OPTIMIZATION OF E-LEARNING AND PERFORMANCE USING IOT AND 6G TECHNOLOGY

Dr.A.Balamurugan[1], S Sureshkumar[2], Dr Putta Srivani[3], Dr Melanie Elizabeth Lourens[4], Deema mohammed alsekait[5]

[1]Professor Department of Management Studies, Bharath Institute of Higher Education and Research, Selaiyur Chennai, drabala72@gmail.com

[2]Assistant Professor, Department of Computer Science and Engineering, Kalasalingam Academy of Research and Education, Krishnankoil, sureshhkumar.ssk@gmail.com

[3]Associate Professor, Department of CSE, Malla Reddy Engineering college for women Hyderabad, pulla.srivani@gmail.com

[4]Deputy Dean, Faculty of Management Sciences, Durban University of Technology, Durban, KwaZulu-Natal, South Africa, Melaniel@dut.ac.za

[5]Princess Nourah bint Abdulrahman university, Applied College, Department of Computer Science and Information Technology, Dmalsekait@pnu.edu.sa

Corresponding Email: drabala72@gmail.com

Abstract

The sixth-generation (6G) has stricter criteria for the online learning capability and high interpretability of taught algorithms. It is anticipated that machine learning would be crucial for making network effective and flexible, however the most promising technologies are frequently considered as secret elements because of their profound designs' major areas of strength for and. To make AI calculations more reasonable to 6G-empowered web of things (IoT) organizations, the motivation behind this paper is to analyse their translations. This article presents two different ways for acquiring translations: the free technique and the Joint strategy. Probes numerous IoT network datasets exhibit that the recommended techniques produce unrivalled execution regarding the two clarifications and forecasts.

Keywords: IoT (Internet of Things), 6G (sixth generation network), ML (Machine Learning), etc.

I. INTRODUCTION

The 5G networks have previously been conveyed somewhat in certain nations beginning in 2020.[1] While 5G gives an obvious improvement towards the progress of a connected society, it is perceived that it isn't sufficient to finish this change [2]. Likewise, significant upgrades are attractive to deal with impending non-homogeneous IoT based networks also the original propensities in client and the implications prerequisites, for example, improved quality video real-time and enhanced genuineness.

In a few previous years, many AI calculations has been utilized in the IoT based associations to supersede the ordinary methodologies, beginning to last channel, different kinds associations, network channels contraption to-device correspondences, and so on This AI estimation can uncommonly chip away at the introduction of IoT structures.

Many suppliers have also begun conducting 6G field experiments and are moving closer to launching 5G deployments by the end of the forecast period.

As of late, the versatile Web of Things (MIoT) for on the web English instruction has quickly turned into a significant method and primary apparatus for individuals to learn and impart in English. It is another kind of English instruction technique. This technique understands the English schooling model with understudies as the fundamental body furthermore, a product stage as the transporter. Contrasted and

customary disconnected study hall training, online English instruction has attributes and benefits like high productivity, understudies and instructors are not geologically distance- restricted and so on. In particular, from one perspective, it tends to be very advantageous to do showing exercises; then again, it permits educators in the US and Canada to real-time educate, tackling the problem area of how to guarantee 'credible' English language learning. Nonetheless, many difficulties should be

tackled to understand a safe also, proficient MIoT for online English training. In the first place, the honesty and unwavering quality of messages and the protection security of clients' data should be guaranteed in MioT correspondence. Besides, when a noxious substance exists, the believed outsider ought to follow its character and play out the comparing discipline to accomplish restrictive protection assurance. Nonetheless, in a remote climate, noxious aggressors can send off different kinds of assaults by listening in or manufacturing messages to obliterate typical correspondence in the organization climate to fulfil their needs. Second, to accomplish MIoT for online English instruction correspondence, large-scale organization of framework is required, and a few plans require the foundation to store private data of the MIoT to aid message confirmation, which unavoidably builds the arrangement cost.

AI for remote framework

AI innovations are turning into an increasingly more significant answer for different issues in current society. They furnish us with a solid device to fabricate an entire framework model utilizing a huge assortment of information in a remote correspondence framework and remote correspondence organization. Machine learning advancements, including profound learning, have been progressively explored in the field of correspondence innovation as of late. A few examinations demonstrate that the administration of 5G/Past5G frameworks requires AI innovations.

In reference, computer-based intelligence empowered keen design for 6G is proposed. Their proposed design is partitioned into four layers: keen detecting layer, information mining and examination layer, insightful control layer and brilliant application layer. Between them, savvy control layer comprises of learning, improvement, and navigation. They demonstrate that altogether unique and complex organization in 6G can't be streamlined through customary numerical calculations. Our exploration depends on the same perspective, and proposes plans to improve such complex organizations by utilizing AI innovations.

There are two perspectives while utilizing AI to enhance the choices and activities of remote correspondence frameworks. One point is how much information. Managed learning, particularly deep learning and its connected techniques, can manage a lot of information to separate the qualities of the framework from which the information are gathered. Assuming how much information is restricted, the support learning approach would be more appropriate. It permits one to settle on the ideal choice through the emphasis of experimentation cycles under the climate of restricted data and boundaries to be controlled.

