608/), D. Sugumar, Y. Mallikarjuna Rao, C. Karpagavalli, B. Kiruthiga (/affiliate/b-kiruthiga/476612/)

Source Title: Security Issues and Solutions in 6G Communications and Beyond (/book/security-issues-solutions-communications-beyond/334236)

Pages: 19

DOI: 10.4018/979-8-3693-2931-3.ch003

Abstract

The incorporation of Artificial Intelligence (AI) into 6G security measures and its revolutionary effect on the telecommunications industry are examined in this paper. We start off by talking about how important it is to integrate AI in order to strengthen overall security posture, improve network defenses, and address vulnerabilities. We clarify AI's critical role in promoting innovation and efficiency within the telecom industry by analyzing 6G network vulnerabilities and the importance of enhanced security measures. The use of AI for 6G security and its potential for threat detection, incident response, and network optimization through machine learning techniques.

Chapter Preview

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Digvijay Pandey, Binay Kumar Pandey, Tanveer Ahmad

Chapter 1

A Systematic Review of Security Issues in 6G Networks and Communication (/chapter/a-systematic-review-of-security-issues-in-6g-networks-and-communication/351763) (pages 1-11)

Digvijay Pandey, Sumeet Goyal, Kallol Bhaumik, Sonia Suneja, Manvinder Sharma, Pankaj Dadheech Dadheech

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Sādhanā (2023)48:206
https://doi.org/10.1007/s12046-023-02249-2

Secure and privacy in healthcare data using quaternion based neural network and encoder-elliptic curve deep neural network with blockchain on the cloud environment

P SUGANTHI[1,*] and R KAVITHA[2]

[1]Department of CSBS, Thiagarajar College of Engineering, Madurai, India
[2]Department of IT, Velammal College of Engineering and Technology, Madurai, India
e-mail: suga.pathma@gmail.com

MS received 13 July 2022; revised 8 June 2023; accepted 8 July 2023

Abstract. The security and privacy of healthcare data are crucial aspects within the healthcare industry, as accurate diagnoses rely on medical professionals accessing patient healthcare data. Similarly, patients often require access to their data. However, ensuring that sensitive health data is shared securely while prioritizing privacy is essential. This paper proposes an innovative solution called the quaternion based neural network, Advanced Data Security Architecture in Healthcare Environment (ADSAH), which combines Elliptical curve cryptography (ECC) with a blockchain mechanism and a Deep Fuzzy Based Neural Network (DFBNN) to safeguard cloud-stored health data. The proposed approach begins by encoding the input medical data using an encoder and then encrypting the encoded data using ECC techniques. The secret key for encrypting the data is securely stored within a blockchain framework. The key is divided into blocks to enhance security, and the SHA algorithm is employed to identify key events within these blocks. These key events are subsequently stored in a cloud storage system. A modified genetic algorithm is utilized to generate the encryption and decryption key. This algorithm is explicitly tailored to secure healthcare data. Authorized patients or physicians can access medical data using the secret key to decrypt and retrieve the necessary information. The performance of the proposed network is evaluated by considering factors such as time and cost and is compared against existing studies. The evaluation demonstrates notable improvements, including a reduction in the time required for the encryption and decryption process, as well as a decrease in transaction and execution costs when compared to previous research. By incorporating ECC with a blockchain mechanism and DNN, the ADSAH approach offers an advanced solution for ensuring the security and privacy of cloud-stored health data. It provides robust encryption and facilitates efficient and cost-effective access to authorized individuals while safeguarding sensitive health information.

Keywords. Healthcare data; security; deep neural network; improved quaternion based neural network; blockchain mechanism; elliptic curve cryptography.

1. Introduction

The healthcare industry is of paramount importance as it delivers vital medical services and continually strives to enhance patient outcomes through technological advancements, innovative treatments, and public health initiatives [1]. Despite these advancements, ensuring the security and privacy of patient data remains a pressing concern within the healthcare sector. While healthcare professionals require access to patient healthcare data for accurate diagnoses and effective treatments, it is equally vital to prioritize the secure and private sharing of sensitive health information [2]. Protecting patient's privacy is imperative to maintain trust and confidentiality in healthcare interactions. To address these concerns, robust measures must be implemented to safeguard patient data against unauthorized access, breaches, and misuse. Achieving a balance between data accessibility and privacy preservation is paramount in the healthcare industry, as it allows for effective healthcare delivery while respecting patient rights [3].

Therefore, comprehensive and reliable solutions are needed to establish stringent security measures and ensure the utmost privacy protection in the healthcare data ecosystem. Maintaining patient data privacy has become increasingly challenging with the digitization of healthcare records and the widespread use of cloud storage systems [4, 5]. Existing techniques for securing healthcare data often need to be revised to address privacy concerns

*For correspondence
Published online: 23 September 2023

adequately [6]. These techniques may need more robust encryption mechanisms, efficient access controls, and secure storage methods [7, 8]. As a result, healthcare organizations face the risk of data breaches, unauthorized access, and misuse of sensitive patient information [9]. This paper proposes a novel solution called the Advanced Data Security Architecture in Healthcare Environment (ADSAH) to address these challenges and enhance the security and privacy of cloud- stored health data. ADSAH combines Elliptical curve cryptography (ECC) [10] with a blockchain mechanism and deep Fuzzy Based Neural Network (DFBNN) [11] to provide a comprehensive and practical approach to safeguarding patient data [12, 13]. The ADSAH technique presents numerous advantages in overcoming the shortcomings of current privacy protection methods. It leverages advanced encryption techniques, specifically Elliptical curve cryptography (ECC), to establish a robust layer of data security and ensure the utmost confidentiality of sensitive information. Through integrating a blockchain framework, ADSAH provides a secure storage mechanism for encryption keys, enhancing critical management practices and mitigating the risk of unauthorized access. Additionally, ADSAH integrates a modified genetic algorithm [14, 15], enabling efficient encryption and decryption processes that significantly reduce time requirements and enhance overall system performance. This combination of cutting-edge encryption, secure key storage, and optimized algorithms makes ADSAH an effective solution for bolstering data privacy in healthcare settings. Through integrating ECC (blockchain) and DNN, the proposed ADSAH enables secure access and retrieval of medical data for authorized individuals like patients and physicians. This integration ensures efficient and controlled data sharing while upholding patient privacy. By addressing the limitations of existing methods, ADSAH provides a comprehensive and advanced solution to safeguard patient data in cloud-based healthcare environments. The incorporation of ECC strengthens data security, while the utilization of DNN-based DFBNN processes the encrypted data using deep learning capabilities and fuzzy logic to handle uncertainty and imprecision. It performs analysis and decision-making tasks on the encrypted data while preserving its confidentiality. By utilizing the proposed ADSAH, healthcare organizations can protect patient data effectively while facilitating seamless and protected access for authorized users.

The main contributions of the paper are as follows.

- Introducing a ground-breaking approach called the Advanced Data Security Architecture in Healthcare Environment (ADSAH) that addresses the secure handling of patient data within healthcare settings.
- The ADSAH technique incorporates Elliptical Curve Cryptography (ECC) with a blockchain mechanism, Deep Fuzzy Based Neural Network (DFBNN), to ensure healthcare data's seamless and efficient transfer.
- Within the Blockchain mechanism, the keys are converted into blocks, and subsequently, the SHA algorithm is employed to recognize and process them.

The experiments are conducted to demonstrate the effectiveness of the proposed technique.

1.1 *Blockchain*

Recent growth of blockchain technology assists in solving the interoperability challenges in healthcare and plays a major role in maintaining patient's record at the centre of ecosystem. Thereby, blockchain improves the privacy, security and interoperability. Generally, blockchain can be used in sharing and accessing the medical record of patients and also in remote monitoring. Blockchain is used in medical data management system which permits patients to maintain ownership over the available records.

The main advantages of using the blockchain are

- Single point failure and performance bottlenecks are avoided.
- Patients may view and manage their data.
- The blockchain guarantees the consistency, precision, simplicity, completeness, and timeliness of medical data history.
- The patient network participants may see every step of the blockchain procedure.
- The data insertions are also unchangeable. Unauthorised alterations have been discovered.

1.2 *Privacy preservation*

The major focus is on how to completely manage privacy problems and forecast efficacy, especially when it comes to sensitive medical data kept in third parties. As a result, in order to prevent the loss of privacy associated with medical data, data mining techniques for privacy preservation should be developed. Accordingly, Machine Learning (ML) algorithms possess innate abilities of effective learning. Such abilities could be employed in blockchain for enhancing the smartness of the chain. This integration could also be valuable in enhancing the security of blockchain distributed ledger. With the ability in predicting the system behavior, using various ML algorithms optimizes blockchain mechanisms. No privacy preservation approach currently in use provides the necessary privacy protection. It is quite effective, practical and useful. The capacity of blockchain to provide adequate privacy protection is represented by security analysis. The objective of the study involves:

1. To use improved quaternion based neural network cryptography, elliptical curve cryptography to generate

keys, encrypt data, and decode data in order to protect shared data.
2. To implement blockchain technology, which converts keys into blocks and then recognises them using the ADSHA algorithm.
3. To put the encrypted data in a cloud storage system and provide authorised patients and clinicians access to it.

1.3 *Novelty of the proposed system*

Proposed framework permits the clinicians for transferring their data in encrypted format to cloud which hosts the corresponding network. A neural network is fed with input (plain text) and neurally based pseudo-random numbers (in vector form). Results of process include weights and cipher text in hidden-layers. In accordance with the changes in weight based on the pseudo-random number, cipher text alters in accordance with it. Hence, this permits the model to be highly secured. The study proposes Modified Genetic Algorithm, wherein, based on fitness-function, keys are generated and these keys are utilized for encryption. Such encrypted predictions could be sent to secret-key owner who could decrypt them. The proposed system is highly secured as the training-input adjusts its weight in accordance with the trained data.

