The Application of Machine Learning to the Prediction of Heart Attack

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Abstract: Heart illnesses are among the most significant contributors to mortality in the world in the modern era. Heart attacks are responsible for the death of one person every 33 seconds. disease of the cardiovascular system by disclosing the proportion of mortality all over the world that are caused by heart attacks. In order to forecast instances of heart disease, a supervised machine learning method is utilised. Because the incidence of heart strokes in younger people is growing at an alarming rate, we need to establish a method that can identify the warning signs of a heart attack at an early stage and stop the stroke before it occurs. Because it is impractical for the average person to often undertake expensive tests like the electrocardiogram (ECG), there is a need for a system that is convenient and, at the same time, accurate in forecasting the likelihood of developing heart disease. Therefore, our plan is to create a programme that, given basic symptoms such as age, sex, pulse rate, etc., can determine whether or not a person is at risk for developing a cardiac condition. The machine learning algorithm neural networks that are used in the suggested system are the most accurate and dependable.

Keywords: Machine Learning, Prediction of Heart Attack, Electrocardiogram, Heart Disease, Algorithm Neural Networks

Introduction

One of the conditions that affects the most people is heart disease. This sickness is still fairly prevalent in today's society. In our search for a more accurate technique of prediction, we made use of a variety of characteristics that have a strong bearing on the heart condition in question, and we also made use of algorithms [1]. The

algorithm known as Naive Bayes is applied to a dataset consisting of risk factors and the results are analysed. In addition to using decision trees and a variety of different algorithms, we used the aforementioned characteristics to make predictions about heart disease [2-6]. The findings have demonstrated that even when the dataset is the superior approach for prediction, we nevertheless utilised algorithms for the purpose of making predictions. The naive Bayes algorithm is applied to a dataset consisting of risk factors and the results are analysed [7-14]. We also employed decision trees and a variety of algorithms in our attempt to forecast heart disease based on the results of a tiny naive Bayes algorithm. When used to huge datasets, decision trees are capable of producing reliable findings [15-21]. The art of prediction through the application of machine learning methods is the primary focus. These days, machine learning is employed extensively in a wide variety of business applications such as e-commerce [22-26]. Our topic is about the prediction of heart disease by processing a patient's dataset and data of Patients for whom we need to forecast the risk of occurrence of heart disease. Prediction is one of the domains in which this machine learning is applied [27-35].

The practise of discovering fascinating hidden patterns inside vast databases is known as data mining [36]. It is possible to mine the heterogeneous data in the medical domain, which includes text, numbers, and images, in order to offer clinicians with information that is helpful to them [37-45]. The patterns that are derived from medical data can be helpful to physicians in a variety of ways, including the detection of diseases, the prediction of patient survivability and disease severity, and other similar endeavours [46-56]. The primary objective of this study is to investigate the use of data mining in the field of medicine as well as a selection of the methods that are utilised in disease prognosis [57].

The discipline of medicine regularly works with an extremely large volume of data [58]. Handling such enormous amounts of data in the traditional manner may have an effect on the results [59-65]. For the purpose of finding facts in databases and medical research, particularly for the purpose of predicting heart disease, advanced data mining techniques are applied. In every region of the world, cardiovascular disease is the leading cause of death. The enormous volumes of data that were generated for the purpose of predicting heart disease are far too complex and cumbersome to be processed and analysed using the procedures that are already in use [66-73]. The approach and technology that is provided by data mining make it possible to translate these mountains of data into information that is valuable for decision-making [74]. The use of data mining algorithms will lead to the rapid prediction of diseases with a high degree of accuracy [75-89]. In this paper, we conduct a literature review of other papers in which a single data mining algorithm or a hybrid combination of data mining algorithms is used to predict heart disease. Our goal is to identify the algorithms that have a high degree of accuracy so that we can use them in future research [90].

Heart disease is one of the most prevalent types of illness. These days, the sickness is very widespread. In order to identify the best approach for prediction, we made use of a variety of characteristics that are able to relate to this heart illness very effectively [91-96]. In addition, we employed algorithms for prediction. The algorithm known as Naive Bayes is used to a dataset that is comprised of risk factors. To forecast heart disease based on the aforementioned characteristics, we also used decision trees and a combination of several algorithms. According to the findings, there are times when using the dataset as a prediction approach is superior to using

the algorithms that we developed [97-101]. On a dataset consisting of potential dangers, the naïve Bayes algorithm is analysed for its effectiveness. We also employed decision trees and a combination of algorithms to forecast cardiac disease based on a simple naive Bayes algorithm that delivers accurate results. The algorithm was developed by us. When used to vast datasets, decision trees generate accurate conclusions [102-109]. The ability to predict outcomes using methods of machine learning is the primary focus of this discussion. These days, machine learning is employed extensively in a wide variety of business applications such as online shopping [110-115]. Our topic is about the prediction of heart disease by processing a patient's dataset and data of Patients for whom we need to forecast the risk of occurrence of heart disease. Prediction is one of the areas in which this machine learning is employed; one of these areas is prediction [116-122].

Data mining refers to the technique of discovering fascinating hidden patterns inside vast databases. The field of medicine has a variety of data, including text, numbers, and images, which, if mined correctly, can supply clinicians with information that is helpful to them [123-131]. The patterns that are derived from medical data can be beneficial to clinicians in a number of ways, including the detection of diseases, the prediction of the severity of diseases, the survival of patients following disease, and many other aspects of medical care. The primary objective of this study is to investigate the utilisation of data mining in the field of medicine as well as a selection of the methods that are applied in disease prognosis [132].

Regularly, those working in the medical area must deal with a massive volume of data. The traditional method of managing very enormous data sets might have an effect on the results. Finding facts in databases and medical research, in particular the prediction of heart disease, sometimes requires the use of advanced data mining tools. Around the world, heart disease is the leading cause of death in both men and women. Massive volumes of data are generated for the purpose of predicting cardiac disease, but these data are too tough and complex to be processed and analysed using traditional methods [133-137]. Data mining offers both the approach and the technology necessary to turn these mountains of data into information that can be used for decision-making. When data mining techniques are used, the result will be accurate illness prediction that is both quick and accurate. In this paper, we conduct a literature review of various other papers in which a single data mining algorithm or a hybrid combination of data mining algorithms is used to predict heart disease [138-141]. Our goal is to identify the algorithms that have a high degree of accuracy so that we can use them in future research [142-153].

CAD, or computer-assisted diagnosis, is a growing and evolving sector of medical imaging research. Since inaccurate medical diagnoses can have serious consequences, there has been intensive work in recent years to enhance computer-aided diagnosis software [154-161]. This is because of the potential harm caused by such mistakes. Computer-assisted diagnosis, or CAD, is a field that makes heavy use of machine learning. Some items, including organs, may not be indicated correctly after using a straightforward equation. Learning by example is thus the most crucial part of pattern recognition [162-169]. Pattern recognition and machine learning have the potential to improve the precision with which diseases are diagnosed and information is processed in the field of biomedicine. They also play a role in making sure judgments are made without bias [170]. Machine learning is an important tool for the development of complex and self-sufficient algorithms for the processing

of high-dimensional and multimodal biological data [171-176]. This survey article's goal is to provide readers with a comparison of different machine-learning algorithms that have been developed to detect ailments like heart disease, diabetes, liver disease, dengue, and hepatitis [177]. It highlights the suite of machine learning techniques and tools employed in the analysis of diseases and the accompanying choice-making procedure [178-181].

System Analysis

Computer-aided diagnosis (CAD) is a fast developing and evolving subfield of medical imaging. Recent years have seen intensive work devoted into improving applications for computer-aided diagnosis because of the potential for errors in medical diagnostic systems to lead to significantly incorrect medical treatments. The use of machine learning is highly valued in the field of computer-assisted diagnostics [182]. Some items, including organs, may not be correctly represented when using a basic equation [183]. Therefore, pattern recognition relies heavily on the ability to learn from prior patterns [184]. The fields of biomedicine and artificial intelligence (AI) have much to gain from pattern recognition and machine learning in terms of improving the precision of perception and illness diagnosis. They also contribute to the impartiality of the decision-making procedure. Machine learning is a powerful tool for creating high-level, self-driving algorithms to analyse high-dimensional, multimodal biomedical data. Diseases like heart disease, diabetes, liver illness, dengue, and hepatitis are all compared and contrasted in this survey research of machine-learning algorithms. It highlights the entire toolkit of machine learning methods and applications used in illness analysis and decision making.