Deep-learning-based model and support learning-based choice

In the event that a lot of information of remote correspondence frameworks is supposed to be gotten, and to look for the best activity by learning, the methodology could be a blend of displaying by directed learning and the decision making by support learning, as displayed in the upper-right board. Deep support learning (DRL) is a regular illustration of this methodology. Deep learning (DL) is a recently evolved and quickly spreading procedure in different fields. It is a high-level type of a counterfeit brain organization and a kind of directed learning. The main accomplishment of the DL was in the field of PC vision. This procedure has been presented in different layers of correspondence frameworks. The early utilizations of DL were for the assessment of boundaries of the spread channel and gadget area assessment. It very well may be viewed as an execution of the mental cycle: it learns the relationship among climate, boundary, activity, and execution of the remote correspondence hub through deep learning. Decisioning trialand-mistake: it looks for better activities through support learning. The major solid place of DRL is to construct a presentation model by deep learning in a web-based way and to use it to foresee the exhibition of the frameworks when certain boundaries are sent. Support learning, normally Q-learning based calculations, are applied to look for better activity by assessing the outcomes, refreshing its network, and picking the anticipated boundaries better utilizing deep learning. Note that DRL generally requires the data of the condition of remote correspondence frameworks, which may be unreasonable in this present reality

In any case, alongside the above benefits, AI calculations' absence of straightforwardness and trust contrasted with the customary ones. The promising AI calculations generally with profound designs and lowest ratio of interpretability for their dynamic cycles, and they are normally handled as "secret elements". As a rule, AI calculations can not guarantee 100% exactness, in this manner, the interpretability of the dynamic cycles is fundamentally expected to pass judgment and break down regardless of whether the choice is right, particularly when the choice is significant, for example, independent driving, wellbeing checking et. al. In particular, there are a few unequivocal confronts for the ratio interpretability of AI algorithm in various Landmarks districts:

1) National: 2016 French Computerized Republic Act required the design of the computations that just chosen, the provenance of the used data , feature importance, as well as the ensuing exercises .

2)   China: 2017 The Disseminating Advancement Plan of New Age Man-made reasoning expected that AI hypothesis ought to be profoundly interpretable.

3)   EU: 2018 General Information Assurance Guideline (GDPR) in EU expected that AI calculations ought to have the option to make sense of their choices 3.

4)   USA: 2019 The Public Computerized Reasoning Innovative work Well defined course of action expected to plan adequate morals reference structures to guarantee AI framework interpretable for its decisions and

Accordingly, the nature of-trust necessities are vital for lawful, well-being, and reasons [13]. What's more, the dependable AI calculations are significant to what's to come administration of 6G-empowered IoT based networks [14,21-50]. Hence, this research paper endeavours to concentrate on the translation of AI calculations to do it more relevant in the 6G-empowered IoT organizations. GB DT [16] NN are the two generally involved strategies in IoT organizations. GBDT, who puts choice trees as frail forecast models, have qualities in particular highlights disclosure, highlights mix also clarification of results, because of both the system of choice trees and the advancement methodology of slope helping [16].

Internet of Things (IoT)

The Internet of Things is a network of Internet-connected devices, sensors, and users that can self-organize, sense and collect data, evaluate the stored information, and respond to the dynamic environment. The number of connected devices is anticipated to surpass 40 billion by 2030, representing more than 70 percent of non-IoT gadgets.

6G Needs and Tendencies

The mobile industry should transition away from traditional strategies and toward some new ones, such as operation in shared spectrum bands, inter-operator spectrum sharing, indoor small cell networks, a large number of local network operators, and on-demand network slice leasing, as a result of the clearly defined problems facing current generations of mobile networks. Several of the most important criteria and trends for the next generation of mobile networks will be examined in greater depth in the following sections.

II. Literature Survey

Y. Chen call attention to four innovation patterns advancing the improvement of 6G. In the first place, because of dramatically expanding web traffic utilizing remote, more extensive spectra of transmission capacity, including terahertz, will become fundamental for executing portable organizations that can be coordinated with detecting to give streamlined transportation to the board. Second, three-layered vertical organizations coordinating satellite and cell correspondence will be expected to help consistent associations with (UAVs), because of universal admittance to the web. Third, man-made consciousness should be conveyed to improve network execution and reduction the computational intricacy of network operations. At last, a green and practical plan will turn into a basic prerequisite of portable organizations, which advances the improvement of 6G.

In particular, gives a far-reaching overview on key empowering innovation for 6G, where the accentuation is on a conversation of the activity of the singular innovation with valuable measurements for businesses and scholastic scientists on the potential for exploring new exploration headings. The creators of talked about the necessities of 6G and ongoing examination patterns to empower 6G capacities and configuration aspects by utilizing problematic advancements like man-made brainpower (simulated intelligence) and driving the rise of new use cases and applications appeared by rigid execution prerequisites. A survey of 6G as far as use cases, specialized necessities, use and key execution indicators (KPI) is introduced in. Here, the creators introduced a fundamental definition guide, particulars, normalization and guideline for 6G. An overview on remote development toward 6G organizations is introduced in, examining the capacities of organization cutting innovation with artificial intelligence to empower a huge number of administrations with various nature of administration (QoS) prerequisites for 6G organizations. An extensive overview on the current patterns, applications, network design and innovations of 6G is introduced in , with an emphasis on modern business sectors and use instances of 6G that exploit a superior on-gadget handling and detecting, high information rates, super low latencies and high level man-made intelligence. In, the creators introduced an outline of 6G portraying the total development way from 1G organizations to date and zeroing in on a few key innovations like

terahertz correspondences, optical remote correspondences (OWC) and quantum correspondences for further developing the information rates.

A far-reaching overview on the combination of the IoT and 6G is introduced in with an emphasis tense knowledge, reconfigurable savvy surfaces, space-air-ground-submerged correspondences, terahertz correspondences, huge super dependable and low-dormancy interchanges and blockchain as the advances that engage future IoT organizations. A thorough report on 6G-empowered huge IoT is introduced in, where ML and blockchain innovations are examined as the essential security and protection empowering influences. In, the capability of the IoT and 6G for different use cases in medical services, savvy matrix, transport and Industry 4.0 have been expounded mutually with the difficulties during their viable executions. A few deficiencies of 5G and elements of 6G connected with social, financial, mechanical and functional perspectives, for example, the shortcoming of short bundle and detecting based URLLC, which might restrict the steadfastness of low-idleness administrations with high information rates or the absence of help of cutting edge IoT innovations are examined in. Momentum research exercises, accordingly, ought to zero in on imaginative methods, for example, high level time-stamp stream sifting joined with shrewd organization cutting to help multi-party (source) information stream synchronization in exceptionally low dormancy conditions combined with appropriated control.