As the model quickly and easily provides overall output, plain text encryption is accomplished easily for producing cipher text in less time with the updated key-generation approach. With the use of several nodes and hidden layers, it enhances the model complexity, thereby affording high cryptosystem security. The keys generated with Modified Genetic Algorithm are integrated with the hidden weights. Thus, even when an intruder attempts to hack any data, it is not possible to decrypt it. Owner of the data could possess confidence upon their data as it is safely stored in cloud. The proposed system seems to exist as a potential-source for the public-key cryptographic approaches which does not rely on the number theoretic-operations and possess memory and time complexities. The outcomes reveal the better performance of the proposed system while comparison with conventional studies in accordance with security. In blockchain, third-parties are not needed for verifying the transactions. The consensus approaches are utilized for maintaining the consistency of data on the blockchain networks. The ethereum possess 3 kinds of consensus approaches (PoS-Proof of Stake, PoW-Proof of Work and PoA-Proof of Authority). In this study, PoW consensus approach is executed in the fusion-chain with Ethereum as it assists only PoW. This approach is implemented with full-node type, block creation and block validation, wherein, CPU overhead tends to increase. To ensure the smooth and effective transfer of healthcare data, the ADSAH approach combines Elliptical Curve Cryptography (ECC) with a blockchain mechanism known as Deep Fuzzy Based Neural Network (DFBNN).

2. Related works

This study aims to evaluate the performance of various encryption and decryption schemes for securing medical data transmitted wirelessly. The study assesses the execution time, throughput, average data rate, and information entropy of encryption schemes such as Blowfish, DES, AES, RC4, RSA, ECC, CBE, MTLM, and CEC [16]. This paper proposes a hybrid cryptographic algorithm combining RC4, ECC, and SHA-256 to enhance the security of sensitive information in IoT-based intelligent irrigation systems. By encrypting the RC4 key with ECC and applying SHA-256 for hashing, the proposed scheme ensures data integrity and protection against known attacks [17]. This paper addresses the privacy and efficiency challenges in IoT devices and applications that rely on continuous data collection. The paper presents a hybrid approach where the initial layers of a deep neural network are run on the IoT device, and the output is sent to the cloud for further processing. To ensure privacy, the paper introduces Siamese fine-tuning to prevent unwanted inferences in the data [18]. This paper uses blockchain technology to enhance healthcare systems by improving health record management, insurance billing, and data security. It explores solutions such as Hyperledger Fabric, Composer, Docker Container, and Hyperledger Caliper to measure the performance of blockchain-based systems. This paper aims to propose GuardHealth, a decentralized Blockchain system for innovative electronic medical records (EMRs), ensuring secure and privacy-preserving data sharing. GuardHealth focuses on managing confidentiality, authentication, and data preservation while utilizing consortium Blockchain, smart contracts, and a trust model with Graph Neural Network (GNN) for malicious node detection [19]. The proposed framework addresses the challenges of log record protection and real-time anomaly detection in IoT systems. By leveraging Blockchain and smart contracts, it ensures data integrity and automates anomaly detection, overcoming issues with high communication overhead and tampering vulnerability in existing methods [20]. This paper addresses the privacy and control issues associated with centralized health data storage in IoT systems. The proposed scheme, Healthchain, utilizes blockchain technology to preserve the privacy of health data by encrypting it and implementing fine-grained access control [21]. This paper aims to shed light on the constraints of conventional health information technology in delivering personalized and patient- centric care. It underscores the transformative potential of blockchain technology in overcoming these limitations by offering decentralized and secure solutions for data access, storage, and payment systems in healthcare

[22]. This study aims to address the security vulnerabilities in a multiserver authentication scheme proposed by Wang *et al* to manage the increasing number of users in a mobile network. The authors demonstrate the insecurity of Wang *et al* scheme against various attacks and propose an improved scheme to mitigate these security weaknesses [23]. The focus is on addressing the security, privacy, and trust issues in intelligent healthcare, a crucial aspect of smart cities. The authors propose a human-in- the-loop-aided (HitL-aided) scheme to preserve privacy in intelligent healthcare. The scheme incorporates a block design technique to obfuscate health indicators and introduces the concept of human-in-the-loop to enable privacy-controlled access to health reports [24]. This paper aims to address the research challenge of achieving efficient data search and sharing in cloud-assisted IoT systems while ensuring sensor data security in healthcare applications. The authors propose a solution called proxy re-encryption with equality test (PRE- ET) by combining the concepts of proxy re-encryption (PRE) and public key encryption with equality test (PKE-ET) [25]. This paper aims to address the security and privacy concerns in IoT-enabled healthcare infrastructure by proposing a novel encryption scheme. The scheme combines elliptic curve cryptography, Advanced Encryption Standard (AES), and Serpent to secure healthcare data [26]. The paper discusses using cryptographic algorithms for access contro l in IoMT-based healthcare systems, emphasizing algorithms like RC6, elliptic curve digital signature, and SHA256 for data integrity. It highlights how adopting high-security algorithms enhances availability and confidentiality and protects sensitive information from implantable devices, strengthening healthcare services [27]. This research addresses the challenge of storing and securely transferring healthcare data by proposing the LRO-S encryption method. This method combines lionized remora optimization and improved security algorithms to generate secure keys for the serpent encryption algorithm [28]. This paper addresses the security concerns in transmitting ECG data to cardiologists for telecardiology services. The proposed method focuses on securing the ECG transmission using a triple data encryption standard (3-DES) for encryption and a water cycle optimization (WCO) algorithm for authentication [29]. This research addresses the security concerns in healthcare data and services by proposing a content-aware DNA computing system for encrypting medical images [30]. This research addresses the security and privacy concerns of storing and accessing patients' health data in cloud computing environments. The vulnerability of patient data to various cyberattacks necessitates the implementation of encryption mechanisms to protect sensitive health information. This paper proposes a hybrid cryptography approach to securely share health data over the cloud, ensuring data privacy and secrecy [31–33].

2.1 *Significance of blockchain in healthcare sector*

As the study focuses on blockchain in healthcare, significance and usage of blockchain in healthcare as claimed by conventional studies are presented to afford a comprehensive view about it in existing researches [34–36].

The recommended study has explained about the significance of blockchain in health care during pandemic situation. The application of blockchain technology includes digital data storage, public surveillance system, disease control, supporting the supply chain of medical parts, healthcare instruments tracking, enhanced the transparency during treatment of patients, assist in storing and transferring the information related to treatment, helps in efficient healthcare management and provides better healthcare protection [37, 38].

2.2 *Research gap*

The recommended study has confessed that blockchain technology is prone to have information decay, lack of scalability and non-standardization. Hence, the new approaches may be integrated with blockchain technology to overcome the existing drawbacks.

As the healthcare services are complex in nature, the blockchain technology is still in a budding stage. Therefore, more empirical base is needed to make the existing mechanism highly conclusive and emphatic which may reduce the complexity of the existing system.

Scalability acts as a major limitation, as validation needs more time because of the authorization of transactions from majority of nodes. Additionally, complexity of blockchain and need for extensive network of users is considered as another disadvantage. And also, privacy preservation acts as a major limitation in using blockchain technology in health care.

3. Methodology

Through the implementation of the proposed work improved quaternion neural network cryptography is used to encrypt the shared healthcare data in order to achieve strong security. The ADSAH, a robust security framework is established for encrypting shared health data. This approach incorporates key generation, encryption, and decryption processes to optimize complexity and execution time. The overall process is depicted in figure 1, showcasing the seamless flow of data security measures. In the ADSAH framework, private medical data uploaded by physicians is encrypted using the ECC encryption technique. The secret key associated with the encrypted data is securely stored using blockchain technology, utilizing a block-based storage approach. Key events within these blocks are identified using the SHA algorithm, bolstering

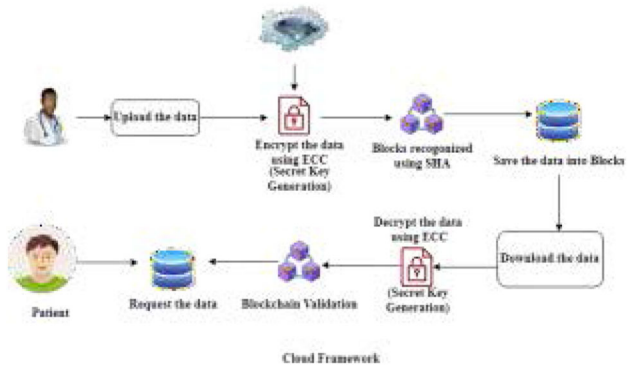

Figure 1. An implementation framework for the proposed methodology.

security measures. The encrypted and secured data is then stored in a cloud storage system, ensuring its accessibility and integrity. Using the secret key, authorised patients or medical professionals can access the medical information. The data is decrypted using the ADSAH encryption and decryption processes, enabling the retrieval of secure medical data. The data remains protected and stored within the cloud environment throughout the process, safeguarding its confidentiality and privacy (figures 2 and 3).

3.1 *Proposed ADSAH*

3.1.1 *Elliptic curve cryptography (ECC) algorithm:* In hospital management, the security of user-related data, encompassing patient information, medical records, and medication details, holds immense

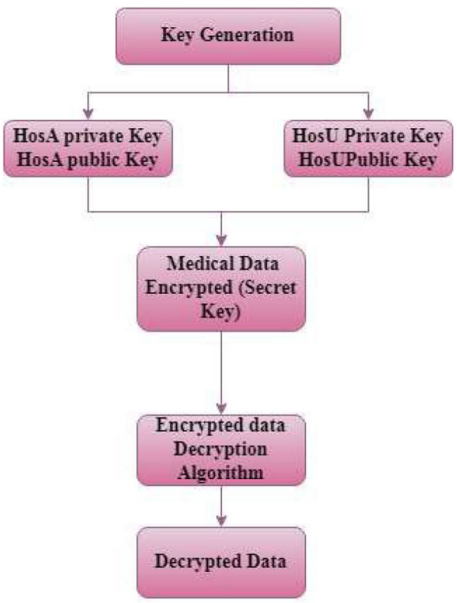

Figure 2. ECC Encryption process workflow.

