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Accurately Predicting Monument Failure via Deep Asymmetry Allocation

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Abstract: When the number of instances falls unevenly into the several recognised categories, we say that we have an imbalanced classification problem. There can be a small bias in the distribution or a huge imbalance with hundreds, thousands, or even millions of examples in the majority class or classes, with just one example in the minority class. Because most machine learning algorithms for classification were built around the assumption of an equal number of samples for each class, imbalanced classifications present a difficulty for predictive modelling. For the minority group in particular, this causes models to underperform in terms of prediction. The issue becomes more acute when classification mistakes affect the minority class as compared to the majority class due to the fact that the minority class is usually more significant. We presented a model that updates itself with fresh data on pipeline failures, deals with imbalanced data, and predicts when faults will occur and how to fix them. While fixing a problem in the industry doesn't take much work, identifying it is a pain. The oil and gas production industries will see a decrease in both cost and efficiency as a result of this.

Keywords: *Deep Monument Asymmetry, Breakdown Prediction, Gas Production Industries, Poor Predictive Performance, Imbalanced Classification.*

Introduction

The oil and gas business relies on pipelines, which carry everyday items worth millions of dollars. Pipelines are the most secure means of transporting petroleum products, but when they break, it can cause a huge economic loss. Pipelines can burst for a variety of reasons, including mechanical and operational faults, corrosion, interference from outside parties, and natural disasters, as reported by CONCAWE, a European oil company association that studies EHS issues. For the purpose of studying the effects of the oil industry on the environment, the CONCAWE group was founded in 1963.

Magnetic flux leakage and ultrasonic testing are two of the new inspection methods that have emerged in the last 20 years for finding pipeline anomalies and faults without halting operations. A lot of effort and money will have to be spent on these methods, but they work. The significant financial and time investments required by these methods have prompted scientists to create condition assessment models specifically for oil pipelines in order to forestall the aforementioned dangers. A new model will be built and the datasets will be loaded into it using machine learning. After that, we will provide the precise answer by training the model. But datasets have issues owing to uneven classification.

When the amount of examples in the training dataset for each class label is unequal, it is known as imbalanced classification, and it is an issue with classification predictive modelling [6]. The oil and gas industry is becoming more competitive, but machine learning can help it stay ahead of the curve. The technology can maximise extraction and deliver accurate models, and it can also assist streamline the labour. In order to address complicated problems using this technique, more model training is required. In practical settings, an imbalanced data set would consist of a majority class consisting of typical occurrences and a minority class consisting of exceptional or crucial ones. In order to improve machines, the synthetic minority over-sampling method is tailored to learn from unbalanced data sets [7-12].

The overarching goal of this project is to develop a model capable of handling imbalanced data, making predictions about when faults will occur and how to fix them, and updating the model with new data on pipeline failures. While fixing a problem in the industry doesn't take much work, identifying it is a pain. The oil and gas production industries will see a decrease in both cost and efficiency as a result of this [13-21]. In the future, we want to analyse data from sensors in the oil and gas sector to better monitor all machinery types, and we want to apply machine learning techniques for predictive maintenance to make pipelines and other equipment last longer [22-26].

Literature Survey

The need to improve our understanding of how to discover and analyse knowledge from raw data in order to support decision-making is growing as the amount of data available in many large-scale, complex, and networked systems, including security, surveillance, the internet, and financial markets, continues to grow. Existing knowledge discovery and data engineering strategies have been highly effective in numerous real-world applications. However, there is a growing interest from both academia and industry about the relatively new difficulty of learning from imbalanced data [27-33]. The performance of learning algorithms when faced with underrepresented data and significant class distribution skews is the focus of the imbalanced learning problem. Learning from imbalanced data sets necessitates novel insights, concepts, algorithms, and tools for effectively representing information and knowledge from massive volumes of raw data, all of which are intrinsic and complicated features of such data sets. The current state of research on learning from unbalanced data is thoroughly reviewed in this publication. In order to evaluate learning performance under the imbalanced learning scenario, we will first conduct a critical analysis of the problem's nature, present assessment criteria, and state-of-the-art technology. Additionally, in order to encourage more studies in this area, we draw attention to the key problems, opportunities, and possible future paths for learning from unbalanced data [1].

Class distributions in the vision domain are generally very skewed, meaning that the vast majority of data points fall into just a handful of categories. The minority classes, on the other hand, have a very small number of examples. Modern deep convolutional neural network (CNN) classification approaches often use time-tested techniques like class re-sampling and cost-sensitive training to get around this problem. In order to prove that these traditional methods work for representation learning with class-imbalanced data, we do comprehensive and methodical experiments in this article [34-45]. Our research goes a step further by showing that by training a deep network to preserve inter-cluster and inter-class margins, we can achieve more discriminative deep representation. The class imbalance that exists in the immediate data neighbourhood is significantly reduced by this stricter constraint. We prove that the margins, together with the related triple-header hinge loss and quintuplet instance sampling, may be readily implemented in a conventional deep-learning system. Our approach outperforms state-of-the-art methods on both low- and high-level vision classification tasks with imbalanced class distribution when trained with a basic k-nearest neighbour (kNN) algorithm [2].