III. Potential applications of 6G in IoT

1. Automation & extended reality

Automation of IoT is supposed to be a significant application for 6G. Based on the joining of detecting and correspondence, the 6G organization will empower portable robots to team up with one another steadily and quickly bringing about superior efficiency, precision, and adaptability in assembling. Although independent vehicles have independent platforms, autonomous driving features require a table and secure vehicular organizing as this is straightforwardly associated with the well-being of drivers. 6G organizations can act as a key framework for vehicular correspondence frameworks. 6G organizations' upgraded ultrareliable low-inertness correspondence permits independent vehicles to trade data with servers or different vehicles to improve street security and driving fulfilment.6G can advance the improvement of XR innovation in the IoT region by utilizing superior execution portable organizations. The idea of expanded reality, which consolidates the genuine world with virtual conditions, covers both VR and AR. While VR gives a PC recreated virtual world utilizing a headset producing sounds and pictures, AR adds computerized content to this present reality utilizing cell phones [8] Both VR and AR are supposed to profit from the improvement of 6G organizations supporting dependable networks, fast information rates and low dormancy. 6G's ultramobile broadband will permit VR innovation to augment versatility with next to no actual limitations, and AR innovation to interface with this present reality right away. 6G will likewise empower XR applications with numerous sensor inputs, which are not taken care of by the existing 5G frameworks' organization limit.

2. Wireless brain-computer

Brain-computer interface (BCI) advancements give elective strategies to correspondence and control without depending on human nerve frameworks. The headway of portable correspondence advancements has brought about remote BCI. Customarily, BCI was utilized for patients who have no control over their bodies; be that as it may, remote BCI has reformed interfaces for different use cases. 5G is known to be restricted in supporting remote BCI because of it's. information rate and dormancy abilities. 6G will uphold remote BCI innovation with better organizations and spectra. These 6G properties can be applied to different wearable gadgets and front and centre consoles.

3. Cognitive cycle and streamlining for complex remote frameworks

Cognitive radio is the idea of a smart radio that can gain from its previous experience and independently choose its activities reasonable for radio conditions and requirements for correspondence. The cognitive cycle is a criticism cycle of perception, learning, independent direction, and activity. Haykin proposed a more substantial course of cognitive radio in according to a designing viewpoint. He tended to the accompanying essential undertakings for a cognitive radio: radio-scene investigation, channel-state assessment, send power control, and dynamic range the executives. Remote organization hubs can change the radio boundaries of transmission and gathering to keep away from impedance among clients and further develop correspondence quality. As a general rule, remote correspondence expects learning to lay out remote connections and fulfil correspondence characteristics. For instance, a radio recurrence (RF) module controls the coding rate in view of the received

signal strength indicator (RSSI) to lessen the mistake likelihood of remote connections. This implies that the RF module learns the connection between the information sources (RSSI, coding rate) and result (connect quality). In cognitive radio organizations, the cognitive motor ought to decide and arrange the activities of the cognitive radio in view of the learning of the climate.

IV. Experimentation

A. Data taken from the IoT

Use of the 6G-empowered IoT organizations, the associated terminals are tremendous. Then, at that point, the information sent in remote channels might be an image, an observing sign, or simply a tick record. In this manner, the got data from the IoT organizations can be organized information or dis structured information, and the unstructured information in IoT based networks is predominantly pictures, texts, recordings, etc. To assess the presence of the proposed strategies, we lead trial examinations on the four varied related datasets: three organized data groups and one unstructured dataset. In particular, AutoML-35 is from the "AutoML for Deep rooted AI" Challenge in NeurIPS 2018, and the run of the machine learning issues of its rivalry, Zillow, which is likewise an issue of this present reality situation.

B. Metrics of Evaluation

The estimation of deciphering the nature however has not yet described up, this research estimates the outcomes from the two different perspectives: the deciphering similitude among Sabbas and the described strategy, and the perception of deciphering by pictures dataset. We also take the understanding outcomes got from the first model of GBDT by the Sabbas defined as "standard", and utilization of NDCG @k [15] and with top-k inclusion to gauge the relationship of element significance positioning in between the two clarification outcomes. NDCG@k is a proportion of DCG@k

$$\text{DCG@k} = + \sum_{i=1}^{k} = \frac{rel_i - 1}{\log_2(i+1)} \quad (1)$$

where reli is represented as the real score of the ith item in the sequence of prediction presented as the value of that position ith, stands the smaller smaller i is, stands the larger. Then the calculation of (2)

$$ck(x) = [£[j€¢(x).I(j€¢(x)]/k \quad (2)$$

here F displayed as relationship of used features by the NNs, Φtop-k(x) is at the top k huge components of GBDT procured through skeleton based on tree explanation system, Φˆtop-k(x) is the top k critical components of GBDT2NN scraped by through given strategies. Top-k consideration ck is intended to sort out the merged speed of the huge types of feature.

For assessing the forecast enhancements of the combined strategy, we used AUC [11] to quantify the expectation aftereffects of grouping various data sets and use MSE to gauge of relapse datasets. AUC considers both the positive and negative examples, in this manner, it can make a sensible assessment of the arrangement issue when the examples are unequal. The estimation equation of MSE is as per the following:

MSE   .

$$MSE = \frac{1}{N} \sum_{i=1}^{N} = (yi - \mathring{y}i)^2 \quad (3)$$

C. The Efficiency of Sabbas

As referenced in segment 4, our new technique fabricates the clarification structure in light of the organized-based understanding strategy for GBDT, Sabbas. To show the adequacy of Sabbas,
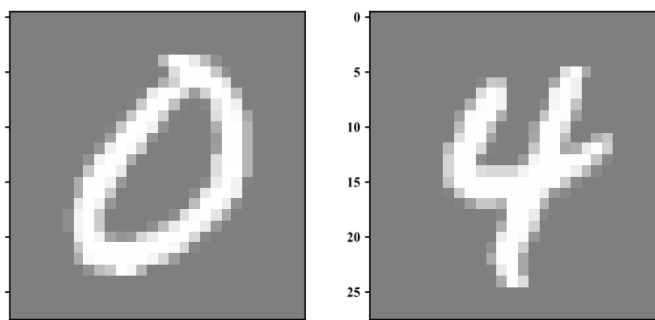
(a) number represents 0 (b) number represents 4

Fig. 1. Figures showing digit 0 and 4.