In this thesis, we introduce the reader to the foundational concepts of supervised and unsupervised learning, as well as to the most common machine learning algorithms. Among these algorithmic methods are decision tree learning, deep learning, and the k-nearest neighbour algorithm. Activities in the field of machine learning are often organised according to broad classifications. The ways in which knowledge is learned and the ways in which the system being developed receives feedback on that learning define these classes. Unsupervised learning, in which an algorithm is given no labelled data in order to allow it to find structure within its input data, and supervised learning, in which an algorithm is trained based on example input and output data that humans label, are two of the most popular and widely used machine learning methods. Let's take a more in-depth look at these procedures.

Most practical uses of machine learning employ a form of supervised learning. You are engaging in supervised learning when you use an algorithm to discover the input-to-output (X-Y) mapping function (f). Input variables (x) and a target variable (Y) are essential for this style of learning (X). The goal is to obtain a close enough approximation of the mapping function such that it continues to work even with new input data. that you can anticipate the outcome variables (Y) based on the input variables (X). Supervised machine learning techniques use a wide variety of statistical analysis methods, such as multi-class classification, decision trees, support vector machines, linear and logistic regression, and multi-class regression. In supervised learning, the data is already labelled with the right responses and is used to train the algorithm. For instance, a classification system can be taught to recognise animals by exposing it to examples of labelled data that include both the species

name and a list of distinguishing features. The dataset used for this training will include thousands of pictures of various animals. Problems in supervised learning can be further subdivided into the regression and classification categories. The purpose of both is to create a model that can predict the value of the dependent attribute with high accuracy given the attribute variables. Whereas in classification the dependent variable is a set of categories, in regression it is a number. This concept defines the split between the two types of labour.

"Classifying objects" into a set of more specific categories is what we mean when we talk about categorization. Nonetheless, via an automated process. Imagine if your computer could distinguish between you and a total stranger; if you don't think that's a huge problem, just try to imagine it. not quite a potato, not quite a tomato. A passing grade and a failing one. Classification is a challenge in machine learning and statistics that entails assigning an observation to one of several predefined groups (subpopulations) based on its similarities to those in a training set for which category membership has already been established. The fresh observation is compared to a collection of data whose category membership is previously established. There are times when we need to categorise our data into two groups; for example, when we need to determine whether or not a person has a certain disease based on the information we have about their health.

There is a wider variety of courses than just two. For example, to finish the Binary and Multi-class Classification, we need to determine which species our observation belongs to based on what we know about the different kinds of flowers. The variables x1 and x2 are used to create a prediction about the group here. Let's pretend for a second that we have been tasked with using three features to determine whether or not a given patient suffers from a given condition. A binary classification task is at hand. The training data set is an observational collection that contains both simulated and actual categorization outcomes. We utilise this dataset to educate a classifier, a model that may be used to generate predictions about a patient's prognosis.

1. X: data that has already been categorised and is presented in the form of a N*M matrix. The number of features is denoted by "M," while the number of observations is denoted by "N."
2. An N-d vector that corresponds to the classes that are predicted for each of the N observations.
3. Feature Extraction: The process of extracting useful information from an input X by utilising a number of transforms.
4. Machine Learning Model: The "Classifier" that will be trained.
5. The labels that were predicted by the classifier are denoted by y'.
6. Quality Metric: The metric that is utilised for the purpose of measuring the performance of the model.
7. Machine Learning Method: The algorithm that is used to update weights w', which iteratively updates the model and "learns" from previous data.

Types of Classifiers (Algorithms)

There are various types of classifiers. Some of them are:
- Logistic Regression is an example of a linear classifier.
- Decision Tree Classifier belongs to the family of tree-based classifiers.

- Machines with Support Vectors
- Neural Networks Created Artificially
- The Bayesian method of regression
- Classifiers Using the Gaussian and Naive Bayes Methods
- The ensemble methods of the stochastic gradient descent (SGD) classifier include the following: The Random Forests classifier, the Ada Boost classifier, the Bagging Classifier classifier, the Voting Classifier classifier, and the Extra Trees Classifier classifier
- Applications of Classification Theory in Everyday Life
- The self-driving automobile developed by Google utilises classification algorithms that are enabled by deep learning in order to detect and categorise impediments.
- Spam One of the most common and widely acknowledged applications of classification algorithms is the screening of incoming electronic mail.
- Classification is at the heart of a variety of important analytical processes, including the identification of health issues, facial features, speech patterns, objects, and emotions.

We have a regression issue when the outcome variable is a real or continuous value, like "salary" or "weight." There are a variety of models that can be used, with linear regression being the simplest. It strives to fit the data with the hyper-plane that goes through the points in the best conceivable way. Unsupervised learning is a sort of learning in which the only data provided are those for the input variable (X), with no output variables to match to them. The goal of unsupervised data analysis is to learn more about the data by modelling its underlying structure or distribution. Insight into the information can be gained in this manner. Because there is neither a right answer nor a teacher involved in unsupervised learning, it is given that name to distinguish it from supervised learning. The onus of finding and presenting an intriguing structure in the data falls on the algorithms themselves, and they are allowed free liberty to do so. Clustering and association concerns are two subcategories that can be utilised to further organise unsupervised learning challenges.

Clustering is an example of an unsupervised learning approach that can be applied. Unsupervised learning is a method of data analysis in which examples are taken from unlabeled datasets consisting only of input data. It is typically employed to unearth the underlying structure, explanatory processes, generative qualities, and groups of a set of examples. The term "clustering" refers to the act of dividing a population or set of data points into several groups in which the data points within each group are more similar to one another and less similar to the data points within the other groups. It's a set of items arranged in accordance with their likenesses and dissimilarities to one another. Groups of data points in the graph below, for instance, can be interpreted as representing a single entity. The clusters can be distinguished from one another, allowing us to conclude that there are three separate groups in the image on the right.

Each point in this set of data is assigned to a cluster based on the assumption that it lies inside the range defined by the given constraint with respect to the cluster's centre. The outliers are determined using a variety of distance metrics, methods, and approaches. Clustering is crucial because it determines the inherent groupings in the

unlabeled data. Effective clustering has not been standardised to any degree. Whether or not it satisfies their needs depends on the person and the criteria they utilise. Finding useful and acceptable groupings ("useful" data classes) or discovering uncommon data items could be of interest. Finding representatives for homogeneous groups (data reduction) and revealing the unknown properties of these clusters ("natural" data types) are further examples. Alternatively, we could be on the prowl for out-of-the-ordinary data objects (outlier detection). The assumptions that this algorithm must make about what makes some points similar to one another lead to different clusters that are nonetheless valid.

Density-based approaches recognise clusters as the dense region that has some commonalities with the less dense part of space but also some key distinctions. These methods can effectively merge two distinct clusters and boast a high degree of accuracy. For instance, "Ordering Points to Identify Clustering Structure" (OPTICS) and "Density-Based Spatial Clustering of Applications with Noise" (DBSCAN) are two such methods. Hierarchical approaches The clusters formed by this method have a hierarchical tree structure due to the way they are organised. New clusters are formed by using the existing one as a template. Partitioning Strategies: These techniques separate the items into k clusters, with each partition helping to build a single cluster. This technique is used, for instance, to optimise a similarity function based on an objective criterion when distance is a primary parameter. K-means, CLARANS (Clustering Large Applications using Randomized Search), etc. are some other examples.

Grid-based procedures are those that employ a grid layout. In this technique, the available data space is partitioned into a fixed number of cells that form a grid. All of the clustering techniques that are performed on these grids, such as STING (Statistical Information Grid), wave cluster, and CLIQUE (CLusteringIn Quest), amongst others, are completed fast and do not depend on the whole quantity of data pieces. The architecture of a system is the underlying model that defines its composition, operation, and viewpoints. Systems blueprint is another name for system architecture. An architecture description is a formal attribution and representation of a system that is organised to make it easier to reason about the system's structures and operations. The term "blueprint" is commonly used to refer to a detailed description of a building's layout.

