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FIRE DETECTION SYSTEM: IOT-DRIVEN

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ABSTRACT

Fire accidents cause devastating consequences in smart cities, the buildings and valuable property is destroyed by fire accidents, not only property but it also shows effect on the natural environment and the endangering lives also, So the fire detection system is useful to keep the people updated about the fire accidents. The fire detection system can be implemented by using many ways such as machine learning, and it can be implemented using IOT also. It keeps the people safe and its accuracy and speed is also important as it reduces the false alarms and improves the accuracy. The smoke sensor can also be used to detect the smoke in case of the gas leaks or floodings. It is useful in forest manages and to save endangered lives. The early detection of fires is a very important task in preventing large-scale accidents. This can increase the accuracy and reduce the false detection rate of existing fire detection models that are not adaptive to space.

1. INTRODUCTION

Among the disasters that might occur in a city, fire accidents can gradually spread their harm, causing property loss as well as damage to human life.one of the most devastating fire accidents in India was the 1997 fire at the uphaar cinema in Delhi [1]. On June 13,1997, a fire broke out during the screening of a movie, leading to the deaths of 59 people and injuries to more than 100 people [2-5]. Therefore, fire prevention requires considerable effort. Sensors for fire detection were conducted. Gas sensors offer an advantage over smoke sensors as they can operate faster than smoke sensor. A critical issue of smoke detectors is their inability to discriminate between smoke particles from genuine fires and particles generated by other sources, such as dust or dense water vapor [3-7]. This results in a high rate of FPs, which raises serious concerns related to costs. Fire detection and suppression methods have been largely the same for many years, using people in fire towers for ignition reporting, and a map and pencil to pinpoint the location for its suppression [4-8]. A smarter, more dependable detecting system is needed, using modern technologies such as cameras, sensors, satellites, robots and artificial intelligence. However, there are challenges with the associated costs, and there is a lack of confidence in the reliability of these technologies.

2.LITERATURE SURVEY

We use a real-time fire detection system based on the nearest measure classifier with a time series. A detailed description of the problem is as follows Assuming that we have P fire sensor signals, each forming time series data, the objective of this research is to classify each point in time as fire or non-fire and estimate the true fire-starting time based on historical fire sensor signals [9-11].

Similarity measures for fire sensor data

As mentioned earlier, fire sensor signals observed during different fire types and locations show distinct patterns [12-16]. In order to deal with the aforementioned characteristic, a major challenge is to design a flexible similarity measure to compare the closeness of the current sensor signals with other representative non-fire sensor signals and fire sensor signals obtained from different fire types. Euclidean distance (ED) is a classical similarity measure that has been used for evaluating the closeness of two different sequences [17-20]. ED uses a linear mapping technique to align two sequences when measuring the distance.

However, although applying ED as a similarity measure has the advantages of using current and past measurements as a single feature, ED neglects temporal autocorrelation that existed in time series data, and thus cannot capture temporal information that characterizes sensor signals [21-24]. In addition, ED measure is very sensitive when time distortion exists in each sequence. Interactive machine learning: Experimental evidence for the human in the algorithmic loop

In this paper, Overall, a fire detection system is an important safety measure that can help protect lives, property, and financial assets Industries including coal, biomass, industrial laundry, wood processing, trash bunkers, and metal recycling can benefit from a fire detection system [25-28]. They are employed in

applications such as oil and gas industry, fuel and gas monitoring, combustion control systems, warehouses. By detecting flames, these sensors ensure the safe operation of industrial equipment and help prevent accidents or explosions. Fire detection systems are designed to discover fires early in their development when time will still be available for the safe evacuation of occupants. Early detection also plays a significant role in protecting the safety of emergency response personnel [29-31]. Property loss can be reduced and downtime for the operation minimized through early detection because control efforts are started while the fire is still small. Most alarm systems provide information to emergency responders on the location of the fire, speeding the process of fire control.