The outcomes shows of MNIST information assortment using visual appraisal technique, and first figures are shown in Quite a while For the assessment, we shows the visual order delayed consequences of MNIST-0 and MNIST-4 in Figures Take note, white types pixels appearing in the last pictures of Fig. 2 seem, by all accounts, to be fairly more than in Figures , and that is in light of the fact that that Sabbas picks more establishment pixels

Moreover, there are additionally a few different perceptions. 1) For the digit of 0, the showing pixels of the blueprint and in between of the circle are both significant for the acknowledgement.. Yet, when k is sufficiently large, the expansion of k broughts an excessive number of superfluous pixels, which have little impact on the acknowledgement. Subsequently, the quantity of significant elements that are utilized or not entirely set in stone by this present reality uses of 6G-empowered IoT organizations. In general, our proposed autonomous technique is compelling in deciphering the singular choice made by GBDT2NN.

Other than the free interpretable technique, we likewise propose a joint strategy. In principle, the joint technique can further develop the expectation execution while giving the understanding outcomes. The deciphering results are practically equivalent to the autonomous strategy, which are discarded.
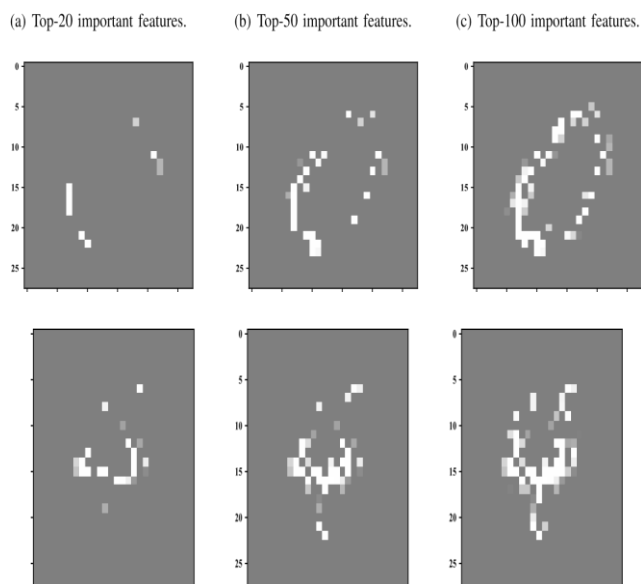

Fig. 2. The assessment consequence of digit showing 0 with autonomous strategy. here principal line showing top-k significant elements, utilize the white various pixels to address them. Also, the subsequent column represents the top-k significant elements in the digits' diagram.
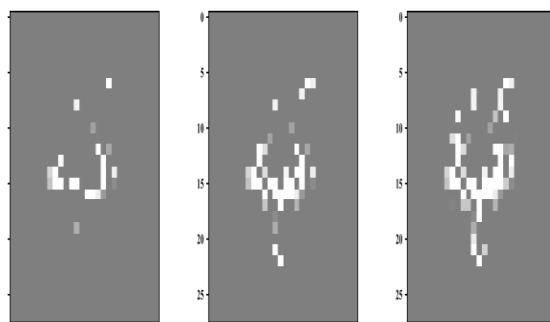
Fig 3 The assessment results of the digit 4 with the free technique. Fundamental line is showing top-k basic highlights, and we utilize the different white pixels to address them. Additionally, the subsequent line depicts the top-k immense parts in digits' construction.

V. Conclusion

6G is supposed to accomplish a lot higher information rates and more extensive recurrence groups than 5G, it requires more powerful and interpretable innovations. AI strategies are fundamental for what's to come administrations of 6G-empowered IoT undertakings, which have been generally taken on. In any case, most of promising calculations with mind boggling plans and critical nonlinearity, like GBDT2NN, have low interpretability. This work offers a sharp explanation for the GBDT2NN model. Utilizing the deciphering vectors acquired from the improvement based tree clarification method, it recognizes the part's credits and gives the clarification results due to the installing vector. In addition, we have proposed two tremendous systems: the Joint philosophy and the Autonomous procedure. Positive associations using IoT network datasets display the authenticity of the proposed procedures considering the two conceptualizations and presumptions. This further shows that the convincing AI development, GBDT2NN, connected with our proposed translation procedures, may every one of the more really meet the needs for proficiency and high interpretability of 6G-based IoT networks simultaneously.