UCI's repository is the source of the machine learning datasets. It's likely that the attribute values in the raw data are all over the place, leading to erroneous inferences. The dataset will be preprocessed by the learner as a result. The collected data is in real-time and comes from UCI. A machine can learn to recognise patterns in new data with the help of training data. The purpose of cross-validation is to ensure that the machine-training procedure is as precise and efficient as possible. Supervised machine learning is used to train the system. Predictive analytics is the practise of making predictions based on patterns identified in data that has already been collected. The accuracy of the machine's predictions after being trained is measured against the test data. There must be no duplicate data in the test set from the training set. Examine the consistency between the patient's medical background and the databases. Applying the Support vector machine algorithm to the datasets is the best way to make a reliable forecast of a heart attack.

Conclusion

In this article, we investigate many classification algorithms that have the potential to be utilised for the diagnosis of cardiac disease. A heart attack is one of the most significant public health challenges facing modern societies. A person's heart condition is their number one risk factor for mortality, regardless of gender. If you or someone you know might be experiencing a heart attack, it is important to be aware of the warning signs and symptoms of a heart attack so that you can take immediate action. When immediate emergency treatment is initiated, a patient's chances of surviving are increased. The accuracy of predictions made using currently available methodologies can be enhanced; hence, this research will, in the future, contribute to the development of accurate prediction algorithms for heart attacks.

References

1. Rathi, S., Chaturvedi, S., Abdullah, S., Rajput, G., Alqahtani, N. M., Chaturvedi, M., Gurumurthy, V., Saini, R., Bavabeedu, S. S., & Minervini, G. (2023). Clinical Trial to Assess Physiology and Activity of Masticatory Muscles of Complete Denture Wearer Following Vitamin D Intervention. Medicina, 59(2), 410.

2. Kaur, K., Suneja, B., Jodhka, S., Saini, R. S., Chaturvedi, S., Bavabeedu, S. S., Alhamoudi, F. H., Cicciù, M., & Minervini, G. (2023). Comparison between Restorative Materials for Pulpotomised Deciduous Molars: A Randomized Clinical Study. Children, 10(2), 284.

3. Kumar A, Saini RS, Sharma V , Rai R U , Gupta P, Sabharwal P (2021) , Assessment of Pattern of Oral Prosthetic Treatment and Prevalence of Oral Diseases in Edentulous Patients in North Indian Population: A Cross-sectional Study. J Pharm Bioallied Sci. 2021 Jun; 13(Suppl 1): S187–S189.

4. Solanki, J., Jain, R., Singh, R., Gupta, S., Arya, A., & Tomar, D. (2015). Prevalence of Osteosclerosis Among Patients Visiting Dental Institute in Rural Area of Western India. Journal of clinical and diagnostic research : JCDR, 9(8), ZC38–ZC40.

5. Lie, Z. W., Zheng, Q. L., Zhou, S., & Rauf, H. L. (2022). Virtual energy-saving environmental protection building design and implementation. International Journal of System Assurance Engineering Management, 13(1), 263-272.

6. Rauf, H. L. (2016). Rethinking Contemporary Library Environment as a Social Learning Centre. Eastern Mediterranean University (EMU)-Doğu Akdeniz Üniversitesi (DAÜ),

7. Rauf, H. L., Gunce, K., & Ozersay, M. O. (2020). Self-advocacy for first-year students in interior architecture design studios. Open House International.

8. Rauf, H. L., Gunce, K., & Özersay, M. Ö. (2019). Impact Of Students'self-Advocacy On Their Perception In Design-Studio. The Online Journal of Quality in Higher Education, 6(1), 1-12.

9. Rauf, H. L., & Shareef, S. S. (2019). Understanding the relationship between construction courses and design in architectural education. international journal of recent technology engineering, 8(3), 3201-3207.

10. A. Khelifi, A. Abran, and L. Buglione, "2.4 a system of reference for software measurements with ISO 19761 (COSMIC FFP)," in COSMIC Function Points: Theory and Advanced Practices, vol. 142, 2016.

11. A. Khelifi and A. Abran, "Design steps for developing software measurement standard etalons for iso 19761 (cosmic-ffp)," in WSEAS International Conference on COMPUTERS, 2007.

12. M. A. Talib, A. Khelifi, A. Abran, and O. Ormandjieva, "Techniques for quantitative analysis of software quality throughout the sdlc: The swebok guide coverage," in 2010 Eighth ACIS International Conference on Software Engineering Research, Management and Applications, pp. 321-328, 2010.

13. M. A. Talib, A. Khelifi, and T. Ugurlu, "Using ISO 27001 in teaching information security," in IECON 2012-38th Annual Conference on IEEE Industrial Electronics Society, pp. 3149-3153, 2012.

14. M. Aburrous and A. Khelifi, "Phishing detection plug-in toolbar using intelligent Fuzzy-classification mining techniques," in The international conference on soft computing and software engineering [SCSE'13], San Francisco State University, San Francisco, California, USA, 2013.

15. A. Khelifi, Y. Grisi, D. Soufi, D. Mohanad, and P. V. S. Shastry, "M-Vote: a reliable and highly secure mobile voting system," in 2013 Palestinian International Conference on information and communication technology, pp. 90-98, 2013.

16. A. Khelifi, M. Aburrous, M. A. Talib, and P. V. S. Shastry, "Enhancing protection techniques of e-banking security services using open source cryptographic algorithms," in 2013 14th ACIS International Conference on Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing, pp. 89-95, 2013.

17. A. Khelifi and K. H. Hyari, "A mobile device software to improve construction sites communications" MoSIC"," International Journal of Advanced Computer Science and Applications, vol. 7, no. 11, pp. n/a, 2016.

18. M. A. Talib, O. Ormandjieva, A. Abran, A. Khelifi, and L. Buglione, "Scenario-based Black Box Testing in COSMIC-FFP: a case study," in Software Quality Professional, vol. 8, no. 3, pp. 22, 2006.

19. M. A. Talib, A. Khelifi, and L. Jololian, "Secure software engineering: A new teaching perspective based on the SWEBOK," in Interdisciplinary Journal of Information, Knowledge, and Management, vol. 5, pp. 83-99, 2010.

20. Ravinder M and Kulkarni V (2023), Intrusion detection in smart meters data using machine learning algorithms: A research report. Front. Energy Res. 11:1147431. doi: 10.3389/fenrg.2023.1147431

21. R. M and V. Kulkarni, "Energy-Efficient Algorithm for Cluster Formation and Cluster Head Selection for WSN," 2022 IEEE Bombay Section Signature Conference (IBSSC), Mumbai, India, 2022, pp. 1-6.

22. M. Ravinder and V. Kulkarni, "A Review on Cyber Security and Anomaly Detection Perspectives of Smart Grid," 2023 5th International Conference on Smart Systems and Inventive Technology (ICSSIT), Tirunelveli, India, 2023, pp. 692-697.

23. Vikram K, Sarat Kumar Sahoo, "Interference-Aware Adaptive Transmission Power Control for ZigBee Wireless Networks" Vol. 828, Pg. No: 56-69, June-2018, Communications in Computer and Information Science, Springer.

24. Vikram K, Sarat Kumar Sahoo, "A Collaborative Frame Work for Avoiding the Interference in 2.4GHz Frequency Band Smart Grid Applications" Vol. No. 22, No.1, Pg. No: 48-56, June-2018. Electronics Journal.

25. Vikram K, Sarat Kumar Sahoo, K. Venkata Lakshmi Narayana, "Forward Error Correction based Encoding Technique for Cross-layer Multi Channel MAC protocol", Vol. 117, Pg. No 847-854, September 2017, Energy Procedia.

26. Vikram K, Sarat Kumar Sahoo, K. V. L. Narayana, "A Survey on Interference Avoiding Methods for Wireless Sensor Networks working in the 2.4GHz Frequency Band", Vol. 13, Number 3, Pg No: 59 – 81, July-2020, Journal of Engineering Science and Technology Review,

27. Yuvaraj. P, Vikram K, K. Venkata Lakshmi Narayana, A Review on state of art variants of LEACH protocol for Wireless Sensor Networks, Sensors & Transducers Journal, U.K. vol. 186, Issue 3, pp.25-32, March 2015.