These systems have numerous advantages as discussed above. The one major limitation is that they do nothing to contain or control the fire. Suppression systems such as automatic sprinklers act to control the fire. They also provide notification that they are operating, so they can fill the role of a heat detection-based system if connected to notification appliances throughout the building [32-35]. They will not, however, operate as quickly as a smoke detection system. This is why facilities where rapid notice is essential, even when equipped with sprinklers, still need detection and alarm systems.

Fire detection and suppression methods have been largely the same for many years, using people in fire towers for ignition reporting, and a map and pencil to pinpoint the location for its suppression [37-39]. A smarter, more dependable detecting system is needed, using modern technologies such as cameras, sensors, satellites, robots and artificial intelligence. However, there are challenges with the associated costs, and there is a lack of confidence in the reliability of these technologies. This is the way the fire detection is implemented using IOT. Fire detection systems are designed to discover fires early in their development when time will still be available for the safe evacuation of occupants [40-44]. Early detection also plays a significant role in protecting the safety of emergency response personnel. Property loss can be reduced and downtime for the operation minimized through early detection because control efforts are started while the fire is still small. Most alarm systems provide information to emergency responders on the location of the fire, speeding the process of fire control.

The most basic alarm system does not include detection. It has manual pull stations and sounds only a local alarm. This level of system is not what is typically used; it relies on an occupant to discover the fire, which can cause a significant delay [45]. The more quickly you want to be notified of the fire, the more costly the system you must install. Speed of detection is expensive.

The most basic alarm system does not include detection. It has manual pull stations and sounds only a local alarm. This level of system is not what is typically used; it relies on an occupant to discover the fire, which can cause a significant delay [46]. The more quickly you want to be notified of the fire, the more costly the system you must install. Speed of detection is expensive. The slowest system to detect a fire is a heat detector, which is also the least expensive. An air-aspirating smoke detection system provides the most rapid indication of fire, but these systems are five to 10 times as expensive.

This research proposes an integrated IoT–fog–cloud framework for real-time detection and prediction of forest fires. Initially, a Bayesian belief network is used to detect the outbreak of wildfire at fog layer followed by real-

time alert generation to the forest department offices and fire-fighting stations. Bushfires are devastating to forest managers, owners, residents, and the natural environment [47].

Recent technological advances indicate a potential for faster response times in terms of detecting and suppressing fires. However, to date, all these technologies have been applied in isolation. This paper introduces the latest fire detection and suppression technologies from ground to space. An operations research method was used to assemble these technologies into a theoretical framework for fire detection and suppression.

The framework harnesses the advantages of satellite-based, drone, sensor, and human reporting technologies as well as image processing and artificial intelligence machine learning. The study concludes that, if a system is designed to maximize the use of available technologies and carefully adopts them through complementary arrangements, a fire detection and resource suppression system can achieve the ultimate aim: to reduce the risk of fire hazards and the damage they may cause[48.carefully adopts them through complementary arrangements, a fire detection and resource suppression system can achieve the ultimate aim: to reduce the risk of fire hazards and the damage they may cause.

Fire detection system using IOT

Fire detection and suppression methods have been largely the same for many years, using people in fire towers for ignition reporting, and Increasing demand and costs for health care s a challenge because of the high populations and the[48] To place the best resources at the right location in suppression management, it is important look at landscape information with regards to fuel type, route map (minimum travel time), water points, behavior with regard to moisture, wind speed and direction, the facilities available crews, tankers, trucks, aircraft and to whom they belong) and the management program (Martell 2007). Some of the traditional methods of dealing with fire have been redirected such as burning with regard to moisture, wind speed and direction, the facilities available (fire crews, tankers, trucks, aircraft and to whom they belong) and the fire management program (Martell 2007). Some of the traditional methods of dealing with fire have been redirected such as prescribed burning difficulty to cover all patients by the available doctors. The healthcare data processing and management became a challenge because the problems with the data itself like irregularity high-dimensionality, and sparsity. A number of researchers worked on these problems and provided some efficient and scalable healthcare solutions.

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DISADVANTAGESOF THE EXISTING SYSTEM

Fire detection and alarm systems may be prone to false alarms or malfunctions, leading to unnecessary evacuations, disruptions, and loss of productivity. Malfunctions in fire suppression systems can also occur, compromising their effectiveness during emergencies.