REFERENCES

1. N. Kato, B. Mao, F. Tang, Y. Kawamoto, and J. Liu, "Ten challenges in advancing machine learning technologies toward 6g," IEEE Wireless Communications, 2020.
2. Y. Lu and X. Zheng, "6g: A survey on technologies, scenarios, challenges, and the related issues," Journal of Industrial Information Integration, p. 100158, 2020.
3. O. B. Sezer, E. Dogdu, and A. M. Ozbayoglu, "Context-aware computing, learning, and big data in internet of things: a survey," IEEE Internet of Things Journal, vol. 5, no. 1, pp. 1–27, 2017.
4. F. Tang, Y. Kawamoto, N. Kato, and J. Liu, "Future intelligent and secure vehicular network toward 6g: Machine-learning approaches," Proceedings of the IEEE, vol. 108, no. 2, pp. 292–307, 2019.
5. Y. Yuan, S. Li, X. Zhang, and J. Sun, "A comparative analysis of svm, naive bayes and gbdt for data faults detection in wsns," in 2018 IEEE International Conference on Software Quality, Reliability and Security Companion (QRS-C). IEEE, 2018, pp. 394–399.
6. A. Zanella, N. Bui, A. Castellani, L. Vangelista, and M. Zorzi, "Internet of things for smart cities," IEEE Internet of Things journal, vol. 1, no. 1, pp. 22–32, 2014.
7. L. Li, H. Xiaoguang, C. Ke, and H. Ketai, "The applications of wifibased wireless sensor network in internet of things and smart grid," in 2011 6th IEEE Conference on Industrial Electronics and Applications. IEEE, 2011, pp. 789–793.
8. S. Al-Rubaye, E. Kadhum, Q. Ni, and A. Anpalagan, "Industrial internet of things driven by sdn platform for smart grid resiliency," IEEE Internet of Things Journal, vol. 6, no. 1, pp. 267–277, 2017.
9. C. Di, B. Zhang, Q. Liang, S. Li, and Y. Guo, "Learning automata-based access class barring scheme for massive random access in machineto-machine communications," IEEE Internet of Things Journal, vol. 6, no. 4, pp. 6007–6017, 2018.
10. P. Casas, A. D'Alconzo, F. Wamser, M. Seufert, B. Gardlo, A. Schwind, P. Tran-Gia, and R. Schatz, "Predicting qoe in cellular networks using machine learning and in-smartphone measurements," in 2017 Ninth International Conference on Quality of Multimedia Experience (QoMEX). IEEE, 2017, pp. 1–6.
11. P. Casas, "Machine learning models for wireless network monitoring and analysis," in 2018 IEEE Wireless Communications and Networking Conference Workshops (WCNCW). IEEE, 2018, pp. 242–247.
12. K. D. Humbird, J. L. Peterson, and R. G. Mcclarren, "Deep neural network initialization with decision trees," IEEE Transactions on Neural Networks, vol. 30, no. 5, pp. 1286–1295, 2019.
13. G. Biau, E. Scornet, and J. Welbl, "Neural random forests," Sankhya A, vol. 81, no. 2, pp. 347–386, 2019.
14. T. Chen and C. Guestrin, "Xgboost: A scalable tree boosting system," in Proceedings of the 22nd acm sigkdd international conference on knowledge discovery and data mining, 2016, pp. 785–794.

15. Babu, Syed Nasrullah, Abhishek Madduri, Saima Ahmed Rahin, "Light Weighted Healthcare CNN Model to Detect Prostate Cancer on Multiparametric MRI", Computational Intelligence and Neuroscience, vol. 2022, Article ID 5497120, 11 pages, 2022.

16. Mehraj, Haider, D. Jayadevappa, Sulaima Lebbe Abdul Haleem, Rehana Parveen, Abhishek Madduri, Maruthi Rohit Ayyagari, and Dharmesh Dhabliya. "Protection motivation theory using multi-factor authentication for providing security over social networking sites." Pattern Recognition Letters 152 (2021): 218-224.

17. Abhishek Madduri. "Human Gait Recognition using Discrete Wavelet and Discrete Cosine and Transformation Based Features." International Journal of Computer Trends and Technology, vol. 69, no. 6, June. 2021, pp.22-27.

18. Abhishek Madduri. Content based Image Retrieval System using Local Feature Extraction Techniques. International Journal of Computer Applications 183(20):16-20, August 2021.

19. Sharma, D. K., Chakravarthi, D. S., Boddu, R. S. K., Madduri, A., Ayyagari, M. R., & Khaja Mohiddin, M. (2023). Effectiveness of Machine Learning Technology in Detecting Patterns of Certain Diseases Within Patient Electronic Healthcare Records. In Proceedings of Second International Conference in Mechanical and Energy Technology (pp. 73-81). Springer, SingaporeIn Proceedings of Second International Conference in Mechanical and Energy Technology (pp. 73-81). Springer, Singapore.

20. Omarov, B., Narynov, S., Zhumanov, Z., Gumar, A., & Khassanova, M. (2022). State-of-the-art violence detection techniques in video surveillance security systems: a systematic review. PeerJ Computer Science, 8, e920.

21. Tursynova, A., & Omarov, B. (2021, November). 3D U-Net for brain stroke lesion segmentation on ISLES 2018 dataset. In 2021 16th International Conference on Electronics Computer and Computation (ICECCO) (pp. 1-4). IEEE.

22. Omarov, B., Narynov, S., Zhumanov, Z., Gumar, A., & Khassanova, M. (2022). A Skeleton-based Approach for Campus Violence Detection. CMC-COMPUTERS MATERIALS & CONTINUA, 72(1), 315-331.

23. S. V. N. Sreenivasu, S. Gomathi, M. Jogendra Kumar, Lavanya Prathap, Abhishek Madduri, Khalid M. A. Almutairi, Wadi B. Alonazi, D. Kali, S. Arockia Jayadhas, "Dense Convolutional Neural Network for Detection of Cancer from CT Images", BioMed Research International, vol. 2022, Article ID 1293548, 8 pages, 2022.

24. Mukesh Soni, Ihtiram Raza Khan, K. Suresh Babu, Syed Nasrullah, Abhishek Madduri, Saima Ahmed Rahin, "Light Weighted Healthcare CNN Model to Detect Prostate Cancer on Multiparametric MRI", Computational Intelligence and Neuroscience, vol. 2022, Article ID 5497120, 11 pages, 2022.

25. Mehraj, Haider, D. Jayadevappa, Sulaima Lebbe Abdul Haleem, Rehana Parveen, Abhishek Madduri, Maruthi Rohit Ayyagari, and Dharmesh Dhabliya. "Protection motivation theory using multi-factor authentication for providing security over social networking sites." Pattern Recognition Letters 152 (2021): 218-224.