28. D. R. Patil, B. S. Borkar, A. V. Markad, and H. P. Singh, 'Applications of Artificial Intelligence using Baye's Theorem: Survey', Universal Review, vol. 8, no. 02, pp. 198–203, 2019.

29. D. R. Patil and R. Purohit, 'Dynamic Resource Allocation and Memory Management using Deep Convolutional Neural Network', IJEAT, vol. 9, no. 02, pp. 608–612, 2019.

30. D. R. Patil and M. Sharma, 'Dynamic Resource Allocation and Memory Management Using Machine Learning for Cloud Environments', International Journal of Advanced Trends in Computer Science and Engineering, vol. 9, no. 04, pp. 5921–5927, 2020.

31. B. Adgaonkar, D. R. Patil, and B. S. Borkar, 'Availability-Aware Multi-Objective Cluster Allocation Optimization in Energy-Efficient Datacenters', in 2022 2nd Asian Conference on Innovation in Technology, 2022, pp. 1–6.

32. D. R. Patil, G. Mukesh, S. Manish, and B. Malay, 'Memory and Resource Management for Mobile Platform in High Performance Computation Using Deep Learning', ICIC Express Letters:Part B: Applications, vol. 13, no. 9, pp. 991–1000, 2022.

33. B. S. Borkar, D. R. Patil, A. V. Markad, and M. Sharma, 'Real or Fake Identity Deception of Social Media Accounts using Recurrent Neural Network', in 2022 International Conference on Fourth Industrial Revolution Based Technology and Practices (ICFIRTP), 2022, pp. 80–84.

34. D. R. Patil, B. Borkar, A. Markad, S. Kadlag, M. Kumbhkar, and A. Jamal, 'Delay Tolerant and Energy Reduced Task Allocation in Internet of Things with Cloud Systems', in 2022 International Interdisciplinary Humanitarian Conference for Sustainability (IIHC), 2022, pp. 1579–1583.

35. K. Sridhar, Ajay Reddy Yeruva, Renjith P N, Asmita Dixit, Aatif Jamshed, and Ravi Rastogi, "Enhanced Machine learning algorithms Lightweight Ensemble Classification of Normal versus Leukemic Cel," Journal of Pharmaceutical Negative Results, pp. 496–505, Nov. 2022.

36. Nita S. patil, Sanjay M. Patil, Chandrashekhar M. Raut, Amol P. Pande, Ajay Reddy Yeruva, and Harish Morwani, "An Efficient Approach for Object Detection using Deep Learning," Journal of Pharmaceutical Negative Results, pp. 563–572, Nov. 2022.

37. A. R. Yeruva, C. S. L Vijaya Durga, G. B, K. Pant, P. Chaturvedi, and A. P. Srivastava, "A Smart Healthcare Monitoring System Based on Fog Computing Architecture," 2022 2nd International Conference on Technological Advancements in Computational Sciences (ICTACS), Oct. 2022.

38. A. R. Yeruva, P. Choudhari, A. Shrivastava, D. Verma, S. Shaw, and A. Rana, "Covid-19 Disease Detection using Chest X-Ray Images by Means of CNN," 2022 2nd International Conference on Technological Advancements in Computational Sciences (ICTACS), Oct. 2022.

39. T. Vinoth Kumar, A. R. Yeruva, S. Kumar, D. Gangodkar, A. L N Rao, and P. Chaturvedi, "A New Vehicle Tracking System with R-CNN and Random Forest Classifier for Disaster Management Platform to Improve Performance," 2022 2nd International Conference on Technological Advancements in Computational Sciences (ICTACS), Oct. 2022.

40. P. William, M. Shamim, A. R. Yeruva, D. Gangodkar, S. Vashisht, and A. Choudhury, "Deep Learning based Drowsiness Detection and Monitoring using Behavioural Approach," 2022 2nd International Conference on Technological Advancements in Computational Sciences (ICTACS), Oct. 2022.

41. A. Rana, A. Reddy, A. Shrivastava, D. Verma, Md. S. Ansari, and D. Singh, "Secure and Smart Healthcare System using IoT and Deep Learning Models," 2022 2nd International Conference on Technological Advancements in Computational Sciences , Oct. 2022.

42. A. Reddy Yeruva, E. Saleh Alomari, S. Rashmi, A. Shrivastava, M. Kathiravan, and A. Chaturvedi, "A Secure Machine Learning-Based Optimal Routing in Ad Hoc Networks for Classifying and Predicting Vulnerabilities," Cybernetics and Systems, pp. 1–12, Jan. 2023.

43. A. Shrivastava, S. J. Suji Prasad, A. R. Yeruva, P. Mani, P. Nagpal, and A. Chaturvedi, "IoT Based RFID Attendance Monitoring System of Students using Arduino ESP8266 & Adafruit.io on Defined Area," Cybernetics and Systems, pp. 1–12, Jan. 2023.

44. A. R. Yeruva, "Monitoring Data Center Site Infrastructure Using AIOPS Architecture," Eduvest - Journal of Universal Studies, vol. 3, no. 1, pp. 265–277, Jan. 2023.

45. V. Samudrala, A. Reddy Yeruva, N. Jayapal, T. Vijayakumar, M. Rajkumar, and S. Razia, "Smart Water Flow Monitoring and Theft Detection System using IoT," 2022 International Conference on Automation, Computing and Renewable Systems (ICACRS), Dec. 2022.

46. S. V. N. Sreenivasu, T. Sathesh Kumar, Omer Bin Hussain, Ajay Reddy Yeruva, Subash Ranjan Kabat & Abhay Chaturvedi (2023) Cloud Based Electric Vehicle's Temperature Monitoring System Using IOT, Cybernetics and Systems.

47. A. R. Yeruva, "Providing A Personalized Healthcare Service To The Patients Using AIOPs Monitoring," Eduvest - Journal of Universal Studies, vol. 3, no. 2, pp. 327–334, Jan. 2023.

48. V. Chaudhary, Z. Dalwai and Vikram Kulkarni, "Intelligent Distraction and Drowsiness Detection System for Automobiles," 2021 International Conference on Intelligent Technologies (CONIT), 2021, pp. 1-4.

49. N. Verma, S. Patil, B. Sinha and Vikram Kulkarni, "Object Detection for COVID Rules Response and Crowd Analysis," 2021 Innovations in Power and Advanced Computing Technologies (i-PACT), 2021, pp. 1-6.

50. Rauf, H. L., Shareef, S. S., & Othman, N. N. (2021). Innovation in Architecture Education: Collaborative Learning Method Through Virtual Reality. Journal of Higher Education Theory Practice, 21(16), 33-40.

51. Shareef, S. S. (2016). Considerations in Design of Interior Spaces for Autistic Children. Eastern Mediterranean University (EMU)-Doğu Akdeniz Üniversitesi (DAÜ).

52. Shareef, S. S., & Farivarsadri, G. (2019). The impact of colour and light on children with autism in interior spaces from an architectural point of view. International Journal of Arts Technology, 11(2), 153-164.

53. Shareef, S. S., & Farivarsadri, G. (2020). An innovative framework for teaching/learning technical courses in architectural education. Sustainability, 12(22), 9514.

54. A. R. Yeruva and V. B. Ramu, "Optimising AIOps system performance for e-commerce and online retail businesses with the ACF model," Int. J. Intellect. Prop. Manag., vol. 1, no. 1, p. 1, 2022.

55. V. B. Ramu and A. R. Yeruva, "AIOps research innovations, performance impact and challenges faced," Int. J. Syst. Syst. Eng., vol. 13, no. 3, p. 1, 2023.

56. M. M. Kirmani and A. Wahid, "Revised use case point (re-UCP) model for software effort estimation," International Journal of Advanced Computer Science and Applications, vol. 6, no. 3, 2015.

57. M. M. Kirmani and A. Wahid, "Impact of modification made in re-UCP on software effort estimation," Journal of Software Engineering and Applications, vol. 08, no. 06, pp. 276–289, 2015.