Learning DEep Landmarks in latent space is a deep unbalanced learning framework that we present (DELTA). The shallow imbalanced learning methods that correct imbalanced samples before using them to train a discriminative classifier served as an inspiration for our study. Our DELTA improves upon previous efforts by presenting the novel idea of rebalancing samples in a latent space that has been severely altered, where the latent points display several desirable characteristics, such as compactness and separability. Typically, DELTA employs a combined, end-to-end architecture to carry out feature learning, sample rebalancing, and discriminative learning all at once. Latent point oversampling and ensemble learning are two further advanced learning ideas that can be easily implemented with the system. On top of that, DELTA provides the opportunity to use a structured feature extractor to perform unbalanced learning [46-51]. We confirm that DELTA works on more difficult real-world tasks, such as click-through rate (CTR) prediction, sequential input sentiment analysis, and multi-class cell type classification, in addition to several benchmark data sets [3].

During their operational phases, oil and gas pipelines failed multiple times, resulting in financial and environmental losses. A survey of the relevant literature reveals a dearth of research on the topic of evaluating oil and gas pipeline failures. In addition, before pipeline breakdown occurs, operators require a prediction tool to assess the likelihood of failure and prioritise inspections and repairs. This study presents new research that offers a new way to predict the likelihood of oil and gas pipeline breakdown. The investigation has focused on failures that vary over time, and the authors used a non-linear regression method to estimate when the pipelines will break. By looking at past data on oil and gas pipeline failures, we can determine which four pipeline characteristics are most relevant to determining when a pipeline fails [52-61]. A few examples of these parameters are the minimum yield strength, the operating pressure of the pipeline, the external pipe diameter, and the thickness of the pipe walls. In order to determine the optimal combination of main variables with the squared root and second terms, stepwise regression analysis is employed. The model's acceptance is proven by validation. The next stage involves applying Monte Carlo simulation to the regression model in order to account for the uncertainty surrounding the operating pressure of the pipelines. The results show that the model become more accurate over time, particularly during the pipelines' early and middle ages [4].

If something goes wrong with the current setup, a trained expert will fix it. Finding the source, determining the procedures, and allocating human resources whenever a rare pipeline issue occurs is a difficult and time-consuming process. Machine learning can enhance the efficiency of problem-solving approaches by predicting the cause of failure. An unbalanced dataset is another issue that develops during model training. The classification challenge known as imbalanced classification arises when the training dataset contains classes that are not evenly distributed. Although there is some variation in the degree of class imbalance, more extreme cases are more difficult to predict and may call for specialist methods. The method of example collection or sampling from the problem domain may have contributed to the unequal distribution of examples among the classes. Errors and biases established during data gathering could be involved here [5]. In the oil and gas industry, one of the most striking effects of machine learning is the revolution it has brought about in the discovery process. Machine learning-based applications in the oil and gas industry allow computers to efficiently and precisely evaluate massive data sets. Modern software applications may generate accurate geological models after this information has been obtained and examined. To automate the tracking of all processes, engineers in the oil and gas industry have turned to machine learning [62-71]. Engineers in the oil and gas industry have been able to better pinpoint the nature of damage and implement effective repairs thanks to this application of machine learning. Specifically, case-based reasoning is a domain where machine learning algorithms excel (CBR). Because of this, the algorithms can swiftly search through enormous problem datasets. Afterwards, the algorithms can detect instances that are comparable [72-80]. When a comparable situation is found, the programme will remember the steps used to fix the problem. This algorithm allows other professionals to solve the issue with a note and solving videos when experienced operators are unavailable or in a difficult scenario (Figure 1).