26. Abhishek Madduri. "Human Gait Recognition using Discrete Wavelet and Discrete Cosine and Transformation Based Features." International Journal of Computer Trends and Technology, vol. 69, no. 6, June. 2021, pp.22-27.

27. Abhishek Madduri. Content based Image Retrieval System using Local Feature Extraction Techniques. International Journal of Computer Applications 183(20):16-20, August 2021.

28. Rathore, M. S., Poongodi, M., Saurabh, P., Lilhore, U. K., Bourouis, S., Alhakami, W., ... & Hamdi, M. (2022). A novel trust-based security and privacy model for Internet of Vehicles using encryption and steganography. Computers and Electrical Engineering, 102, 108205.

29. Gupta, S., Iyer, S., Agarwal, G., Manoharan, P., Algarni, A. D., Aldehim, G., & Raahemifar, K. (2022). Efficient Prioritization and Processor Selection Schemes for HEFT Algorithm: A Makespan Optimizer for Task Scheduling in Cloud Environment. Electronics, 11(16), 2557.

30. Balyan, A. K., Ahuja, S., Lilhore, U. K., Sharma, S. K., Manoharan, P., Algarni, A. D., ... & Raahemifar, K. (2022). A Hybrid Intrusion Detection Model Using EGA-PSO and Improved Random Forest Method. Sensors, 22(16), 5986.

31. Poongodi, M., Bourouis, S., Ahmed, A. N., Vijayaragavan, M., Venkatesan, K. G. S., Alhakami, W., & Hamdi, M. (2022). A Novel Secured Multi-Access Edge Computing based VANET with Neuro fuzzy systems based Blockchain Framework. Computer Communications.

32. Manoharan, P., Walia, R., Iwendi, C., Ahanger, T. A., Suganthi, S. T., Kamruzzaman, M. M., ... & Hamdi, M. (2022). SVM-based generative adverserial networks for federated learning and edge computing attack model and outpoising. Expert Systems, e13072.

33. Ramesh, T. R., Lilhore, U. K., Poongodi, M., Simaiya, S., Kaur, A., & Hamdi, M. (2022). PREDICTIVE ANALYSIS OF HEART DISEASES WITH MACHINE LEARNING APPROACHES. Malaysian Journal of Computer Science, 132-148.

34. Poongodi, M., Malviya, M., Hamdi, M., Vijayakumar, V., Mohammed, M. A., Rauf, H. T., & Al-Dhlan, K. A. (2022). 5G based Blockchain network for authentic and ethical keyword search engine. IET Commun., 16(5), 442-448.

35. Poongodi, M., Malviya, M., Kumar, C., Hamdi, M., Vijayakumar, V., Nebhen, J., & Alyamani, H. (2022). New York City taxi trip duration prediction using MLP and XGBoost. International Journal of System Assurance Engineering and Management, 13(1), 16-27.

36. Poongodi, M., Hamdi, M., & Wang, H. (2022). Image and audio caps: automated captioning of background sounds and images using deep learning. Multimedia Systems, 1-9.

37. Poongodi, M., Hamdi, M., Gao, J., & Rauf, H. T. (2021, December). A Novel Security Mechanism of 6G for IMD using Authentication and Key Agreement Scheme. In 2021 IEEE Globecom Workshops (GC Wkshps) (pp. 1-6). IEEE.

38. Ramesh, T. R., Vijayaragavan, M., Poongodi, M., Hamdi, M., Wang, H., & Bourouis, S. (2022). Peer-to-peer trust management in intelligent transportation system: An Aumann's agreement theorem based approach. ICT Express.

39. Hamdi, M., Bourouis, S., Rastislav, K., & Mohmed, F. (2022). Evaluation of Neuro Image for the Diagnosis of Alzhimer's Disease Using Deep Learning Neural Network. Frontiers in Public Health, 35.

40. Poongodi, M., Hamdi, M., Malviya, M., Sharma, A., Dhiman, G., & Vimal, S. (2022). Diagnosis and combating COVID-19 using wearable Oura smart ring with deep learning methods. Personal and ubiquitous computing, 26(1), 25-35.

41. Sahoo, S. K., Mudligiriyappa, N., Algethami, A. A., Manoharan, P., Hamdi, M., & Raahemifar, K. (2022). Intelligent Trust-Based Utility and Reusability Model: Enhanced Security Using Unmanned Aerial Vehicles on Sensor Nodes. Applied Sciences, 12(3), 1317.

42. Muniyappan, A., Sundarappan, B., Manoharan, P., Hamdi, M., Raahemifar, K., Bourouis, S., & Varadarajan, V. (2022). Stability and numerical solutions of second wave mathematical modeling on covid-19 and omicron outbreak strategy of pandemic: Analytical and error analysis of approximate series solutions by using hpm. Mathematics, 10(3), 343.

43. Rawal, B. S., Manogaran, G., & Poongodi, M. (2022). Implementing and Leveraging Blockchain Programming.

44. Bourouis, S., Band, S. S., Mosavi, A., Agrawal, S., & Hamdi, M. (2022). Meta-Heuristic Algorithm-Tuned Neural Network for Breast Cancer Diagnosis Using Ultrasound Images. Frontiers in Oncology, 12, 834028.

45. Lilhore, U. K., Poongodi, M., Kaur, A., Simaiya, S., Algarni, A. D., Elmannai, H., ... & Hamdi, M. (2022). Hybrid Model for Detection of Cervical Cancer Using Causal Analysis and Machine Learning Techniques. Computational and Mathematical Methods in Medicine, 2022.

46. Lilhore, U. K., Khalaf, O. I., Simaiya, S., Tavera Romero, C. A., Abdulsahib, G. M., & Kumar, D. (2022). A depth-controlled and energy-efficient routing protocol for underwater wireless sensor networks. International Journal of Distributed Sensor Networks, 18(9), 15501329221117118.