58. Syed Immamul Ansarullah, Syed Mohsin Saif, Pradeep Kumar, Mudasir Manzoor Kirmani, "Significance of Visible Non-Invasive Risk Attributes for the Initial Prediction of Heart Disease Using Different Machine Learning Techniques", Computational Intelligence and Neuroscience, vol. 2022, Article ID 9580896, 12 pages, 2022.

59. Syed Immamul Ansarullah, Syed Mohsin Saif, Syed Abdul Basit Andrabi, Sajadul Hassan Kumhar, Mudasir M. Kirmani, Dr. Pradeep Kumar, "An Intelligent and Reliable Hyperparameter Optimization Machine Learning Model for Early Heart Disease Assessment Using Imperative Risk Attributes", Journal of Healthcare Engineering, vol. 2022, Article ID 9882288, 12 pages, 2022.

60. M. Alsoud and I. Othman, "Factors influencing online shopping intention in Jordan: an empirical study based on the Tam model", International Journal of Current Innovations in Advanced Research, vol. 1, no. 6, pp. 1-13, 2018.

61. R. Imtiaz, M. Alsoud, M. Ramish, A. Aziz and A. Anwar, "Impact of Face book on Advertising: Analysis of effectiveness of Face book on enhancing customer purchase intention", Elementary Education Online, vol. 20, no. 5, pp. 7130-7149, 2021.

62. M. Alsoud and I. Othman, "The Determinant of Online Shopping Intention in Jordan: A Review and Suggestions for Future Research", International Journal of Academic Research in Business and Social Sciences, vol. 8, no. 8, 2018.

63. T. Majali, M. Alsoud, A. Omar and I. Alhassan, "Social Media Use as Health Awareness Tool: A Study among Healthcare Practitioners", Multicultural Education, vol. 7, no. 2, pp. 1-5, 2021.

64. T. Majali, M. Alsoud, H. Yaseen, R. Almajali and S. Barkat, "The effect of digital review credibility on Jordanian online purchase intention", International Journal of Data and Network Science, vol. 6, no. 3, pp. 973-982, 2022.

65. Trawnih, S. Al-Masaeed, M. Alsoud and A. Alkufahy, "Understanding artificial intelligence experience: A customer perspective", International Journal of Data and Network Science, vol. 6, no. 4, pp. 1471-1484, 2022.

66. T. Majali, A. Omar, M. Alsoud and S. Barakat, "Use of Social Media in Promoting Breast Cancer Awareness among Malaysian Women of Generation Y: A Conceptual Framework", Multicultural Education, vol. 7, no. 2, pp. 58-67, 2021.

67. A. Al-Adwan, M. Alrousan, H. Yaseen, A. Alkufahy and M. Alsoud, "Boosting Online Purchase Intention in High-Uncertainty-Avoidance Societies: A Signaling Theory Approach", Journal of Open Innovation: Technology, Market, and Complexity, vol. 8, no. 3, p. 136, 2022.

68. M. Alsoud, M., and A. Mustafa. "The Impact of Security Protection on Online Shopping Intention upon Jordanian Markets", Merit Research Journal of Business and Management, vol.8, no.2, pp.023-027.

69. A. Al-Adwan, H. Yaseen, A. Alsoud, F. Abousweilem and W. Al-Rahmi, "Novel extension of the UTAUT model to understand continued usage intention of learning management systems: the role of learning tradition", Education and Information Technologies, vol. 27, no. 3, pp. 3567-3593, 2021.

70. A. Al Adwan, "Case study and grounded theory: a happy marriage? An exemplary application from healthcare informatics adoption research", International Journal of Electronic Healthcare, vol. 9(4), p. 294, 2017.

71. A. Samed Al-Adwan, M. Nofal, H. Akram, N. Awni Albelbisi and M. Al-Okaily, "Towards a Sustainable Adoption of E-Learning Systems: The Role of Self-Directed Learning", Journal of Information Technology Education: Research, vol. 21, pp. 245-267, 2022.

72. A. Al-Adwan, M. Al-Debei and Y. Dwivedi, "E-commerce in high uncertainty avoidance cultures: The driving forces of repurchase and word-of-mouth intentions", Technology in Society, vol. 71, p. 102083, 2022.

73. A. Al-Adwan, "Novel research framework for social commerce purchase intentions", Journal of Theoretical & Applied Information Technology, vol. 96, no.14, pp.4390-4404, 2018.

74. A. Al-Adwan and G. Sammour, "What Makes Consumers Purchase Mobile Apps: Evidence from Jordan", Journal of Theoretical and Applied Electronic Commerce Research, vol. 16, no. 3, pp. 562-583, 2020.

75. J. Cruz Ángeles, The legal-community obligations of the large digital service provider platforms in the metaverse era, Cuad. transnational law , vol. 14, no. 2, p. 294-318, Sept. 2022.

76. J. Cruz Ángeles, The guardians of access to the metaverse. (Re)thinking the Competition Law of the European Union, Cuad. transnational law , vol. 15, no. 1, p. 275-296, Mar. 2023.

77. Pandya S., R. Gadekallu, P. K. Reddy, W. Wang and M. Alazab, "InfusedHeart: A Novel Knowledge-Infused Learning Framework for Diagnosis of Cardiovascular Events," IEEE Transactions on Computational Social Systems.

78. Ghayvat, H., Pandya, S., Bhattacharya, P., Zuhair, M. et al., CP-BDHCA: Blockchain- based Confidentiality-Privacy preserving Big Data scheme for healthcare clouds and applications, IEEE Journal of Biomedical and Health Informatics(J-BHI).

79. Ghayvat, H., Awais, M., Bashir, Pandya S., K. et al. AI-enabled radiologist in the loop: novel AI-based framework to augment radiologist performance for COVID-19 chest CT medical image annotation and classification from pneumonia. Neural Comput & Applic (2022).

80. Ghayvat, H., Pandya, S., M. Awais, K. Dev, "STRENUOUS: Edge-Line Computing, AI and IIoT enabled GPS Spatiotemporal data-based Meta-transmission Healthcare Ecosystem for Virus Outbreaks Discovery", IEEE Internet of Things Journal.

81. Arikumar, K.S.; Prathiba, S.B.; Alazab, M.; Gadekallu, T.R.; Pandya, S.; Khan, J.M.; Moorthy, R.S. FL-PMI: Federated Learning-Based Person Movement Identification through Wearable Devices in Smart Healthcare Sensors 2022, 22, 1377.

82. Patil S, Pandya "Forecasting Dengue Hotspots Associated with Variation in Meteorological Parameters Using Regression and Time Series Models." Frontiers in public health. 2021;9.

83. Pandya Sharnil, Sur, A, Solke, N, COVIDSAVIOUR: A Novel Sensor-Fusion and Deep Learning-Based Framework for Virus Outbreaks, Frontiers in Public Health.

84. Pandya, and Ghayvat, H., Ambient acoustic event assistive framework for identification, detection, and recognition of unknown acoustic events of a residence. Advanced Engineering Informatics, 47, p.1012, 2021, Elsevier.

85. Ghayvat, H., Awais, M., Gope, P., Pandya, S. and Majumdar, S., 2021. ReCognizing SUspect and PredictiNg ThE SpRead of Contagion Based on Mobile Phone LoCation DaTa: A System of identifying COVID-19 infectious and hazardous sites, detecting disease outbreaks based on the internet of things, edge computing, and artificial intelligence, Sustainable Cities and Society, p.102798, Elsevier.

86. Pandya, Sharnil, Aanchal Thakur, Santosh Saxena, Nandita Jassal, Chirag Patel, Kirit Modi, Pooja Shah, Rahul Joshi, Sudhanshu Gonge, Kalyani Kadam, and Prachi Kadam. A Study of the Recent Trends of Immunology: Key Challenges, Domains, Applications, Datasets, and Future Directions, Sensors, 2021, 23: 7786.

87. Abolfazl Mehbodniya, L. Arokia Jesu Prabhu, Julian L. Webber, Dilip Kumar Sharma, Pandya, Sharnil, Fetal Health Classification from Cardiotocographic Data Using Machine Learning, Expert Systems, Wiley,

88. Mishra, N. and Pandya, , Internet of Things Applications, Security Challenges, Attacks, Intrusion Detection, and Future Visions: A Systematic Review, IEEE Access, April 2021.