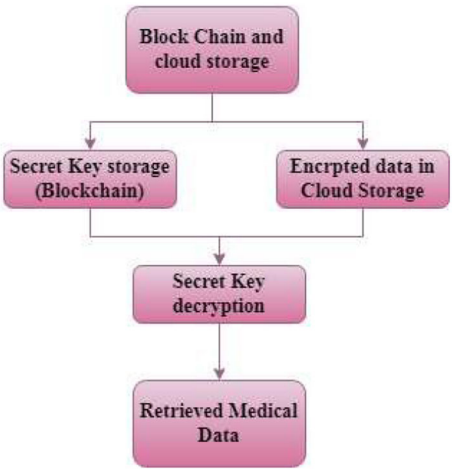

Figure 3. ECC Decryption process workflow.

significance. However, hospitals encounter significant challenges in ensuring data security. To tackle this issue, this paper proposes the adoption of the elliptic curve cryptography (ECC) algorithm for encryption and decryption processes. ECC is an asymmetric cryptographic algorithm that utilizes private and public keys for encryption and decryption operations. One notable advantage of ECC over non-ECC algorithms like RSA and DSA is its ability to provide equivalent security with smaller key sizes. In other words, ECC achieves the same level of protection as different algorithms while requiring shorter key lengths. The name "elliptic curve cryptography" stems from using elliptic curves as the foundation of its mathematical framework. Elliptic curves are described by cubic functions, specifically equations of degree 3. The equation of an elliptic curve follows the form $y^2 = x^3 + (a * x) + b$, where a and b are constants defining the curve. The coordinates of the elliptic curve equation are represented as (x_1, y_1), (x_2, y_2) and so on [32]. By harnessing the power of elliptic curves and their underlying mathematical principles, the ECC algorithm provides a secure and efficient solution for encrypting and decrypting sensitive user data within the realm of hospital management. It offers robust security while minimizing the required key sizes, making it appropriate for safeguarding confidential information within healthcare systems.

The process begins by initiating the algorithm. For each user, their username and password are obtained. If the user's credentials are authenticated, they are granted access to a secret key within the system. This authentication check is performed iteratively, allowing multiple users to be established. If a user is found invalid during the authentication process, the algorithm proceeds to handle this case. It displays a message indicating the user is invalid and then exits the algorithm. Once the authentication process is completed, the algorithm moves on to the next phase, which involves storing the data securely in a cloud storage

system using blockchain technology. This integration ensures the data integrity and provides a secure and decentralized storage solution. After the data is securely stored, the algorithm reads the plain text data. The next step involves initiating the ECC encryption process in the Edge Server. During this process, public and private keys are generated using Algorithm 1, which will be crucial for the subsequent encryption and decryption operations. Following key generation, the algorithm performs the encryption process using Algorithm 2. This process transforms the plain text data into an encrypted form, ensuring its confidentiality and protection against unauthorized access. To enable the decryption of the encrypted data, a request for the decryption process is made in the Edge Server. If the user is authenticated for decryption, the algorithm performs the decryption process using Algorithm 3. This process utilizes the previously generated keys to decrypt the encrypted data and retrieve the original plaintext. Once the decryption process is completed, the data is securely stored in the cloud server and blockchain technology. This dual storage approach enhances the security and persistence of the data. Finally, authenticated users are granted access to view their data securely. This ensures privacy and confidentiality by restricting data access only to authorized individuals

Algorithm 1- public, private, and secret Key Generation

Input: User $HosU$ data; Key size: 516 bits
Output: public, private, and secret key of $HosU\&HosA$
Step 1: create E
Step 2: generate G
Step 3: for-each User $HosU$ do;
Step 4: create private and public keys of $HosA$
Step 5: create private keyN_{HosA} of $HosA$; where $N_{HosA} <$ n
Step 6: compute public key P_{HosA} of $HosA$; where $P_{HosA} = N_{HosA}(G)$
Step 7: create the private key and Public key of $HosU$
Step 8: create private key $N_{HosU}$of $HosU$; where $N_{HosU} < n$
Step 9: compute public key P_{HosU} of $HosU$; where $P_{HosU} = N_{HosU} * G$
Step 10: create a secret key of $HosA$; $kHosA = N_{HosA} * P_{HosU}$
Step 11: create secret key of N_{HosU}; $kHosU = N_{HosU} * P_{HosA}$
Step 12: end for-each;

According to Algorithm 1, the aim is to generate public, private, and secret keys for Hospital Users *HosU* and the Hospital Authority *HosA*. The key size is specified as 516 bits. First, a variable E is created. Then, a point G is generated. For each Hospital User *HosU* in the system, the algorithm proceeds a private key and public key are created for the Hospital Authority *HosA*. The private key is denoted as N_{HosA}, where N_{HosA} is a randomly generated value that is less than the total number of keys n. The public key of *HosA*, denoted as P_{HosA}, is computed as the scalar multiplication of N_{HosA} and G: $P_{HosA} = N_{HosA}(G)$. Similarly, private and public keys are created for the Hospital User *HosU*. The private key for *HosU* is denoted as N_{HosU}, and it is randomly generated such that $N_{HosU} < n$. The public key of *HosU*, denoted as P_{HosU}, is computed as $P_{HosU} = N_{HosU} * G$. To establish the secret key for each entity, the algorithm performs the following calculations: The secret key of HosA, kHosA, is computed as the scalar multiplication of N_{HosA} and P_{HosU}: *HosA*; $kHosA = N_{HosA} * P_{HosU}$. Similarly, the secret key of *HosU*, *kHosU*, is computed as $kHosU = N_{HosU} * P_{HosA}$. These steps are repeated for each Hospital User in the system.

Algorithm 2- plain text PT to cipher text CP_{pt}

Input: plain text PT
Output: cipher text CP_{pt}
Step 1: read PT
Step 2: encode $PT -> EP => EP_{pt}$
Step 3: compute CP
Step 4: compute CP_{pt}; $CP_{pt} = \{K * G, EP_{pt} + K * P_{HosU}\}$
Step 5:compute $X - coordinate = K * G$; $Y - coordinate = EP_{pt} + K * P_{HosU}$

The algorithm 2 takes a plain text message PT as input and aims to produce a cipher text CP_{pt} as output. First, the plain text message PT is read. Next, the plain text message PT is encoded, resulting in an encoded message EP_{pt}, which represents the transformed version of the original message using a specific encoding scheme. Then, the algorithm proceeds to compute the cipher text CP. The cipher text CP_{pt} is calculated using the formula: $CP_{pt} = \{K * G, EP_{pt} + K * P_{HosU}\}$, where K is a randomly generated scalar value, G is a predefined point, and P_{HosU} is a public key associated with the Hospital User. The computation of CP_{pt} involves two components: the X-coordinate and the Y-coordinate. The X- coordinate is determined by multiplying $K * G$, while the Y-coordinate is obtained by adding $EP_{pt} + K * P_{HosU}$.

Algorithm 3- cipher text CP_{pt} **to** plain text PT

Input: Cipher text
Output: Plain text
Step 1: get cipher point CP_{pt} at receiver end
Step 2: compute $Z = KG * N_{HosU}$
Step 3: subtract Z from Y coordinates and compute the following:
Step 4: $HosU < -EP_{pt} + K * P_{HosU} - (Z)$
Step 5: $HosU < -EP_{pt} + K * P_{HosU} - (KG * N_{HosU})$
Step 6: $HosU < -EP_{pt} + K * P_{HosU} - K * P_{HosU}$ $where\ P_{HosU} = N_{HosU} * G$
Step 7: $HosU < -EP_{pt}$

The algorithm 3 aims to decrypt a cipher text and retrieve the original plain text message. Given the cipher text, the receiver obtains the cipher point CP_{pt} as an input. To decrypt the cipher text, the receiver computes Z by multiplying the predefined point $KG * N_{HosU}$ associated with the Hospital User. Next, the algorithm subtracts Z from the Y coordinates of the cipher point and performs the following computations:

$$HosU < -EP_{pt} + K * P_{HosU} - (Z)$$

$$HoSU < -EP_{pt} + K * P_{HosU} - (KG * N_{HosU})$$

$$HosU < -EP_{pt} + K * P_{HosU} - K *$$

P_{HosU} where $P_{HosU} = N_{HosU} * G$ Finally, the algorithm simplifies the expression to: $HosU < -EP_{pt}$

3.1.2 *Deep fuzzy based neural network (DFBNN):* In this section we discussed about the DFBNN which is based On Deep Neural Network (DNN) concept. The proposed ADSAH technique employs a combination of ECC and DFBNN algorithms for secure data analysis and decision-making. It starts by encrypting the data using ECC, which utilizes elliptic curves and cryptographic keys to ensure confidentiality during transmission or storage. The encrypted data, along with other relevant information, is securely stored, such as in a blockchain or secure database. The DFBNN, which combines deep learning and fuzzy logic, is then used for data analysis. The figure 4 depicts the DFBNN architecture, which is made up of several layers, nodes, and fuzzy rules, and it is trained on labeled data to learn patterns and relationships in the encrypted data. The DFBNN processes the encrypted data using deep learning capabilities and fuzzy logic to handle uncertainty and imprecision. It performs analysis and decision-making tasks on the encrypted data while preserving its confidentiality. When the analysis is complete, the encrypted results are retrieved, and the private key associated with ECC encryption is used to decrypt the data back to its original form, allowing for interpretation or further use.