47. Sekar, S., Solayappan, A., Srimathi, J., Raja, S., Durga, S., Manoharan, P., ... & Tunze, G. B. (2022). Autonomous Transaction Model for E-Commerce Management Using Blockchain Technology. International Journal of Information Technology and Web Engineering (IJITWE), 17(1), 1-14.

48. Singh, D. K. S., Nithya, N., Rahunathan, L., Sanghavi, P., Vaghela, R. S., Manoharan, P., ... & Tunze, G. B. (2022). Social Network Analysis for Precise

Friend Suggestion for Twitter by Associating Multiple Networks Using ML. International Journal of Information Technology and Web Engineering (IJITWE), 17(1), 1-11.

49. Balasubramaniam, K., Vidhya, S., Jayapandian, N., Ramya, K., Poongodi, M., Hamdi, M., & Tunze, G. B. (2022). Social Network User Profiling With Multilayer Semantic Modeling Using Ego Network. International Journal of Information Technology and Web Engineering (IJITWE), 17(1), 1-14.

50. Dhiman, P., Kukreja, V., Manoharan, P., Kaur, A., Kamruzzaman, M. M., Dhaou, I. B., & Iwendi, C. (2022). A Novel Deep Learning Model for Detection of Severity Level of the Disease in Citrus Fruits. Electronics, 11(3), 495.

51. Dhanaraj, R. K., Ramakrishnan, V., Poongodi, M., Krishnasamy, L., Hamdi, M., Kotecha, K., & Vijayakumar, V. (2021). Random Forest Bagging and X-Means Clustered Antipattern Detection from SQL Query Log for Accessing Secure Mobile Data. Wireless Communications and Mobile Computing, 2021.

52. Maurya, S., Joseph, S., Asokan, A., Algethami, A. A., Hamdi, M., & Rauf, H. T. (2021). Federated transfer learning for authentication and privacy preservation using novel supportive twin delayed DDPG (S-TD3) algorithm for IIoT. Sensors, 21(23), 7793.

53. Poongodi, M., Nguyen, T. N., Hamdi, M., & Cengiz, K. (2021). Global cryptocurrency trend prediction using social media. Information Processing & Management, 58(6), 102708.

54. Poongodi, M., Sharma, A., Hamdi, M., Maode, M., & Chilamkurti, N. (2021). Smart healthcare in smart cities: wireless patient monitoring system using IoT. The Journal of Supercomputing, 77(11), 12230-12255.

55. Rawal, B. S., Manogaran, G., & Hamdi, M. (2021). Multi-Tier Stack of Block Chain with Proxy Re-Encryption Method Scheme on the Internet of Things Platform. ACM Transactions on Internet Technology (TOIT), 22(2), 1-20.

56. Poongodi, M., Nguyen, T. N., Hamdi, M., & Cengiz, K. (2021). A measurement approach using smart-IoT based architecture for detecting the COVID-19. Neural Processing Letters, 1-15.

57. Poongodi, M., Malviya, M., Hamdi, M., Rauf, H. T., Kadry, S., & Thinnukool, O. (2021). The recent technologies to curb the second-wave of COVID-19 pandemic. Ieee Access, 9, 97906-97928.

58. Rawal, B. S., Manogaran, G., Singh, R., Poongodi, M., & Hamdi, M. (2021, June). Network augmentation by dynamically splitting the switching function in SDN. In 2021 IEEE International Conference on Communications Workshops (ICC Workshops) (pp. 1-6). IEEE.

59. Poongodi, M., Hamdi, M., Gao, J., & Rauf, H. T. (2021, December). A Novel Security Mechanism of 6G for IMD using Authentication and Key Agreement Scheme. In 2021 IEEE Globecom Workshops (GC Wkshps) (pp. 1-6). IEEE.

60. Poongodi, M., Hamdi, M., Vijayakumar, V., Rawal, B. S., & Maode, M. (2020, September). An effective electronic waste management solution based on blockchain smart contract in 5G communities. In 2020 IEEE 3rd 5G World Forum (5GWF) (pp. 1-6). IEEE.

61. Poongodi, M., Sharma, A., Vijayakumar, V., Bhardwaj, V., Sharma, A. P., Iqbal, R., & Kumar, R. (2020). Prediction of the price of Ethereum blockchain cryptocurrency in an industrial finance system. Computers & Electrical Engineering, 81, 106527.

62. Poongodi, M., Hamdi, M., Varadarajan, V., Rawal, B. S., & Maode, M. (2020, July). Building an authentic and ethical keyword search by applying decentralised (Blockchain) verification. In IEEE INFOCOM 2020-IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS) (pp. 746-753). IEEE.

63. Poongodi, M., Vijayakumar, V., & Chilamkurti, N. (2020). Bitcoin price prediction using ARIMA model. International Journal of Internet Technology and Secured Transactions, 10(4), 396-406.

64. Poongodi, M., Vijayakumar, V., Al-Turjman, F., Hamdi, M., & Ma, M. (2019). Intrusion prevention system for DDoS attack on VANET with reCAPTCHA controller using information based metrics. IEEE Access, 7, 158481-158491.

65. Poongodi, M., Hamdi, M., Sharma, A., Ma, M., & Singh, P. K. (2019). DDoS detection mechanism using trust-based evaluation system in VANET. IEEE Access, 7, 183532-183544.

66. Poongodi, M., Vijayakumar, V., Ramanathan, L., Gao, X. Z., Bhardwaj, V., & Agarwal, T. (2019). Chat-bot-based natural language interface for blogs and information networks. International Journal of Web Based Communities, 15(2), 178-195.

67. Poongodi, M., Vijayakumar, V., Rawal, B., Bhardwaj, V., Agarwal, T., Jain, A., ... & Sriram, V. P. (2019). Recommendation model based on trust relations & user credibility. Journal of Intelligent & Fuzzy Systems, 36(5), 4057-4064.