- Pollution: Air Quality and Water Quality.
- Health: Respiratory and Cardiovascular.
- Property: Loss of Property, Crops, Animals, Resources.
- Ecology: Effects on Animals and Plants

3. PROPOSED SYSTEM

Photo electric, and heat. All smoke detectors sound an alarm. When they identify smoke, notify a building's occupants.

What differentiates these detectors from one another is the way that they detect smoke. Wireless sensor networks (WSNs) are self-configured and infrastructure-free wireless networks that help monitor physical or environmental conditions and pass these data through the network to a designated location or sink where the data can be observed and analyzed.

Fig 1: System architecture of a fire detection system.

UML DIAGRAMS

1. CLASS DIAGRAM

The cornerstone of event-driven data exploration is the class outline. Both broad practical verification of the application's precision and fine-grained demonstration of the model translation into software code rely on its availability Class graphs are another data visualization option. The core components, application involvement, and class changes are all represented by comparable classes in the class diagram. Classes with three-participant boxes are referred to be "incorporated into the framework," and each class has three different locations:

• The techniques or actions that the class may use or reject are depicted at the bottom.

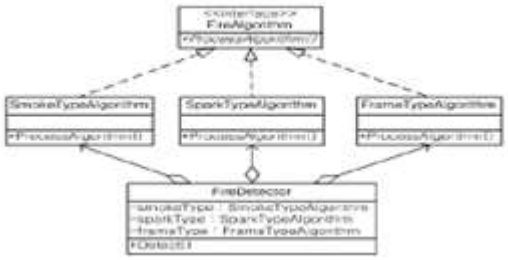

Fig 2: Class diagram for fire detection system

2.USECASEDIAGRAM

A use case diagram in the Unified Modeling language A Use Case Diagram is a vital tool in system design, it provides a visual representation of how users interact with a system. It serves as a blueprint for understanding the functionality requirements of a system from a user's perspective, aiding in the communication between stakeholders and guiding the development process Table

Fig3: Fire detection system in the form of use case diagram

3.SEQUENCE DIAGRAM

A sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams.

The sequence diagram for fire detection system can be shown below and it includes:

A scheduler, a sensor, an actuator, and the blackboard. Here we measure, process, cache the value, send request and cache the value.

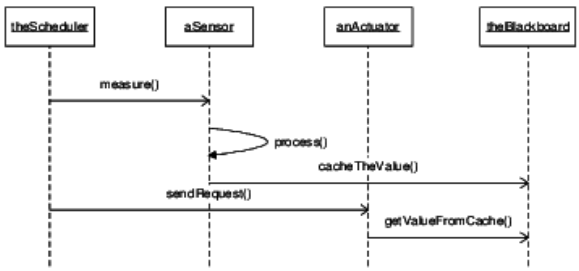

Fig 4: Shows the Sequence Diagram

4. RESULTS

Fig5: Flame sensor detection results

The IOT layer in a smart city consists of physical devices, sensors, and actuators connected to the Internet that collect and exchange data. Sensors detect environmental changes, actuators control and move systems, and effectors interact with the environment. Data collected from sensors are stored and processed to analyze patterns, detect anomalies, and predict future events.

The proposed system utilizes a deep neural network that is trained on a large dataset of images containing fires to detect and locate fires in real time with a high precision rate of 97.1% for all classes. The evaluation of the system on a benchmark dataset showed that it achieves high accuracy and outperforms existing fire detection methods. The proposed system is robust to various environmental conditions, such as smoke, and can detect fires at different scales and orientations.

A fire detection system can help to protect the building and its contents from damage by detecting a fire early and alerting the authorities so that they can respond quickly. It is an important safety measure that can help to protect assets and minimize the impact of a fire on a business or organization.

Reduce the amount of destruction to a building.