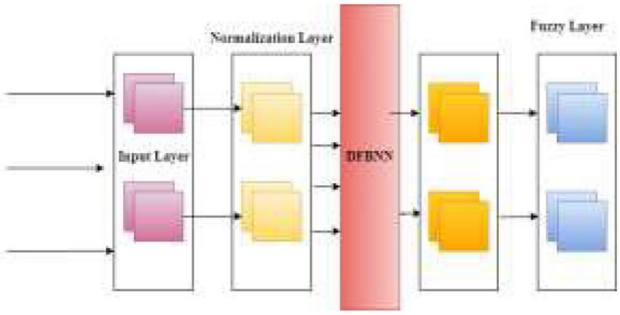

Figure 4. DFBNN Architecture.

Step 1: Initialization:
$DaTr$ = Data for training (scene data and situation labels).
$DaTr_m = m$ number of training data $DaTr$.
X_i = For input X, ith input of the scene data
$\hat{X}_i$ = Input normalized data.
$F_{train}()$ = Function to train the hidden layers of deep network
Fun_{act} =Activation function for the deep neural network
DNN_{imp} = Improved deep neural network (DNN)
$F_{norml}()$ =For input normalization
F_{fuzz_out} =Output Fuzzification
$Fout\_DNN_{imp}$ =Training of the DNN_{imp}
Step 2: Offline training of the DNN_{imp}
Step 3: $i \leftarrow 0$;
Step 4: $do\ i++$
Step 5: $\hat{X}_i \leftarrow F_{norm}(DaTr)$;
Step 6: $F_{train}(Fun_{act}, \hat{X}_i)$;
Step 7: $while\ i > DaTr_m$ is false go back to line 2
Step 8: $Ftrain_{DNN_{imp}(DNN_{imp},DaTr)}$;
Step 9: Online training of the DNN_{imp}:
Step 10: $t \leftarrow 0$;
Step 11: $do\ t++$
Step 12: $\hat{X}_i \leftarrow$Normalized (X_i);
Step 13: $\hat{b_i} \leftarrow Fout_{DNN\,imp}(\hat{X}_i, DNN_{imp})$;
Step 14: $p_i \leftarrow F_{fuzz_{out}}(\hat{b_i})$;
Step 15: $while\ DaTr \geq DaTr_{max}$ is false, go back to line 9

The algorithm starts with an initialization step, where the necessary variables and functions are defined. These include the training data $DaTr$, the number of training data $DaTr_m$, input variables X_i normalized input data $\hat{X}_i$, functions for training the hidden layers of the deep network

F_{train}, activation function for the deep neural network Fun_{act}, the improved deep neural network DNN_{imp}, functions for input normalization F_{norml} and output fuzzification F_{fuzz_out}, and the training of the improved DNN $Fout\_DNN_{imp}$. In the offline training phase, the DNN_{imp} is trained using the training data $DaTr$. Then, in a loop starting from Step 3, the algorithm iterates through the training process. Each iteration involves normalizing the input data and training the hidden layers of the deep network. The loop continues until the condition $i > DaTr_m$ is false, and then DNN_{imp} is further trained. The online training phase begins with initializing the variable t. In the subsequent loop, the algorithm performs online training. It involves normalizing the input data and obtaining the output of the DNN_{imp} $\widehat{b_i}$ for the normalized input. Fuzzifying the output p_i using $F_{fuzz_{out}}\left(\widehat{b_i}\right)$ and repeating the process until the condition $DaTr \geq DaTr_{max}$ is false. The algorithm continues to iterate through the online training phase until the desired criteria for the maximum number of training data $DaTr_{max}$ or the maximum number of iterations $DaTr_{max}$ are met. the training of the improved DNN $Fout\_DNN_{imp}$. In the offline training phase, the DNN_{imp} is trained using the training data $DaTr$. Then, in a loop starting from Step 3, the algorithm iterates through the training process. Each iteration involves normalizing the input data and training the hidden layers of the deep network. The loop continues until the condition $i > DaTr_m$ is false, and then DNN_{imp} is further trained. The online training phase begins with initializing the variable t. In the subsequent loop, the algorithm performs online training. It involves normalizing the input data and obtaining the output of the DNN_{imp} $\hat{b_i}$ for the normalized input. Fuzzifying the output pi using $F_{fuzz_{out}}(\hat{b_i})$ and repeating the process until the condition $DaTr \geq DaTr_{max}$ is false. The algorithm continues to iterate through the online training phase until the desired criteria for the maximum number of training data $DaTr_{max}$ or the maximum number of iterations $DaTr_{max}$ are met.

3.1.3 *Modified genetic algorithm (GA):* As we discussed earlier, in the context of the proposed ADSAH system, a modified genetic algorithm can be used to generate encryption and decryption keys. The genetic algorithm is a search and optimization technique inspired by natural selection and genetics. Figures 5 and 6 illustrates the process of key generation using genetic algorithm [14].

Figure 7 represents the framework for the practical implementation of the model. The cloud framework will be based on the hospital networks. The doctors could create new files and add them to the network, which will be protected using the proposed techniques. The files stored in the cloud server would be accessed by the patient based on privacy, and they could only read the data.

Algorithm 2- Modified Genetic Algorithm for Key Generation

$P(t) - Pop(i)$

Input: *Initialised the data*

Output: *Generated Key*

1. $i \leftarrow 0$
2. *Init_Population* [$Pop(i)$]; *Initialises the population.*
3. *Eval_Population* [$Pop(i)$]; *Evaluates the population.*
4. *While not terminating,*
5. *do*
   $Pop'(i)$
   $\leftarrow$ *Variation* [$Pop(i)$]; *Creates new solutions*
   Eval_Population [$Pop'(t)$]; *Evaluates the new solutions*
   $Pop(i+1) \leftarrow$ *ApplyGeneticOperators*
   [$Pop'(i) U\ Q$]; *Next, generation pop.*
   $i \leftarrow i + 1$;
   end while.
6. *Population having maximum fitness value is selected as key.*

4. Results and discussion

This part presents the findings from the performance analysis, comparison analysis, and environmental setup conducted during the execution of the proposed system.

4.1 *Environmental setup*

In our proposed work, the evaluation is conducted by implementing programs using the Java programming language version 1.8. The computer system used for the evaluation consists of an Intel Core i5 processor with a clock speed of 3.30 GHz. It is equipped with 8 GB of RAM and runs on the Windows 8 operating system, which is a 64-bit OS. This specific hardware and software configuration is chosen to provide a suitable computing environment for our experiments. The Intel Core i5 processor offers a good balance between performance and cost, while the 8 GB of RAM ensures sufficient memory capacity for running the programs and handling the computational tasks involved for training and evaluation. By utilizing this, we can execute our programs efficiently and collect relevant data to evaluate the performance of the proposed ADSAH.

4.2 *Comparative analysis*

4.2.1 *Uploading time:* According to figure 8, for the data size of 1MB, ADSAH achieves an uploading time of 3.98 milliseconds, which is significantly lower than the other methods such as CE (5.6 ms), LR (10.89 ms), RCE (5.6 ms), DOM (5.6 ms), and ECC-CRT (4.38 ms). This indicates that ADSAH has optimized the uploading process for faster data transfer. As the data size increases to 2MB, ADSAH still maintains its superiority with an uploading time of 6.2 ms, outperforming CE (8.68 ms), LR (16.24 ms), RCE (8.68 ms), DOM (8.68 ms), and ECC-CRT (5.42

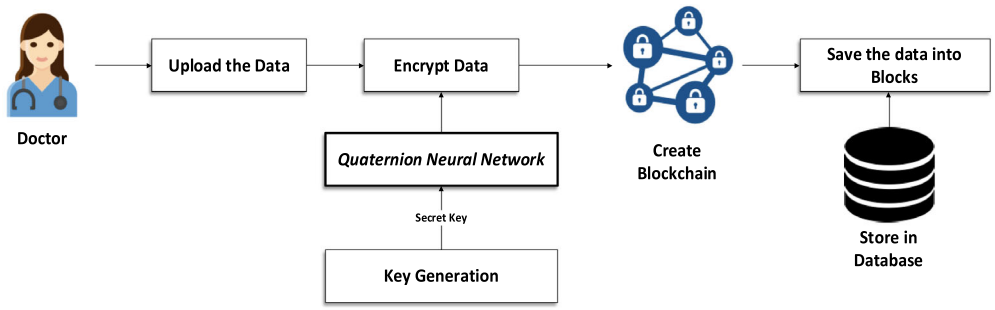

Figure 5. Key generation for the doctor.

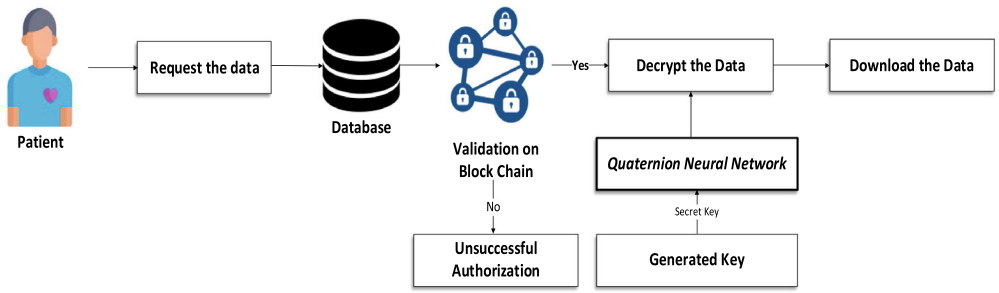

Figure 6. Key generation for the patient.