68. Jeyachandran, A., & Poongodi, M. (2018). Securing Cloud information with the use of Bastion Algorithm to enhance Confiden-tiality and Protection. Int. J. Pure Appl. Math, 118, 223-245.

69. Poongodi, M., Al-Shaikhli, I. F., & Vijayakumar, V. (2017). The probabilistic approach of energy utility and reusability model with enhanced security from the compromised nodes through wireless energy transfer in WSN. Int. J. Pure Appl. Math, 116(22), 233-250.

70. Poongodi, M., & Bose, S. (2015). Stochastic model: reCAPTCHA controller based co-variance matrix analysis on frequency distribution using trust evaluation and re-eval by Aumann agreement theorem against DDoS attack in MANET. Cluster Computing, 18(4), 1549-1559.

71. Poongodi, M., & Bose, S. (2015). A novel intrusion detection system based on trust evaluation to defend against DDoS attack in MANET. Arabian Journal for Science and Engineering, 40(12), 3583-3594.

72. Poongodi, M., & Bose, S. (2015). The COLLID based intrusion detection system for detection against DDOS attacks using trust evaluation. Adv. Nat. Appl. Sci, 9(6), 574-580.

73. Poongodi, M., & Bose, S. (2015). Detection and Prevention system towards the truth of convergence on decision using Aumann agreement theorem. Procedia Computer Science, 50, 244-251.

74. Poongodi, M., Bose, S., & Ganeshkumar, N. (2015). The effective intrusion detection system using optimal feature selection algorithm. International Journal of Enterprise Network Management, 6(4), 263-274.

75. Poongodi, M., & Bose, S. (2014). A firegroup mechanism to provide intrusion detection and prevention system against DDoS attack in collaborative clustered networks. International Journal of Information Security and Privacy (IJISP), 8(2), 1-18.

76. Poongodi, M., & Bose, S. (2013, December). Design of Intrusion Detection and Prevention System (IDPS) using DGSOTFC in collaborative protection networks. In 2013 Fifth International Conference on Advanced Computing (ICoAC) (pp. 172-178). IEEE.

77. Pandithurai, O., Poongodi, M., Kumar, S. P., & Krishnan, C. G. (2011, December). A method to support multi-tenant as a service. In 2011 Third International Conference on Advanced Computing (pp. 157-162). IEEE.

78. Lahari, P. L., Bharathi, M., & Shirur, Y. J. (2020, June). An efficient truncated mac using approximate adders for image and video processing applications. In 2020 4th International Conference on Trends in Electronics and Informatics (ICOEI)(48184) (pp. 1039-1043). IEEE.

79. Bharathi, M., Shirur, Y. J. M., & Lahari, P. L. (2020, July). Performance evaluation of Distributed Arithmetic based MAC Structures for DSP Applications. In 2020 7th International Conference on Smart Structures and Systems (ICSSS) (pp. 1-5). IEEE.

80. Bharathi, M., & Shirur, Y. J. M. (2021). Power-Efficient Modulo Multiply and Accumulate Unit Using Distributed Arithmetic. Design Engineering, 3548-3556.

81. Lahari, P. L., Bharathi, M., & Shirur, Y. J. M. (2019). A Review on Distributed Arithmetic and Offset Binary Coding. i-Manager's Journal on Digital Signal Processing, 7(3), 27.

82. Bharathi, M., & Shirur, Y. J. M. (2021). Floating-Point Multiply and Accumulate Unit Core using Distributed Arithmetic for DSP Applications. Turkish Journal of Computer and Mathematics Education, 12(11), 4730-4738.

83. Bharathi, M., & Shirur, Y. J. M. (2021). Vlsi Implementation Of Multiply And Accumulate Unit Using Offset Binary Coding Distributed Arithmetic. Turkish Journal of Computer and Mathematics Education, 12(11), 4739-4749.

84. Webber, J., Mehbodniya, A., Teng, R., Arafa, A., & Alwakeel, A. (2021). Finger-Gesture Recognition for Visible Light Communication Systems Using Machine Learning. Applied Sciences, 11(24), 11582.

85. Webber, J., Mehbodniya, A., Arafa, A., & Alwakeel, A. (2022). Improved Human Activity Recognition Using Majority Combining of Reduced-Complexity Sensor Branch Classifiers. Electronics, 11(3), 392.

86. Bukhari, S. N. H., Jain, A., Haq, E., Mehbodniya, A., & Webber, J. (2022). Machine learning techniques for the prediction of B-cell and T-cell epitopes as potential vaccine targets with a specific focus on SARS-CoV-2 pathogen: A review. Pathogens, 11(2), 146.

87. Mehbodniya, A., Webber, J. L., Rani, R., Ahmad, S. S., Wattar, I., Ali, L., & Nuagah, S. J. (2022). Energy-Aware Routing Protocol with Fuzzy Logic in Industrial Internet of Things with Blockchain Technology. Wireless Communications and Mobile Computing, 2022.

88. Mehbodniya, A., Kumar, P., Changqing, X., Webber, J. L., Mamodiya, U., Halifa, A., & Srinivasulu, C. (2022). Hybrid Optimization Approach for Energy Control in Electric Vehicle Controller for Regulation of Three-Phase Induction Motors. Mathematical Problems in Engineering, 2022.

89. Bukhari, S. N. H., Webber, J., & Mehbodniya, A. (2022). Decision tree based ensemble machine learning model for the prediction of Zika virus T-cell epitopes as potential vaccine candidates. Scientific Reports, 12(1), 1-11.

90. Khaliq, A. A., Anjum, A., Ajmal, A. B., Webber, J. L., Mehbodniya, A., & Khan, S. (2022). A Secure and Privacy Preserved Parking Recommender System Using Elliptic Curve c Cryptography and Local Differential Privacy. IEEE Access.