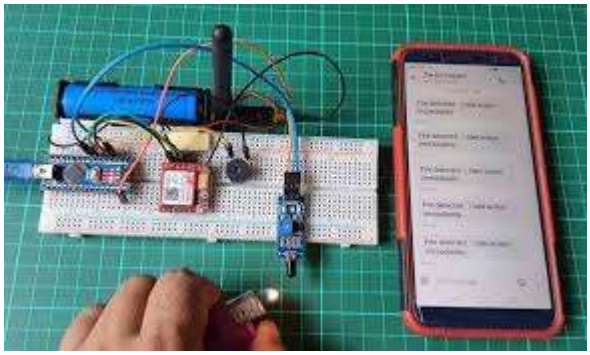

Fig 6: preprocess the data

Fig 7: Output of the code

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Reduce the amount of destruction to a building.

Fire alarms provide early detection of fire. Provide insurance discounts. Life safety and property safety.

A fire alarm system is a building system designed to detect, alert occupants, and alert emergency forces of the presence of fire, smoke, carbon monoxide, or other fire-related emergencies.

The fire detection model can be implemented using IOT without any system failures or wrong detections. It can be very useful to detect the natural environmental changes and fire disasters.

Now click on 'Accuracy Comparison Graph' button to get graph learned from a dataset simulating possible fire conditions at the site created by combining field recording cameras and virtual fires was sufficient to detect small initial fires at the site with very high confidence.

Fig 8: Accuracy Comparison Graph

5.CONCLUSION

In this study, we propose a model that automatically generates digital based field learning data for the early detection of fires. It was confirmed that the detection model learned from a dataset simulating possible fire conditions at the site created by combining field recording cameras and virtual fires was sufficient to detect small initial fires at the site with very high confidence. This experiment confirmed that a fire detection model based on virtual fire synthesis data has great potential for the rapid detection of initial fires. In addition, we developed a system that can detect fires at the site early with little error by overcoming scientific practices that inevitably occur in the process of learning models optimized for the site through postprocessing.

6. REFERENCES:

1. Patibandla, R. S. M. L., & Narayana, V. L. (2021). Computational intelligence approach for prediction of COVID-19 using particle swarm optimization. In *Advances in Computational Intelligence and Data Analytics* (Vol. 923, pp. 175–189). Springer. https://doi.org/10.1007/978-981-15-8534-0_9
2. Santhi Sri, K., Sandhya Krishna, P., Lakshman Narayana, V., &Khadherbhi, R. (2021). Traffic analysis using IoT for improving secured communication. In *Advances in Intelligent Systems and Computing* (Vol. 213, pp. 499–507). Springer. https://doi.org/10.1007/978-981-33-4443-3_48
3. Narayana, V. L., & Bharathi, C. R. (2019). Multi-mode routing mechanism with cryptographic techniques and reduction of packet drop using 2ACK scheme MANETs. In *Advances in Intelligent Systems and Computing* (Vol. 104, pp. 649–658). Springer. https://doi.org/10.1007/978-981-13-1921-1_63
4. Narayana, V. L., & Bharathi, C. R. (2018). Effective multi-mode routing mechanism with master-slave technique and reduction of packet droppings using 2-ACK scheme in MANETS. *Mathematical Modeling of Computer Systems*, 91(2), 73–76. https://doi.org/10.18280/mmc_a.910207
5. Lakshman Narayana, V., Lakshmi Patibandla, R. S. M., Pavani, V., & Radhika, P. (2023). Optimized nature-inspired computing algorithms for lung disorder detection. In *Advances in Intelligent Systems and Computing* (Vol. 1066, pp. 103–118). Springer. https://doi.org/10.1007/978-981-19-6379-7_6
6. Narayana, V. L., Sudheer, B. N., Maddumala, V. R., & Anusha, P. (2020). Fuzzy base artificial neural network model for text extraction from images. *Journal of Critical Reviews*, 7(6), 350–354. https://doi.org/10.31838/jcr.07.06.61
7. Narayana, V. L., Bhargavi, S., Srilakshmi, D., Annapurna, V. S., & Akhila, D. M. (2024). Enhancing remote sensing object detection with a hybrid Densenet-LSTM model. In *Proceedings of the International Conference on Computer Science and Advanced Technology* (pp. 264–269). IEEE. https://doi.org/10.1109/IC2PCT60090.2024.10486394
8. Narayana, V. L., Syamalatha, P., Vatsalya, P., Sricharitha, V., & Akhila, V. (2023). Multi-level node authorization using recurrent neural networks for secure health monitoring system. Proceedings of the IEEE International Conference on Smart Computing and Networking Applications (ICSNA), 1697–1705. https://doi.org/10.1109/ICSCNA58489.2023.10370543
9. Gopi, A. P., Swathi, V., Harshitha, G. S., Swetha, B., & Alekhya, N. (2023). Prediction of paddy yield based on IoT data using GRU model in lowland coastal regions. In Proceedings of the 5th International Conference on Smart Systems and Inventive Technology (ICSSIT 2023) (pp. 1747-1752). https://doi.org/10.1109/ICSSIT55814.2023.10060935
10. Arepalli, P. G., Naik, K. J., & Amgoth, J. (2024). An IoT-based water quality classification framework for aqua-ponds through water and environmental variables using CGTFN model. International Journal of Environmental Research, 18(4), Article 73. https://doi.org/10.1007/s41742-024-00625-2
11. Gopi, A. P., Babu, E. S., Raju, C. N., & Kumar, S. A. (2015). Designing an adversarial model against reactive and proactive routing protocols in MANETs: A comparative performance study. International Journal of Electrical and Computer Engineering, 5(5), 1111-1118. DOI: 10.11591/ijece.v5i5.pp1111-1118
12. Sravanthi, G. L., Devi, M. V., Sandeep, K. S., Naresh, A., & Gopi, A. P. (2020). An efficient classifier using machine learning technique for individual action identification. International Journal of Advanced Computer Science and