89. Nivedita Mishra, Pandya, Sharnil Chirag Patel et al. Memcached: An Experimental Study of DDoS Attacks for the Wellbeing of IoT applications", Sensors 2022.

90. Shah A, Ahirrao S, Pandya S, Kotecha K and Rathod S, Smart Cardiac Framework for an Early Detection of Cardiac Arrest Condition and Risk, Frontiers in Public Health, doi: 10.3389/fpubh.2021.762303

91. Sushruta Mishra,Hrudaya Kumar Tripathy,Hiren Kumar Thakkar,Deepak Garg,Ketan Kotecha*,Sharnil Pandya, An Explainable Intelligence Driven Query Prioritization using Balanced Decision Tree Approach for Multi Level Psychological Disorders Assessment, Frontiers in Public Health, 2021.

92. Ghayvat, ; Awais, M.; Pandya, S.; Ren, H.; Akbarzadeh, S.; Chandra Mukhopadhyay, S.; Chen, C.; Gope, P.; Chouhan, A.; Chen, W. Smart Aging System: Uncovering the Hidden Wellness Parameter for Well-Being Monitoring and Anomaly Detection. Sensors, 19, 766.

93. Pandya, S, Sur, A. and Kotecha, K., "Smart epidemic tunnel: IoT-based sensor-fusion assistive technology for COVID-19 disinfection", International Journal of Pervasive Computing and Communications, Emerald Publishing.

94. Srivastava, A., Jain, S., Miranda, R., Patil, S., Pandya, S., Kotecha K. 2021. Deep learning-based respiratory sound analysis for detection of chronic obstructive pulmonary PeerJ Computer Science 7:e369.

95. Karn, A.L., Pandya, S., Mehbodniya, A. et al. An integrated approach for sustainable development of wastewater treatment and management system using IoT in smart Soft Computing, Springer, 2021.

96. Pandya, S., Ghayvat, H., Sur, A., Awais, M., Kotecha, K., Saxena, S., Jassal, N., Pingale, G. Pollution Weather Prediction System: Smart Outdoor Pollution Monitoring and Prediction for Healthy Breathing and Sensors, 2020, 20, 5448.

97. Awais, , Ghayvat, H., Krishnan Pandarathodiyil, A., Nabillah Ghani, W.M., Ramanathan, A., Pandya, S., Walter, N., Saad, M.N., Zain, R.B., Faye, I. Healthcare Professional in the Loop (HPIL): Classification of Standard and Oral Cancer-Causing Anomalous Regions of Oral Cavity Using Textural Analysis Technique in Autofluorescence Imaging. Sensors, 2020, 20, 5780.

98. Patel, C.I., Labana, D., Pandya, S., Modi, K., Ghayvat, H. and Awais, M., 2020. Histogram of Oriented Gradient-Based Fusion of Features for Human Action Recognition in Action Video Sensors, 20(24), p.7299. [IF: 3.5]

99. Pandya, , Ghayvat, H.; Kotecha, K.; Awais, M.; Akbarzadeh, S.; Gope, P.; Mukhopadhyay, S.C.; Chen, W. Smart Home Anti-Theft System: A Novel Approach for Near Real-Time Monitoring and Smart Home Security for Wellness Protocol. Appl. Syst. Innov.

100. Barot, V., Kapadia, V., & Pandya, S., QoS Enabled IoT Based Low Cost Air Quality Monitoring System with Power Consumption Optimization, Cybernetics and Information Technologies, 2020, 20(2), 122-140, Bulgarian Academy of Science.

101. Pandya, S., Wakchaure MA, Shankar R, Annam JR. Analysis of NOMA-OFDM 5G wireless system using deep neural network. The Journal of Defense Modeling.

102. Mehta P, Pandya S., Kotecha K. 2021. Harvesting social media sentiment analysis to enhance stock market prediction using deep learning, PeerJ Computer Science 7:e369.

103. Sur S., Pandya, S., Ramesh P. Sah, Ketan Kotecha & Swapnil Narkhede, Influence of bed temperature on performance of silica gel/methanol adsorption refrigeration system at adsorption equilibrium, Particulate Science.

104. Sur, A., Sah, R., Pandya, S., Milk storage system for remote areas using solar thermal energy and adsorption cooling, Materials Today, Volume 28, Part 3,

105. N. Albelbisi, A. Al-Adwan and A. Habibi, "Impact Of Quality Antecedents On Satisfaction Toward MOOC", Turkish Online Journal of Distance Education, pp. 164-175, 2021.

106. R. Meet, D. Kala and A. Al-Adwan, "Exploring factors affecting the adoption of MOOC in Generation Z using extended UTAUT2 model", Education and Information Technologies, vol. 27, no. 7, pp. 10261-10283, 2022.

107. A. Al-Adwan, "Revealing the Influential Factors Driving Social Commerce Adoption", Interdisciplinary Journal of Information, Knowledge, and Management, vol. 14, pp. 295-324, 2019. Available: 10.28945/4438

108. A.S. Al-Adwan and N. Khdour, "Exploring Student Readiness to MOOCs in Jordan: A Structural Equation Modelling Approach", vol.19, pp. 223-242.

109. A. Al-Adwan, N. Albelbisi, S. Aladwan, O. Horani, A. Al-Madadha and M. Al Khasawneh, "Investigating the Impact of Social Media Use on Student's Perception of Academic Performance in Higher Education: Evidence from Jordan", Journal of Information Technology Education: Research, vol. 19, pp. 953-975, 2020.

110. Shareef, S. S., Rajeshkumar, S., & Rauf, H. L. (2022). A Numerical Study on Forced Vibration Analysis and Optimum Design of Rotating Composite Multiwalled Carbon Nanotubes-Reinforced Smart Sandwich Plate. International Journal of Structural Stability Dynamics, 22(01), 2250009.

111. Shareef, S. S., & Rauf, H. L. (2021). The Influence of Building Structure on Human Perception in Interior Spaces. Journal of Studies in Science Engineering.

112. Shareef, S. S., & Sani, R. M. (2021). The symbolic usage of stone beyond its function as a construction material: Example of residential architecture in Iraqi Kurdistan. Semiotica, 2021(238), 37-59.

113. Chakrabarti P., Bhuyan B., Chaudhuri A. and Bhunia C.T., "A novel approach towards realizing optimum data transfer and Automatic Variable Key(AVK)" , International Journal of Computer Science and Network Security, 8(5), pp.241-250, 2008.

114. Chakrabarti P. , Goswami P.S., "Approach towards realizing resource mining and secured information transfer", International Journal of Computer Science and Network Security, 8(7), pp.345-350, 2008.

115. Chakrabarti P., Choudhury A., Naik N. , Bhunia C.T., "Key generation in the light of mining and fuzzy rule", International Journal of Computer Science and Network Security, 8(9), pp.332-337, 2008.

116. Chakrabarti P., De S.K., Sikdar S.C., "Statistical Quantification of Gain Analysis in Strategic Management" , International Journal of Computer Science and Network Security,9(11), pp.315-318, 2009.

117. Chakrabarti P. , Basu J.K. , Kim T.H., "Business Planning in the light of Neuro-fuzzy and Predictive Forecasting", Communications in Computer and Information Science , 123, pp.283-290, 2010.

118. Prasad A. , Chakrabarti P., "Extending Access Management to maintain audit logs in cloud computing", International Journal of Advanced Computer Science and Applications ,5(3),pp.144-147, 2014.

119. Sharma A.K., Panwar A., Chakrabarti P. ,Viswakarma S., "Categorization of ICMR Using Feature Extraction Strategy and MIR with Ensemble Learning", Procedia Computer Science, 57,pp.686-694,2015.

120. Patidar H. , Chakrabarti P., "A Novel Edge Cover based Graph Coloring Algorithm", International Journal of Advanced Computer Science and Applications , 8(5),pp.279-286,2017.

121. Patidar H., Chakrabarti P., Ghosh A., "Parallel Computing Aspects in Improved Edge Cover based Graph Coloring Algorithm", Indian Journal of Science and Technology ,10(25),pp.1-9,2017.