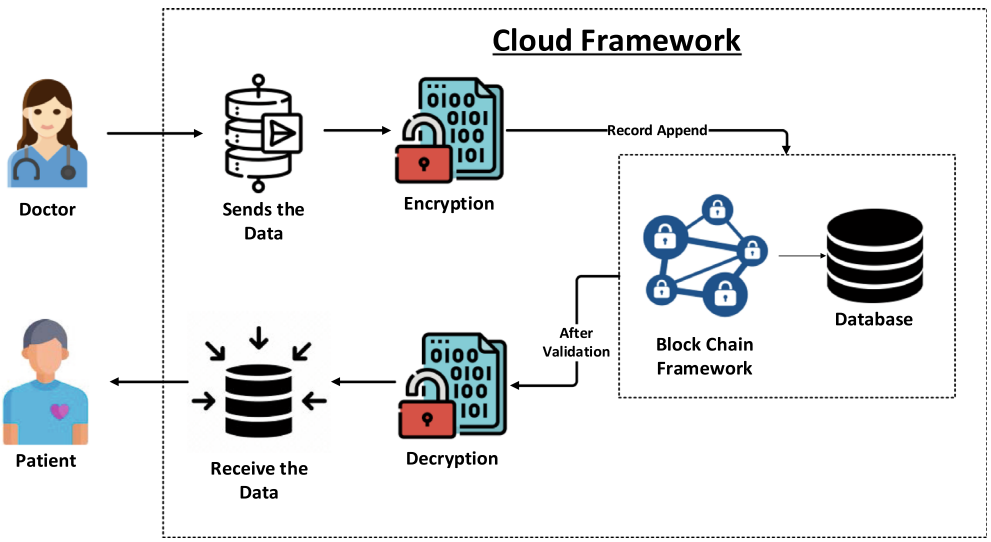

Figure 7. An implementation of overall framework.

ms). The trend continues as the data size grows. For 4MB, 6MB, 8MB, and 10MB, ADSAH consistently exhibits lower uploading times compared to the other methods. This demonstrates that ADSAH has been designed to efficiently handle larger data sizes and minimize the time required for data uploading.

4.2.2 *Downloading time:* ADSAH, the proposed method, demonstrates faster data retrieval compared to other methods for a data size of 1MB, achieving a downloading time of 3.23ms. This superiority is maintained as the data size increases to 2MB, with ADSAH recording a downloading time of 4.89ms,

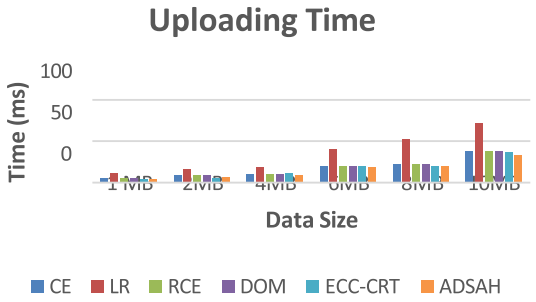

Figure 8. Uploading time.

outperforming the alternative methods. This trend continues for larger data sizes, such as 4MB, 6MB, 8MB, and 10MB. When it comes to the data size of 10 MB it achieving the time with 31.98 ms when compared with the other CE, LR, RCE, DOM, ECC-CRT as 34.92 ms, 34.92ms, 34.92ms, 35ms, 33.89ms respectively, was clearly depicted in figure 9. Where ADSAH consistently exhibits lower downloading times compared to the other methods. These findings highlight the efficiency and effectiveness of ADSAH in facilitating faster data retrieval, regardless of the data size.

4.2.3 *Encryption time comparison:* Figure 10 represents the encryption time comparison for different encryption methods at various input data sizes (in KB), the term of time evaluated in terms of (milliseconds). The encryption times are provided for the following methods: 3DES & ECC & SHA-256, RC4 & 3DES & SHA-256, AES & RC4 & SHA-256, AES & 3DES & SHA-256, RC4 & AES & SHA-256, and the proposed ADSAH method. By analyzing the figure, we can observe that the proposed ADSAH method consistently demonstrates lower encryption times compared to the other encryption methods for all data sizes. This indicates that ADSAH is more efficient in terms of encryption time. For example, at a data size of 200 KB, the proposed ADSAH method has an encryption time of 19.63 ms, while the other methods range from 28 ms to 35 ms. Similarly, at larger data sizes, such as

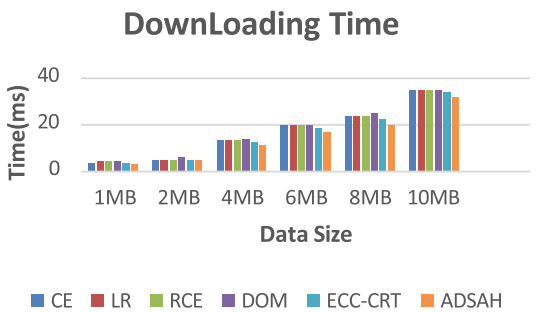

Figure 9. Downloading time.

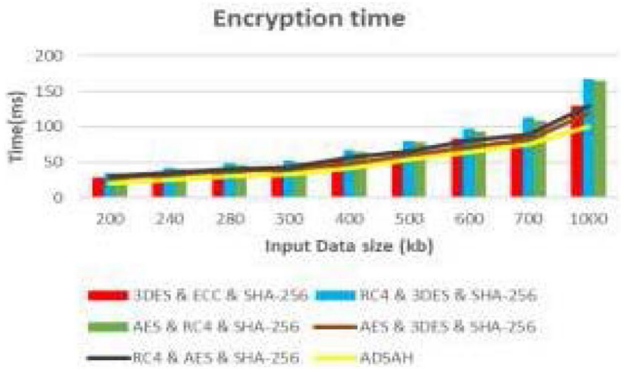

Figure 10. Encryption time comparison of the proposed model.

1000 KB, the proposed ADSAH method has an encryption time of 100.63 ms, outperforming the other methods with encryption times ranging from 119 ms to 168 ms. These results highlight the efficiency of the proposed ADSAH method in terms of encryption time. It offers faster encryption compared to the other methods, making it a more time-effective solution for securing data.

4.2.4 *Decryption time:* Figure 11 represents the decryption time comparison for different decryption methods at various input file sizes (in KB). The decryption times are provided for the following methods: 3DES & ECC & SHA-256, RC4 & 3DES & SHA- 256, AES & RC4 & SHA-256, AES & 3DES & SHA-256, RC4 & AES & SHA-256, and the proposed ADSAH method. By analyzing figure 8, we can observe that the proposed ADSAH method consistently demonstrates lower decryption times compared to the other decryption methods for all file sizes. This indicates that ADSAH is more efficient in terms of decryption time. For example, at a file size of 200 KB, the proposed ADSAH method has a decryption time of 17.66 ms, while the other methods range from 28 ms to 33 ms. Similarly, at larger file sizes, such as 1000 KB, the proposed ADSAH method has a decryption

Figure 11. Decryption time comparison of the proposed model.

Figure 12. Average time comparison for encrypting and decrypting a file for the proposed model and the previous model.

time of 96.82ms, outperforming the other methods with decryption times ranging from 120 ms to 165 ms. These results highlight the efficiency of the proposed ADSAH method in terms of decryption time. It offers faster decryption compared to the other methods, making it a more time-effective solution for retrieving secured data. By minimizing the decryption time, ADSAH enhances the overall efficiency of the system, enabling quick access to decrypted data while ensuring its security.

4.2.5 *Average time comparison:* Figure 12 presents the average time comparison for encryption and decryption execution using different methods: 3DES & ECC & SHA-256, RC4 & 3DES & SHA-256, AES & RC4 & SHA-256, AES & 3DES & SHA-256, RC4 & AES & SHA- 256, and the proposed ADSAH method. In terms of encryption execution time, the proposed ADSAH method demonstrates the best performance with an average time of 49.28 ms. It outperforms the other methods, which range from 57.44 ms to 77.88 ms. This indicates that ADSAH offers faster encryption execution, making it more efficient in terms of time. Similarly, in terms of decryption execution time, the proposed ADSAH method shows superior performance with an average time of 43.44 ms. The other methods have average times ranging from 56.33 ms to 74.33 ms. Once again, ADSAH outperforms the alternatives, providing faster decryption execution. The performance of the proposed ADSAH method can be attributed to its optimized encryption and decryption algorithms, which are specifically designed to minimize execution time while maintaining data security. By reducing the average time required for encryption and decryption, ADSAH enhances the overall performance of the system, enabling efficient and timely data processing From table 1, it has been observed that, Scheme I has regarded to afford security for different attack methods like user anonymity, offline password attacks, stolen smart card attacks and server impersonation attack. Similarly, Scheme II has considered to afford security to offline password attacks, stolen smart card attacks, replay attacks, three factor secrecy and perfect forward secrecy. On contrary, the proposed method has considered to provide security for all the kinds of considered attacks as depicted in table 1 which confirms its ability than other schemes.

In addition, comparison has been performed in accordance with computational cost and the outcomes are shown in table 1.

From table 2, it has been revealed that, the existing methods have consumed high computational cost in comparison with the proposed system. Lower the computational cost, higher is the efficacy of the method. Hence, the proposed algorithm has been found to be effective than conventional algorithms.

Table 2. Comparison of computation cost.

Scheme	Overall computation cost (ms)
Existing algorithm	74.33
Proposed algorithm	49.28

Table 1. Security Performance comparison.

Attack methods	Scheme I	Scheme II	Proposed Method
User anonymity	√	×	√
Offline password attacks	√	√	√
Stolen smart card attacks	√	√	√
Known session- specific temporary information attack	×	×	√
User impersonation attack	×	×	√
Server impersonation attack	×	×	√
Replay attacks	√	√	√
Perfect forward secrecy	×	√	√
Three-factor secrecy	×	√	√

5. Conclusion

The suggested new novel solution improved quaternion based neural network and ADSAH with a blockchain mechanism maintained in a cloud environment secures private health data. The innovative approach to addressing the security and privacy risks associated with cloud-based healthcare data. To reduce complexity and time, the proposed cryptography approach performed the key generation, encryption, and decryption processes.