Applications, 11(6), 513-520. DOI: 10.14569/IJACSA.2020.0110664

13. Gopi, A. P., Durga Mani, P., Chandana, V. B., Sulthana, S. R., & Parameswari, P. P. K. (2024). Classification of fake news using enhanced capsule neural network. In 2024 IEEE International Conference on Interdisciplinary Approaches in Technology and Management for Social Innovation, IATMSI 2024. DOI: 10.1109/IATMSI60426.2024.10502837
14. Arepalli, P. G., & Khetavath, J. N. (2023). An IoT framework for quality analysis of aquatic water data using time-series convolutional neural network. Environmental Science and Pollution Research, 30(60), 125275-125294. https://doi.org/10.1007/s11356-023-27922-1
15. Gopi, A. P., & Jairam Naik, K. (2021). A model for analysis of IoT based aquarium water quality data using CNN model. In 2021 International Conference on Decision Aid Sciences and Application, DASA 2021 (pp. 976-980). https://doi.org/10.1109/DASA53625.2021.9682251
16. Roshini, P., Khajavali, S., Snigdha, M. L. S., Harsha, B. D., Srilakshmi, B., & Gopi, A. (2024). CNN design with AlexNet algorithm for diagnosis of diseases in cassava leaves. In Proceedings - 2024 International Conference on Expert Clouds and Applications, ICOECA 2024 (pp. 711-718). https://doi.org/10.1109/ICOECA62351.2024.00129
17. Narayana, V. L., Gopi, A. P., Khadherbhi, S. R., & Pavani, V. (2020). Accurate identification and detection of outliers in networks using group random forest methodology. Journal of Critical Reviews, 7(6), 381-384. https://doi.org/10.31838/jcr.07.06.67
18. Rao, B. T., Patibandla, R. S. M. L., Narayana, V. L., & Gopi, A. P. (2021). Medical data supervised learning ontologies for accurate data analysis. In Semantic Web for Effective Healthcare Systems (pp. 249-267). https://doi.org/10.1002/9781119764175.ch11
19. Patibandla, R. S. M. L., Gopi, A. P., Narayana, V. L., & Rao, B. T. (2023). Decentralized smart healthcare systems using blockchain and AI. In Blockchain applications in healthcare: Innovations and practices (Vol. 1, pp. 139-154). DOI: 10.1002/9781394229512.ch8
20. Lakshman Narayana, V., & Gopi, A. P. (2020). Enterotoxigenic Escherichia coli detection using the design of a biosensor. Journal of New Materials for Electrochemical Systems, 23(3), 164-166. DOI: 10.14447/jnmes.v23i3.a02
21. Narayana, V. L., & Gopi, A. P. (2017). Visual cryptography for gray scale images with enhanced security mechanisms. Traitement du Signal, 34, 197-208. DOI: 10.3166/ts.34.197-208
22. Arepalli, P. G., Narayana, V. L., Venkatesh, R., & Kumar, N. A. (2019). Certified node frequency in social network using parallel diffusion methods. Ingenierie des Systemesd'Information, 24(1), 113-117. https://doi.org/10.18280/isi.240117
23. Peda Gopi, A., & Lakshman Narayana, V. (2017). Protected strength approach for image steganography. Traitement du Signal, 34(3-4), 175-181. https://doi.org/10.3166/TS.34.175-181
24. Narayana, V. L., Gopi, A. P., Anveshini, D., & Lakshmi, G. V. V. (2020). Enhanced path finding process and reduction of packet droppings in mobile ad-hoc networks. International Journal of Wireless and Mobile Computing, 18(4), 391-397. https://doi.org/10.1504/IJWMC.2020.108539
25. Challa, R., YAMPARALA, R., KANUMALLI, S. S., & KUMAR, K. S. (2020, November). Advanced patient's medication monitoring system with ardunio UNO and NODEMCU. In *2020 4th International conference on electronics, communication and aerospace technology (ICECA)* (pp. 942-945). IEEE.
26. Kanumalli, S. S., Chinta, A., & Chandra Murty, P. S. R. (2019). Isolation of Wormhole Attackers in IOV Using