122. M. Farooq, "Supervised Learning Techniques for Intrusion Detection System based on Multi-layer Classification Approach," International Journal of Advanced Computer Science and Applications, vol. 13, no. 3, 2022.

123. M. Farooq and M. Hassan, "IOT smart homes security challenges and solution," International Journal of Security and Networks, vol. 16, no. 4, p. 235, 2021.

124. M. Farooq and M. Hassan, "Pattern recognition in digital images using fractals," International Journal of Engineering and Advanced Technology, vol. 9, no. 2, p. 3180 – 3183, 2019.

125. M. Farooq, "Optimizing pattern recognition scheme using genetic algorithms in computer image processing". International Journal of Advanced Research in Computer Engineering & Technology. vol. 4, no. 3, p. 834 – 836, 2015.

126. M. Farooq, "Application of Genetic Algorithm & Morphological Operations for Image Segmentation". International Journal of Advanced Research in Computer and Communication Engineering. vol.4, no.3, p. 195-199, 2015.

127. M. Farooq, "Split/Merge and Chromosome Encoding Model of Genetic Algorithm For Image Segmentation & Optimization". International Journal of Advanced Research in Computer Science, vol. 6, p. 87-91, 2015.

128. M. Farooq, "Color Edge Detection Based on the Fusion of Intensity and Chromatic Differences". International Journal of Recent Technology and Engineering (IJRTE). vol. 8, no. 6, p. 1038–1041, 2020.

129. M. Farooq, "Enhancement and Segmentation of Digital Image using Genetic Algorithm". International Journal of Research in Electronics and Computer Engineering. vol.7, no. 2, p. 2619–2623, 2019.

130. M. Farooq, "Genetic algorithm technique in hybrid intelligent systems for pattern recognition". International Journal of Innovative Research in Science, Engineering and Technology. vol. 4, no. 4, p.1891-1898, 2015.

131. M. Farooq, "Application of Genetic Programming for Pattern Recognition". International Journal of Advanced Research in Computer and Communication Engineering. vol. 4, no. 4, p. 14-17, 2015.

132. Srinath Venkatesan, "Design an Intrusion Detection System based on Feature Selection Using ML Algorithms", MSEA, vol. 72, no. 1, pp. 702–710, Feb. 2023

133. Srinath Venkatesan, "Identification Protocol Heterogeneous Systems in Cloud Computing", MSEA, vol. 72, no. 1, pp. 615–621, Feb. 2023.

134. Cristian Laverde Albarracín, Srinath Venkatesan, Arnaldo Yana Torres, Patricio Yánez-Moretta, Juan Carlos Juarez Vargas, "Exploration on Cloud Computing Techniques and Its Energy Concern", MSEA, vol. 72, no. 1, pp. 749–758, Feb. 2023.

135. Srinath Venkatesan, "Perspectives and Challenges of Artificial Intelligence Techniques in Commercial Social Networks"Volume 21, No 5 (2023).

136. Srinath Venkatesan, Zubaida Rehman, "The Power Of 5g Networks and Emerging Technology and Innovation: Overcoming Ongoing Century Challenges" Ion exchange and adsorption, Volume 23, Issue 1, 2023.

137. Srinath Venkatesan, "Challenges of Datafication: Theoretical, Training, And Communication Aspects of Artificial Intelligence" Ion exchange and adsorption. Volume 23, Issue 1, 2023.

138. Giovanny Haro-Sosa , Srinath Venkatesan, "Personified Health Care Transitions With Automated Doctor Appointment System: Logistics", Journal of Pharmaceutical Negative Results, pp. 2832–2839, Feb. 2023

139. Srinath Venkatesan, Sandeep Bhatnagar, José Luis Tinajero León, "A Recommender System Based on Matrix Factorization Techniques Using Collaborative Filtering Algorithm", neuroquantology, vol. 21, no. 5, pp. 864-872, march 2023.

140. Srinath Venkatesan, "Utilization of Media Skills and Technology Use Among Students and Educators in The State of New York", Neuroquantology, Vol. 21, No 5, pp. 111-124, (2023).

141. Srinath Venkatesan, Sandeep Bhatnagar, Iván Mesias Hidalgo Cajo, Xavier Leopoldo Gracia Cervantes, "Efficient Public Key Cryptosystem for wireless Network", Neuroquantology, Vol. 21(5), pp. 600-606, (2023).

142. V. S. R. Kosuru and A. K. Venkitaraman, "Developing a Deep Q-Learning and Neural Network Framework for Trajectory Planning", EJENG, vol. 7, no. 6, pp. 148–157, Dec. 2022.

143. K. Venkitaraman and V. S. R. Kosuru, "Hybrid Deep Learning Mechanism for Charging Control and Management of Electric Vehicles", EJECE, vol. 7, no. 1, pp. 38–46, Jan. 2023.

144. Khan, S. (2021). Visual Data Analysis and Simulation Prediction for COVID-19 in Saudi Arabia Using SEIR Prediction Model. International Journal of Online Biomedical Engineering, 17(8).

145. Khan, S., & Alghulaiakh, H. (2020). ARIMA Model for Accurate Time Series Stocks Forecasting. International Journal of Advanced Computer Science Applications, 11(7), 524-528.

146. Khan, S., & Alqahtani, S. (2020). Big data application and its impact on education. International Journal of Emerging Technologies in Learning, 15(17), 36-46.

147. Khan, S., Fazil, M., Sejwal, V. K., Alshara, M. A., Alotaibi, R. M., Kamal, A., & Baig, A. R. (2022). BiCHAT: BiLSTM with deep CNN and hierarchical attention for hate speech detection. Journal of King Saud University-Computer Information Sciences, 34(7), 4335-4344.

148. Khan, S., Saravanan, V., Lakshmi, T. J., Deb, N., & Othman, N. A. (2022). Privacy Protection of Healthcare Data over Social Networks Using Machine Learning Algorithms. Computational Intelligence and Neuroscience, 2022, 8 pages.

149. Khan, S., & AlSuwaidan, L. (2022). Agricultural monitoring system in video surveillance object detection using feature extraction and classification by deep learning techniques. Computers and Electrical Engineering, 102, 108201.

150. Khan, S. (2022). Business Intelligence Aspect for Emotions and Sentiments Analysis. Paper presented at the 2022 First International Conference on Electrical, Electronics, Information and Communication Technologies.

151. Khan, S. A., Reemiah Muneer. (2023). A Novel Thresholding for Prediction Analytics with Machine Learning Techniques. International Journal Of Computer Science And Network Security, 23(1), 33.

152. Khan, S., & AlAjmi, M. F. (2019). A Review on Security Concerns in Cloud Computing and their Solutions. International Journal of Computer Science Network Security, 19(2), 10.

153. Alfaifi, A. A., & Khan, S. G. (2022). Utilizing Data from Twitter to Explore the UX of "Madrasati" as a Saudi e-Learning Platform Compelled by the Pandemic. Arab Gulf Journal of Scientific Research, 39(3), 200-208.

154. Aryal, A., Stricklin, I., Behzadirad, M., Branch, D. W., Siddiqui, A., & Busani, T. (2022). High-Quality Dry Etching of LiNbO3 Assisted by Proton Substitution through H2-Plasma Surface Treatment. Nanomaterials, 12(16), 2836.

155. Paldi, Robynne L., Arjun Aryal, Mahmoud Behzadirad, Tito Busani, Aleem Siddiqui, and Haiyan Wang. "Nanocomposite-seeded Single-Domain Growth of Lithium Niobate Thin Films for Photonic Applications." In 2021 Conference on Lasers and Electro-Optics (CLEO), pp. 1-2. IEEE, 2021.

156. Shifat, A. Z., Stricklin, I., Chityala, R. K., Aryal, A., Esteves, G., Siddiqui, A., & Busani, T. (2023). Vertical Etching of Scandium Aluminum Nitride Thin Films Using TMAH Solution. Nanomaterials, 13(2), 274.

157. A. Ghosh, P. Chakrabarti, P. Siano, "Approach towards realizing the Security Threats for Mobile IPv6 and Solution Thereof", International Journal of Computer Applications, Foundation of Computer Science, Vol. 90, Issue 10, Jan. 2014.