The blockchain system is used to manage multiple hash events, where the secret key is saved and handled by the ADSAH algorithm. A further enhancement in security is provided by the updated genetic algorithm's key generation process. The data is encrypted and kept securely in the cloud. Using the secret key, the authorised patient or doctor can access the confidential health information, after which the data is decrypted. The assessment findings demonstrate that compared to the previous study, the suggested approach reduces the time required for encryption and decryption. Comparatively, the cost of transaction and execution was also decreased as a result of the complexity reduction. It addresses the security and privacy challenges associated with healthcare data, providing a promising solution for the healthcare industry.

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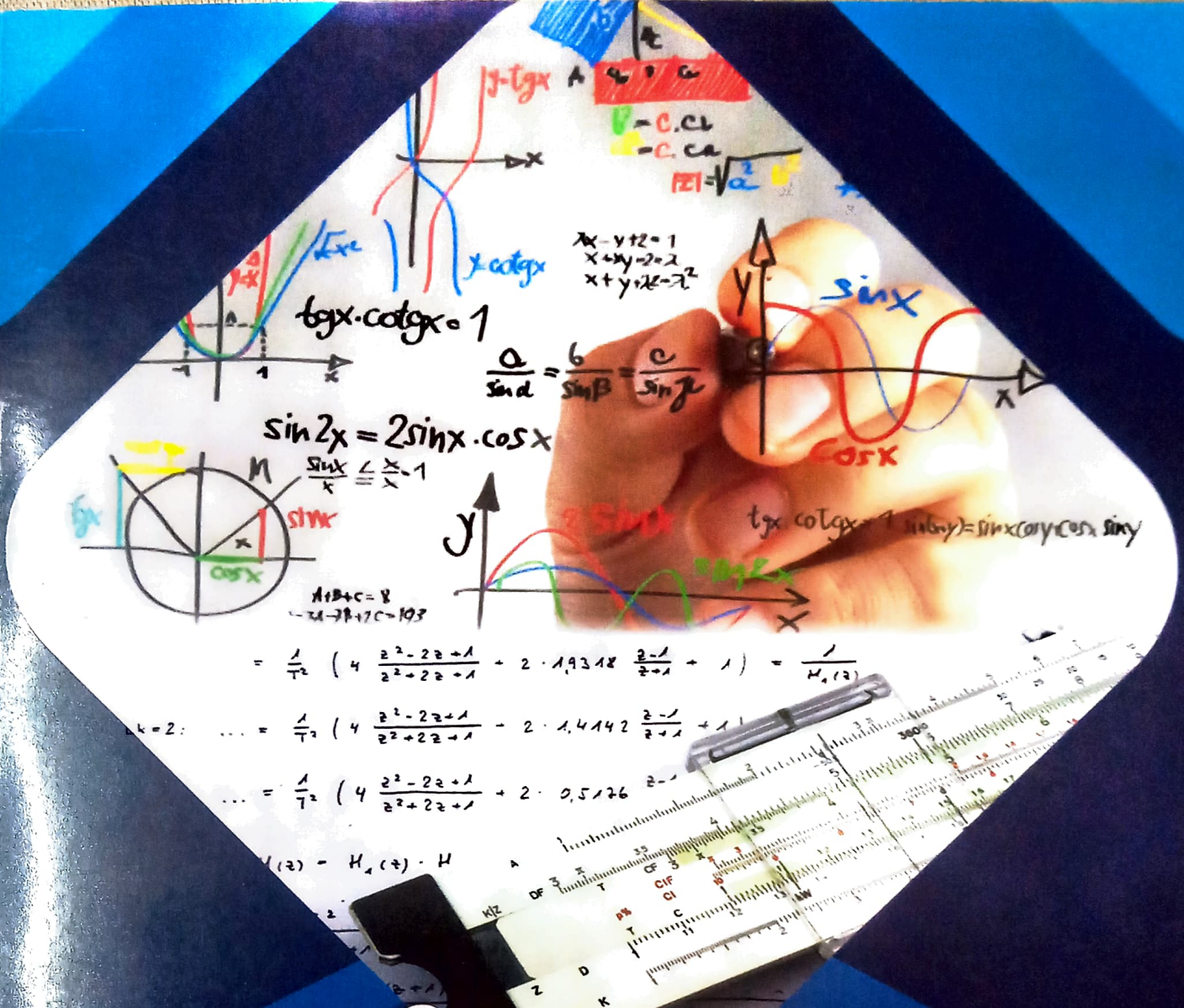

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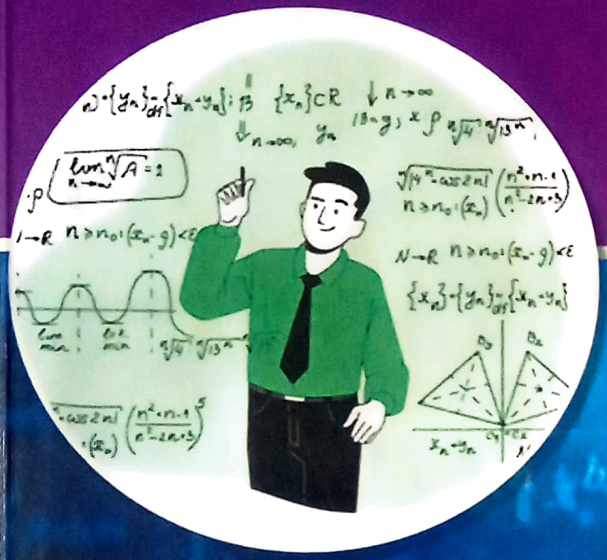

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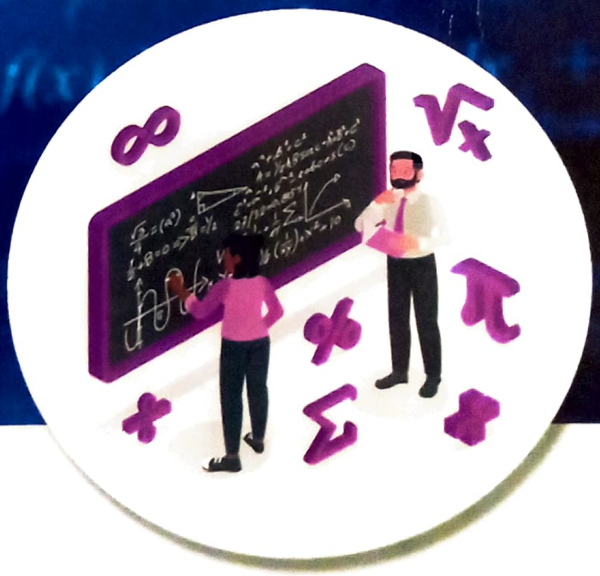

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Text to voice conversion of text embedded in images

Lalitha R
Professor, CSE
Rajalakshmi Institute of Technology
Chennai,India.
researchlalitha@gmail.com

Selvi S
Professor,CSE
RMK Engineering College
Chennai,India
ssi.cse@rmkec.ac.in

Gayathri S
Associate Professor,
Rajalakshmi School of Business
Chennai, India
gayathri.s@rsb.edu.in

Selvalakshmi V
Associate Professor & Head,,MBA
Velammal College of Engineering and Technology
Madurai, India
drselvalakshmi.bharath@gmail.com

Mangaiyarkarasi T
Assistant Professor, Faculty of Management, SRM Institute of Science and Technology, Vadapalani Campus Chennai, India
mangaiyt@srmist.edu.in

Saranya K
Assistant Professor,CSE
Bharathiyar Institute of Engineering for Women
Salem, India
ksaranya@live.com

Abstract: **Natural language processing (NLP) and image processing have seen recent advancements with the goal of developing intelligent systems that would improve quality of life. This research suggests a quick approach for text identification, information extraction from photos, and speech synthesis of extracted information. To start, the input image is first improved through grayscale conversion. The modified image's text parts are then located using the Maximally Stable External Regions (MSER) feature detector. The non-text MSERs are removed by exploiting geometrical features and the stroke width transform. In order to identify text sequences that are later divided into words, individual letter or alphabet groups are then formed. The words are finally converted to digital form using optical character recognition (OCR). In the final stage, a speech synthesizer (TTS) is fed our text along with the identified text to convert the text to voice. The suggested technique is used to test web-based photos, extract text information from the images, convert the recognized text into speech that corresponds to the user's chosen language, and improve the accuracy and robustness of the proposed work.**

Keywords— TTS, OCR, languages, web images, MSER, Natural processing language, image processing.

I. INTRODUCTION

Recently, technological development has advanced more quickly. In this digital era, the primary means of interpersonal contact are mobile phones and other technological devices. Languages, whether spoken or written, are the most primitive means of communication. Modern visual texts in environments built by humans or by nature can include a wealth of important information. To extract and understand the data from these photographs, the researchers have begun digitizing them. After then, TTS (text-to-speech synthesis) will be applied. [13], [10], and [24]. The information is spoken aloud for the user's benefit and convenience. It may be simpler for those with vision or reading difficulties to hear printed material played back by a computer system by combining text extraction and TTS. Text is regularly edited out of photos using OCR [18], [31]. In order to help the blind and illiterate understand signs, pamphlet text, books, and their surroundings, we can devise an effective way.

The operation of OCR is depicted in the picture below (Fig. 1). First, using the library provided by UI Path, we receive a web input and store the OCR-processed web image file. Finally, TTS [19] is used to turn the text into speech after OCR transforms the image into binary values (0 and 1) that the system can understand. Optical character recognition (OCR) is the process of converting a text image into a machine-readable text format. Document image, preprocessing, text lines, segmentation, labels, classifier, feature extraction, and character images are some of the procedures involved in OCR.