WPWP Packet. *Revue d'IntelligenceArtificielle*, *33*(1)

27. Kanumalli, S. S., Ch, A., & Murty, P. S. R. C. (2018). Advances in Modelling and Analysis B. *Journal homepage: http://iieta. org/Journals/AMA/AMA_B*, *61*(1), 5-8.
28. Kosaraju, Chaitanya, et al. "A model for analysis of diseases based on nutrition deficiency using random forest." 2022 7th International Conference on Communication and Electronics Systems (ICCES). IEEE, 2022.
29. Chaitanya, Kosaraju, and Gnanasekaran Dhanabalan. "Secure Route Detection with Multi Level Trust Evaluation Model Using Replicated Auditor Node for Extended Packet Delivery Rate in WSN." Revue d'IntelligenceArtificielle 37.4 (2023).
30. Chaitanya, Kosaraju, et al. "Risk Stratification for Stroke Using Attention Transformer Model." 2024 2nd International Conference on Disruptive Technologies (ICDT). IEEE, 2024.
31. Sujatha, V., Prasanna, K.L., Niharika, K., Charishma, V., Sai, K.B.,K(23),"Network Intrusion Detection using Deep Reinforcement Learning,***Proceedings - 7th International Conference on Computing Methodologies and Communication", ICCMC 2023***, 2023, pp. 1146–1150
32. Sujatha, V., Anitha, B.S., Rama, G.T., Niharika, N., Sahithi, A.,K(23),"Convolutional Neural Network (CNN) based Blood Vessel Segmentation from Ocular Images***Proceedings - 7th International Conference on Computing Methodologies and Communication",ICCMC 2023***, 2023, pp. 518–523
33. Majety, V. D., & Murali, G. (2018). Remote health watchdog framework for seizure patient using electronic sensors. *International Journal of Engineering and Technology(UAE*, *7*, 783–785. https://doi.org/10.14419/ijet.v7i3.12132
34. Alapati, N., Anusha, N.,Joharika, P., Jerusha, N.J., Tanuja, P.(2023)Prediction of Parkinson's Disease using Machine Learning in 2023 2 nd*International Conference on Electronics and Renewable Systems(ICEARS)(pp.1357–1361).IEEE*
35. *Naresh, A., Reddy, B.A., Reddy, G.P., Kumari, K.R., Vaishnavi, M.S.(2023)Melanocytic Pigmented Skin Lesion Detection and Classification using Hybrid Deep Features based on Fully Convolutional Network* in 2023 2 nd*International Conference on Electronics and Renewable Systems(ICEARS)(pp.1011–1018).IEEE*
36. Pavani, Vellalacheruvu, and I. Ramesh Babu. "Three level cloud storage scheme for providing privacy preserving using edge computing." *International Journal of Advanced Science and Technology* 28, no. 16 (2019): 1929-1940.
37. Vellalachervu, Pavani and Babu, I. Ramesh, A Novel Method to Optimize the Computation Overhead in Cloud Computing by Using Linear Programming (May 10, 2019). INTERNATIONAL JOURNAL OF RESEARCH AND ANALYTICAL REVIEWS(IJRAR), May 2019, Volume 6, Issue 2, Available at SSRN: https://ssrn.com/abstract=3452191
38. Rama Krishna, Komanduri Venkata Sesha Sai, and Battula Bhanu Prakash. "Intrusion Detection System Employing Multi-level Feed Forward Neural Network along with Firefly Optimization (FMLF2N2)." *Ingénierie des Systèmesd'Information* 24.2 (2019).
39. Krishna, K. VSS Rama, et al. "Identification of Fraud Transactions using Lightgbm Technique." *2022 3rd International Conference on Issues and Challenges in Intelligent Computing Techniques (ICICT)*. IEEE, 2022.
40. S. K. P, J. Lavanya, G. Kavya, N. Prasamya and Swapna, "Oral Cancer Diagnosis using Deep Learning for Early Detection," *2022 International Conference on Electronics and Renewable Systems (ICEARS)*, Tuticorin, India, 2022, pp. 1260-1268, doi: 10.1109/ICEARS53579.2022.9752280.