158. A. Ghosh, P. Chakrabarti, D. Bhatnagar, "Performance Evaluation of Optimized Mobile IP Protocol Vis-à-vis Bit Map Indexing Method", International Journal of Computer Applications, Foundation of Computer Science, Vol. 75, Issue: 2, Jan. 2013.

159. Papiya Debnath, Pankaj Chittora, Tulika Chakrabarti, Prasun Chakrabarti, Zbigniew Leonowicz, Michal Jasinski , Radomir Gono, Elżbieta Jasińska, "Analysis of earthquake prediction in India using supervised machine learning classifiers", Sustainibility ,13(2):971 , 2021.

160. 21. Pankaj Chittora, Sandeep Chaurasia, Prasun Chakrabarti, Gaurav Kumawat, Tulika Chakrabarti, Zbigniew Leonowiz, Michael Jaisinski, Lukasz Jaisinski, Radomir Gono, Elzbieta Jaisinski, Vadim Bolshev, "Prediction of Chronic Kidney Disease - A Machine Learning perspective", IEEE Access,9 : 17312-17334,2021

161. Akhilesh Kumar Sharma, Gaurav Aggarwal, Sachit Bhardwaj, Prasun Chakrabarti, Tulika Chakrabarti, Jemal Hussain, Siddhartha Bhattarcharyya, Richa Mishra, Anirban Das, Hairulnizam Mahdin, "Classification of Indian Classical Music with Time-Series Matching using Deep Learning", IEEE Access , 9 : 102041-102052 , 2021.

162. Abrar Ahmed Chhipa , Vinod Kumar, R. R. Joshi, Prasun Chakrabarti, Michal Jaisinski, Alessandro Burgio, Zbigniew Leonowicz, Elzbieta Jasinska, Rajkumar Soni, Tulika Chakrabarti, "Adaptive Neuro-fuzzy Inference System Based Maximum Power Tracking Controller for Variable Speed WECS", Energies ,14(19) :6275, 2021.

163. Tulika Chakrabarti, Sibabrata Mukhopadhyay, Prasun Chakrabarti, Gholamreza Hatam, Mohammad Nami, "Phenyl Ethanoid Glycoside from the bark of Oroxylum indicum vent : a potential inhibitor of DNA Topoisomerase IB of Leismania donovani", Journal of Advanced Medical Sciences and Applied Technologies , 2021.

164. Sreemoy Kanti Das, GS Chakraborthy, Tulika Chakrabarti, Prasun Chakrabarti, Mohammad Javad Gholamzadeh, Mohammad Nami, "Evaluation of nootropic activity of standardized Epipremnum aureum extract against scopolamine-induced amnesia in experimental animals", Journal of Advanced Medical Sciences and Applied Technologies, 6(1): 64-71,2021

165. A, V. V. ., T, S. ., S, S. N. ., & Rajest, D. S. S. . (2022). IoT-Based Automated Oxygen Pumping System for Acute Asthma Patients. European Journal of Life Safety and Stability (2660-9630), 19 (7), 8-34.

166. Regin, D. R., Rajest, D. S. S., T, S., G, J. A. C., & R, S. (2022). An Automated Conversation System Using Natural Language Processing (NLP) Chatbot in Python. Central Asian Journal Of Medical And Natural Sciences, 3(4), 314-336.

167. Rajest, S. S. ., Regin, R. ., T, S. ., G, J. A. C. ., & R, S. . (2022). Production of Blockchains as Well as their Implementation. Vital Annex : International Journal of Novel Research in Advanced Sciences, 1(2), 21–44.

168. T, S., Rajest, S. S., Regin, R., Christabel G, J. A., & R, S. (2022). Automation And Control Of Industrial Operations Using Android Mobile Devices Based On The Internet Of Things. Central Asian Journal of Mathematical Theory and Computer Sciences, 3(9), 1-33.

169. Jerusha Angelene Christabel G, Shynu T, S. Suman Rajest, R. Regin, & Steffi. R. (2022). The use of Internet of Things (Iot) Technology in the Context of "Smart Gardens" is Becoming Increasingly Popular. International Journal of Biological Engineering and Agriculture, 1(2), 1–13.

170. R. Steffi, G. Jerusha Angelene Christabel, T. Shynu, S. Suman Rajest, R. Regin (2022), " A Method for the Administration of the Work Performed by Employees", Journal of Advanced Research in Dynamical and Control Systems, Vol.14, no.1, pp. 7-23.

171. R. Regin, Steffi. R, Jerusha Angelene Christabel G, Shynu T, S. Suman Rajest (2022), "Internet of Things (IoT) System Using Interrelated Computing Devices in Billing System", Journal of Advanced Research in Dynamical and Control Systems, Vol.14, no.1, pp. 24-40.

172. S. S. Rajest, R. Regin, S. T, J. A. C. G, and S. R, "Improving Infrastructure and Transportation Systems Using Internet of Things Based Smart City", CAJOTAS, vol. 3, no. 9, pp. 125-141, Sep. 2022.

173. Regin, R., Rajest , S. S., T , S., G, J. A. C., & R , S. (2022). An Organization's Strategy that is Backed by the Values and Visions of its Employees' Families. Central Asian Journal of Innovations on Tourism Management and Finance, 3(9), 81-96.

174. Regin, R., Rajest, S. S., T, S., Christabel G, J. A. and R, S. (2022) "The Influence that the Advertising of Pharmaceuticals has on the Economy", Central Asian Journal Of Social Sciences And History, 3(10), pp. 1-18.

175. Regin, R., Rajest, S. S., T, S., G, J. A. C., & R, S. (2022). Pharmaceutical Supply Chain Challenges and Inventory Management. Central Asian Journal of Innovations on Tourism Management and Finance, 3(10), 143-159.

176. R, S., Regin, R., Rajest, S. S., T, S. and G, J. A. C. (2022) "Rail Project's Needed Project Management Approaches, Strategies, Methodologies, and Processes", International Journal on Economics, Finance and Sustainable Development, 4(10), pp. 109-126.

177. Priscila, S. S., Rajest, S. S., T, S. and G, G. (2022) "An Improvised Virtual Queue Algorithm to Manipulate the Congestion in High-Speed Network", Central Asian Journal of Medical and Natural Science, 3(6), pp. 343-360.

178. Regin, R., Rajest, S. S., T, S., & R, S. (2023). An Analytical Study of Development in Response to the COVID-19 Pandemic. Central Asian Journal of Medical and Natural Science, 4(1), 199-216. https://doi.org/10.17605/OSF.IO/423PJ

179. Regin, R., Rajest, S. S., T, S., & R, S. (2023). A Review of Secure Neural Networks and Big Data Mining Applications in Financial Risk Assessment. Central Asian Journal of Innovations on Tourism Management and Finance, 4(2), 73-90.

180. Prasun Chakrabarti , Tulika Chakrabarti , Mayank Sharma. , D Atre D, K.Baba Pai, "Quantification of Thought Analysis of Alcohol-addicted persons and memory loss of patients suffering from stage-4 liver cancer", Advances in Intelligent Systems and Computing, 1053, pp.1099-1105, 2020

181. Prasun Chakrabarti, Tulika Chakrabarti , Biswajit Satpathy, I SenGupta , Jonathan Andrew Ware, "Analysis of strategic market management in the light of stochastic processes, recurrence relation, Abelian group and expectation", Advances in Artificial Intelligence and Data Engineering, 1133 , pp.701-710, 2020

182. Prasun Chakrabarti, Siddhant Bane, Biswajit Satpathy , Mark Goh , B N Datta , Tulika Chakrabarti, "Compound Poisson Process and its Applications in Business", Lecture Notes in Electrical Engineering, 601, pp.678-685,2020

183. Roja Boina, "Assessing the Increasing Rate of Parkinson's Disease in the US and its Prevention Techniques", International Journal of Biotechnology Research and Development, 3(1), pp. 1-18, 2022.

184. S. Pandya, T. R. Gadekallu, P. K. Reddy, W. Wang and M. Alazab, "InfusedHeart: A Novel Knowledge-Infused Learning Framework for Diagnosis of Cardiovascular Events," in IEEE Transactions on Computational Social Systems, doi: 10.1109/TCSS.2022.3151643.