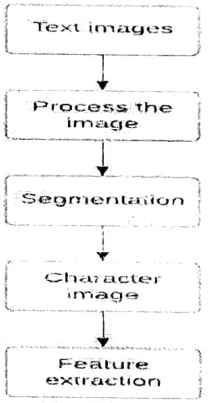

Fig 1. Working of OCR

If you store any kind of language image or a text with images, the system will need to save the web images as an image file. The image that contains the word file cannot be edited, searched for, or counted in a text editor. However, the image can be converted into a text document while maintaining its text content by using OCR [6], [27]. Using algorithms for pattern matching, the OCR system examines text images character by character for its internal database. In cases where the computer matches the text word for word, optical word recognition is employed. There are drawbacks to this method because there are only

a handful of font types and handwriting variations in the database, making it practically hard to record them all. This restricts the application of this methodology. This approach has limitations because the database only contains a small number of font styles and handwriting variants, making it almost impossible to record them all. This limits how this methodology can be used. It creates contemporary OCR systems that include various types of OCR technology, like intelligent character recognition (ICR) [23], [28] technology, in order to read the text like a human. They apply cutting-edge methods to teach machines or systems to act like people by utilizing machine and deep learning technology. The image is repeatedly processed while a neural network, a type of machine learning system, carefully examines the text. It looks for a variety of visual cues, such as curves, lines, junctions, and loops. The final product is created by integrating the outcomes of all three stages of investigation.

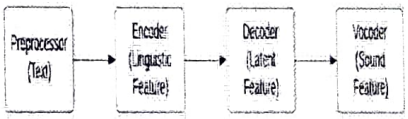

Fig 2 - TTS Process

The phases of the TTS process are depicted in Fig. 2; they are the preprocessor, encoder, decoder, and vocoder. Text must first be translated into a comprehensible and consistent format before it can be fed into a model for additional analysis and learning. Text preparation [2] techniques can either be general, making them applicable to a wide range of applications, or they can be specialized for a specific objective. This is a schematic representation of the various TTS system components. Our model accepts text as its input, which is then processed via a variety of processes before being converted to audio.

II. LITERATURE SURVEY

In this section we categorize the available literature on Text recognition in images and converting recognized text to speech based on the techniques uses like Optical Character Recognition (OCR), Text to Speech (TTS) synthesizer.

Review on Optical Character Recognition (OCR):

In order to allow for additional data processing, optical character recognition (OCR) transforms handwritten text and scanned or printed text images into editable text (new text). This study offers a trustworthy method for speech synthesis and text extraction. The device was tested on the Raspberry Pi platform [1][2]. The Raspy is initially connected to the internet using VLAN.

OCR is frequently used to edit and remove text from images. In order to help the blind and illiterate understand signs, pamphlet text, books, and their surroundings, we can develop an effective approach [3][4]. This study report is divided into three steps. Prior to employing OCR (UI Path's library), an input is first received via the camera or a previously saved picture file. Our robot handles the OCR output after which it processes the received text and converts it to audio [5][6]. The processed audio is then displayed to the user.

Line spacing and letter spacing are initially distinguished. This procedure is made much simpler when zoning is done properly [7]. OCR handles each line or section of text separately. During the tokenization process, each pause in a sentence is recognized as a token, and each token is handled as a character [8]. These gaps are found using OCR, which also separates different words. The OCR applies its methods to discover the meaning of the tokens or characters after all the characters have been tokenized.

In these publications [9], [10], and [11], the voice processing module converts.txt files into speech after the image processing module converts.jpg files to.txt using OCR. OCR is an important part of this module. By mechanically detecting characters using an optical device, a method known as OCR, or optical character recognition, infers the capacity of the human sense of sight. Before being delivered to OCR, the image is converted into a binary format to increase the accuracy of image recognition.

Review on Text to Speech (TTS):

The review's focus is on the text-to-speech synthesis (TTS) field, which turns gathered text into engaging speech. The discovered syllables are delivered using the appropriate duration and prosodic properties. It is a part of the natural language processing (NLP) discipline, which seeks to eliminate communication barriers between people and machines. Research to create intelligent and lifelike synthetic speech has advanced greatly in Western languages like English.

However, many regional languages, such as Malayalam, are understudied in NLP in a diverse country like India [10]. In this article, we make an effort to compile the most significant studies in the field of TTS (Text to Speech) in English and the most widely spoken Indian languages, with a focus on the South Indian language Malayalam. This study aims to guide future language research in the area of TTS in the right directions.

This study [12] addresses the development and evaluation of an Around Festival Hindi text-to-Speech (TTS) synthesis algorithm based on syllables using ORCA and NVDA for Linux and Windows computers, respectively. Six Indian languages—Hindi, Tamil, Marathi, Bengali, Malayalam, and Telugu—have TTS systems available. Usability tests for screen readers were performed. Based on a questionnaire they were given, a group of people with visual impairments

This process gives the exact output of the OCR. The text from the images will be extracted.

C. *Language identification*

The next process is language identification. This plays an important role in the project as it is crucial to satisfying the user's need. Once the language is identified, it becomes the source language of the images, and the destination language can be fixed by the user according to their needs.

D. *Language translation*

Translating is the process of turning one language into another. In order for the user to comprehend the information presented in the visuals. The user provides the input for this step as they choose the language based on their needs. [27] [28] [29] A Python GUI component can be used to create the translator, or the package can be installed in Google Collaborate and given the name Google Translator.

E. *Text-to-Speech*

TTS is a text-to-speech system. This mechanism is used to read text that is understandable by the user, or humans [30] [31] [32]. It involves 40+ languages and 200+ voices, including an American accent, a French accent, etc.

F. *Text of speech*

The previous stage includes the TTS in which the extracted text is converted into speech. Suppose the user is given to translate the text into the English language. The system automatically reads the text in an American accent but some people do not understand the American accent so it can be changed to an Indian accent according to their needs. The TTS is the package that is available in the collab system.

IV. ALGORITHM

The following steps are used in our proposed system

STEP 1: Start

STEP 2: Load the images

STEP 3: Import the Easyocr, TTS, Googletrans, Pil packages.

STEP 4: Bounding box is used to recognize the characters in the image by drawing the imaginary rectangular box around the characters.

STEP 5: Optical Character Recognition is used to convert the extracted characters to machine readable format.

STEP 6: Text to Speech is used to translate the extracted text to any user preferable language.

STEP 7: The translated speech can be converted to any user preferable accent.

Module 1-Optical Character Recognition

- The image is downloaded from the web and uploaded to the drive as .jpeg.
- This project is implemented in the Google Collaboratory Platform and the drive is mounted.
- Necessary packages are imported in the Google Collaboratory.

  The following packages are used:

  - Easyocr
  - Google trans
  - GTTS (Google Text to Speech)

- The text is completely extracted from the image and the code is written based on the language in the uploaded image.
- The text is extracted from the image using Optical Character Recognition and bounding box [33].
- OCR infers the capacity of the human sense of sight by mechanically identifying characters through an optical image.
- In the context of digital image processing, the bounding box denotes the border's coordinates on the X and Y axes that enclose an image.

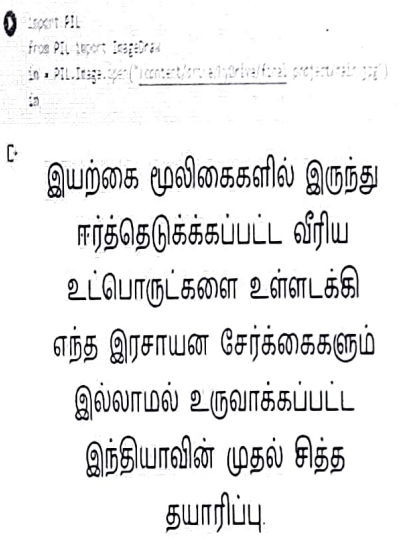

Fig 4 Importing Image

Bounding boxes give information about an object's position, class, and confidence, which indicates the likelihood that the object is indeed present within the bounding box. The essential components and the main image processing tools for projects involving video annotation are bounding boxes.

The bounding box is initially a fictitious rectangular box that contains an item and several data points. The bounding box refers to the border's X and Y axis coordinates when used with digital image processing. They are employed for target

evaluated the system's effectiveness. A mean opinion score (MOS) of 62.2 percent was additionally attained.

This method has been investigated for use in text-to-speech systems. The method outputs high and good quality clear speech from conventional Arabic calligraphy with diacritical marks and/or simple numerical phrases as input [13]. The main benefits of this work are its simplicity and ability to ensure the numerous benefits of any text-to-speech production technique. Findings suggest that producing high-quality audio requires good preprocessing as well as a comprehensive and trustworthy voice database. In addition to being understood, the artificial speech must sound natural enough to be accepted.

The two fundamental parts of a text-to-speech device are the voice-processing module and the picture-processing module [14]. An image processing module uses a camera to take a picture and convert it to text. The speech processing module transforms the text into sound and treats it with specific physical attributes so that the sound may be understood.

They suggested that OCR generates text, which is saved in a file named speech.txt in these works [15], [16]. Here, Festival software is used to convert text to speech. Festival is an open-source, multilingual Text to Speech (TTS) programme. The English TTS system is used to read the text in this project. The text-to-speech system is known as TTS [16]. This method is used to read text that the user or humans can understand [17]. It uses 200+ voices and more than 40 different languages, including American and French accents, among others.