41. Krishna, P. Sandhya, SK Reshmi Khadherbhi, and Vellalachervu Pavani. "Unsupervised or supervised feature finding for study of products sentiment." *International Journal of Advanced Science and Technology* 28, no. 16 (2019): 1916-1928.

42. Qi, Zhang, P. SilpaChaitanya, and T. Sudhir. "Spoofing attack detection wireless networks using advanced KNN." *International Journal of Smart Device and Appliance* 4.1 (2016): 1-8.

43. S. K. P, J. Lavanya, G. Kavya, N. Prasamya and Swapna, "Oral Cancer Diagnosis using Deep Learning for Early Detection," *2022 International Conference on Electronics and Renewable Systems (ICEARS)*, Tuticorin, India, 2022, pp. 1260-1268, doi:10.1109/ICEARS53579.2022.9752280.

44. Krishna, P. Sandhya, SK Reshmi Khadherbhi, and Vellalachervu Pavani. "Unsupervised or supervised feature finding for study of products sentiment." *International Journal of Advanced Science and Technology* 28, no. 16 (2019): 1916-1928.

45. Deepthi, T.N., Sharmila, S., Swarna, M., Gouthami, M., & Akshaya, C.L. (2023). Prediction of brain stroke in human beings using machine learning. In *Proceedings of the 2023 2nd International Conference on Electronics and Renewable Systems* (ICEARS 2023, pp. 1314–1320). https://doi.org/10.1109/ICEARS56392.2023.10085128

46. Sharmila, S.K., Bhargavi, R., Anusha, R.Y., Anusha, K., & Divya, B. (2023). Cotton leaf disease detection using convolutional neural networks (CNN). In *Proceedings of the 2023 2nd International Conference on Electronics and Renewable Systems* (ICEARS 2023, pp. 1179–1185). https://doi.org/10.1109/ICEARS56392.2023.10085551

47. Sharmila, S., & Aparna, C. (2019). VMSSS: A proposed model for cloud forensic in cloud computing using VM snapshot server. In *Advances in Intelligent Systems and Computing* (Vol. 816, pp. 483–493). https://doi.org/10.1007/978-981-13-1592-3_3.

48. Mohiddin, S.K., Sharmila, S., & Srinivas, V. (2024). Intelligent transport system in smart cities: Aspects and challenges of vehicular networks and cloud computing. In *Energy Efficient Vehicles: Technologies and Challenges* (pp. 173–185). https://doi.org/10.1201/9781003464556-9