The TTS, which turns the extracted text into speech, is a part of the earlier stage. Assume that the user has been tasked with rendering the content in English [18] [19]. The material is automatically read aloud with an American accent, but some people may not be able to comprehend it, thus the system can be switched to an Indian accent to suit their needs [20][21]. On the Collaborate platform, there is a package called TTS[22][23][24]

Based on the literature survey we have identified the following drawbacks:

- First, it takes more time to process the images, which leads to more runtime.
- Accuracy is lower, which means that there is a chance of identifying the text wrongly and that the TTS system may read the text incorrectly.
- The existing system does not allow users to select the language they prefer.
- Those who speak rapidly, mash words together, or have an accent may have trouble getting their words transliterated by speech recognition software. When more than one speaker is present and being recorded, accuracy suffers as well.
- The existing system is expensive to implement in real time.

To overcome these drawbacks, we have proposed the following methodology. The proposed methodology is compared with the existing techniques and it is observed that the results obtained with the proposed method is more accurate and reliable than the existing system.

III. MATERIALS AND METHODS

The proposed system of our model contains the following steps:

- Optical Character Recognition
  - Load the image
  - Bounding box (image processing technique)
- Language identification
- Language translation
- Text-to-Speech (By default accent)
- Text of speech (According to the user)

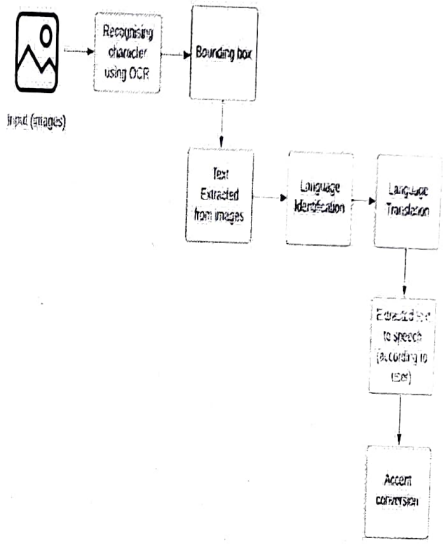

Fig 3 Proposed System

A. *Load the image*

Mostly the images are extracted from websites or web pages.[25][26]. We can store the images in our system or we can just copy the link of the images and enter the link in the coding platform. In this work we are going to use the Google Collaboratory platform). Another way to load the image is that we can save the image in Google Drive and we can mount it on the Collab platform.

B. *Optical Character Recognition*

After loading the image, we can apply OCR technology to the image. It involves two processes for the images. (1) training the image; (2) testing the image. Training the image involves using the segmentation method and extracting the features of images. Then the trained image model is given to the testing mechanism.

recognition, act as a guide for object detection, and produce a collision box for the item.

A bounding box essentially consists of 4 points along the (x, y) axes, which indicate the corners:
(X min., Y min.) at the top-left
(X max, Y min) at the top-right
Left-bottom: (x min, y max)
Right-bottom: (x max, y max)

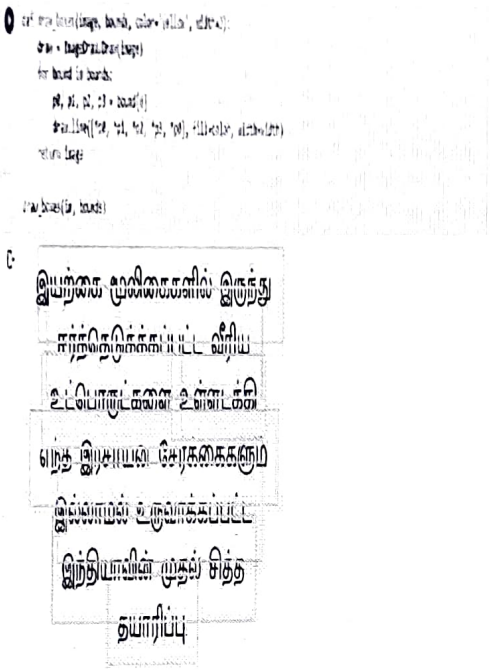

Fig 5 Text Extraction using bounding box

Module 2-Conversion of Extracted Text to Speech

In this module, the extracted text is converted to speech by using the Text to Speech synthesizer technique. The detected syllables are delivered with the appropriate duration and prosodic traits. It belongs to the field of natural language processing (NLP). The voice-processing module and the picture processing module are the two basic components of a text-to-speech device. This mechanism is used to read the text that is understandable by the user or humans. It involves 40+ languages and 200+ voices, including an American accent, a French accent, etc. Fig 3, Fig 4, Fig 5 and Fig 5 shows the conversion process and sample output.

Text-to-Speech

The technique known as text-to-speech (TTS) transforms written text into spoken language. Using this technology, any written material, including books, articles, emails, and web pages, can be read aloud by a computer or other device. TTS can provide access to textual content in an auditory format, which is very helpful for persons who have trouble reading or have vision problems. Fig 7 shows the workflow.

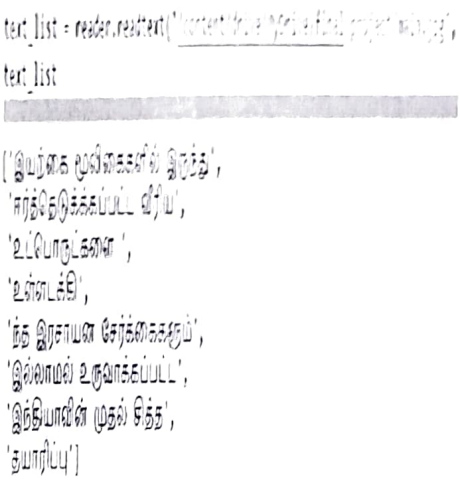

Fig 6 Extracted Text

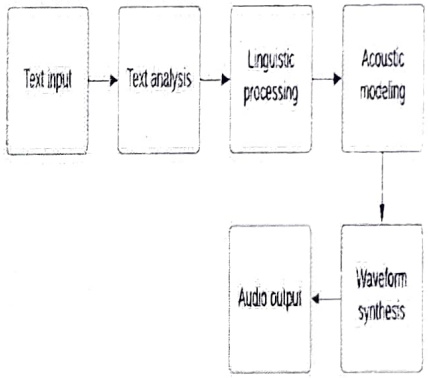

Fig 7 Workflow of TTS

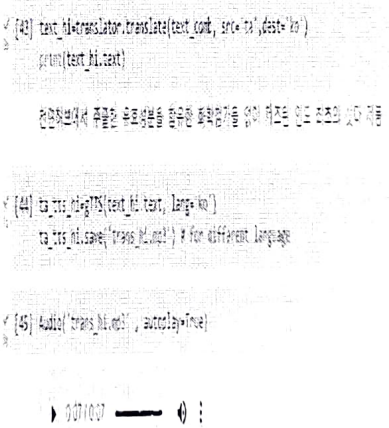

Fig 8 Language Translation

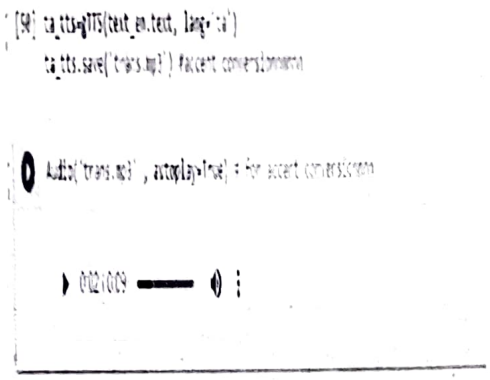

Fig 9 Accent Conversion

Module 3-Translation and Accent

In this module, the user provides the input for this step as they choose the language based on their needs. A Python GUI component can be used to create the translator, or the package can be installed in Google Collaborate and given the name Google Translator. Suppose the user is given to translate the text into the Korean (any user preferable language) language. The system automatically reads the text in an American accent but some people do not understand the American accent so it can be changed to an Indian accent according to their needs. Fig 8 shows the translation. Fig 9 shows the accent conversion.

V. RESULTS AND DISCUSSION

The majority of the photos have text regions that can be successfully detected by the suggested method, and the text can be accurately extracted from the detected regions. According to our experimental research, the suggested method can accurately identify text regions from photos with a variety of font sizes, styles, and colors. Although our method circumvents most of the problems other algorithms run into, it still struggles to work on images with small or blurry text regions. The words that we were able to obtain after using optical character recognition on the image that was put to the test in this paper's experimental analysis part have their word-confidences listed below in Table 1.

Word confidence is a metric that expresses the level of assurance in the recognition outcome. The range of confidence ratings, from 0 to 1, should be read as probabilities. As we can see from the chart above, words with fewer characters have higher word confidence than words with more characters. The average word-confidence is 0.8250 on average.

VI. CONCLUSION

The Existing work on text recognition in images and converting recognized text to speech involves different 8and correctly extracts the text from the images, and it also satisfies the user's needs. In our proposed system, we are going to use the bounding box algorithm to extract the text from the image, as it reduces the cost when it is implemented practically. There is not enough research carried out, so we made the research to develop it to help visually impaired people. The demand for text information extraction from images is rising in the modern day. As a result, numerous extraction strategies for locating pertinent information have been created. Also, the time it takes to separate the text from the colored image irritates the user. In this research, we present a method for text extraction from images that extracts text more precisely. It is possible to extract information quickly using our strategy. This paper also provides a review of different techniques for text extraction from images. However, OCR is the best technique for text extraction from images, and for converting the text to speech, TTS is the best method.

TABLE 1 – Analysis of word confidence

WORD	WORD CONFIDENCE
இயற்கை மூலிகைகளில் இருந்து	0.7780338
உட்பொருட்களை	0.7689028
ஈர்த்தெடுக்க்கப்பட்ட வீரிய	0.7767425
உள்ளடக்கி	0.8348975
இந்த இரசாயன சேர்க்கைகளும்	0.7727689
இல்லாமல் உருவாக்கப்பட்ட	0.9735796
இந்தியாவின் முதல் சித்த	0.9628064
தயாரிப்பு	0.7776598

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