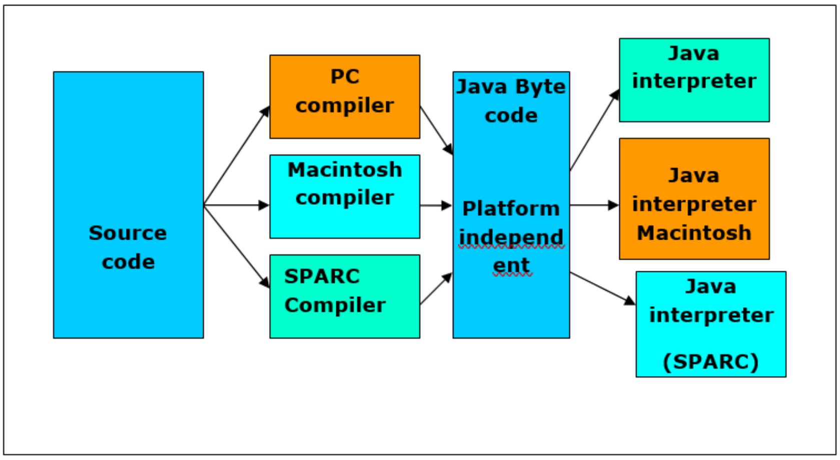

Figure 1: Compiling and Interpreting JAVA Source code

The byte code file is tricked into thinking it runs on a Java Virtual Machine during run-time by the Java interpreter. The truth is that any computer with an internet connection could send code to this machine, and it could run the Applets [81-85]. The machine could be an Intel Pentium with Windows 95, a Sun SPARC station with Solaris, or even an Apple Macintosh. Because it handles location automatically, Java almost does away with memory management issues. Any and all run-time faults should be handled by your application in a well-written Java programme. One kind of server extension is the Servlet. To enhance a server's capabilities, Java classes can be dynamically loaded. As an alternative to CGI scripts, servlets are widely utilised with web servers [86-91].

Servlets are secure and portable server extensions that are comparable to proprietary ones, except they run inside the server's Java Virtual Machine (JVM). The server itself is the only environment in which servlets may function. All servlets are handled by distinct threads within the web server process, in contrast to CGI and Fast CGI, which employ numerous processes to manage individual applications or requests. All servlets are scalable and efficient because of this. Because of their portability, servlets can be used on any web server and on any operating system. The ideal platform for developing web applications is Java Servlets. Servlets can replace CGI scripts on web servers and increase the capabilities of any server, including mail servers. For example, servlets can scan all uploaded documents for viruses or handle mail filtering chores [92-101].

Servlets are a Java-based alternative to the existing state of affairs in server-side programming that aims to solve issues including incomplete interfaces, platform-specific APIs, and scripting solutions that are not extendable. In order to be integrated into a server running Java, servlets must adhere to a particular standard. Similar to applets on the server side, servlets allow for the dynamic loading of object byte codes from the internet on the client side. They are distinct from applets in that they lack a human element (without graphics or a GUI component). They allow for the dynamic extension of server-side functionality and are platform-independent, pluggable helper byte code objects.

User Authorization

One approach to session tracking is to make use of the data provided by the User permission. This occurs when a web server requires a user to enter a login and password before granting access to certain resources. The getRemoteUser method makes the user's login information accessible to servlets once the client has logged in (). Whenever the session is being monitored by means of the login. As the user navigates to different pages on the site, the browser remembers her username and password and re-sends them. Using the user's username, a servlet can identify her and keep tabs on her session [102-109]. The simplicity of implementation is the main benefit of utilising user authorization for session tracking. Instruct them to secure a range of pages, and then identify each client using getRemoteUser(). Furthermore, the method remains effective regardless of whether the user navigates away from your site or returns after leaving it. User authorization's main drawback is that it necessitates account registration and subsequent login processes for every user visit to your site. While most users will put up with the inconvenience of having to register and log in in order to access sensitive information, this is excessive for something as simple as session tracking. An additional issue with user permission is that users are not allowed to have numerous sessions at the same site at the same time [110].

Hidden Form Fields

To facilitate anonymous session monitoring, concealed from the fields is one option. These are, as the name suggests, hidden fields in an HTML form that, upon submission, are sent back to the server rather than seen to the client's browser. A form's hidden form fields can be thought of as defining its constant variables. Because more data is connected with a client's session, a servlet that receives a submitted form does not differentiate between visible and hidden fields. Passing it all using hidden form fields can become a nuisance. It is possible to simply send on a unique session ID in these cases so that each client session can be identified. All of the session data kept on the server can be linked to the session ID [111-115].

The widespread availability and anonymity they provide are two benefits of hidden form fields. You can utilise hidden fields with customers who haven't logged in or registered, and they are compatible with all popular browsers. However, there are some specific server requirements that must be met. The main drawback of this method is that it is ineffective with static documents, emails, bookmarks, and browser shutdowns; it only works with a series of forms that are dynamically generated. In the petroleum business, pipelines play a crucial role. Pipelines can be categorised according to the products they carry: crude oil, natural gas, and finished goods. Steel pipes with diameters between 8 and 47 inches make up the vast majority of pipelines. Alternatively, distributive pipes typically use plastic and have extremely modest six-inch diameters, if any at all [116-122]. Main oil pipelines are the focus of this study. These pipes can operate at varying pressures and are constructed of steel grades ranging from B to X90 (10 to 220 bar)

Factors Contributing to Oil and Gas Pipeline Failure

The elements that influence pipeline failure are multifaceted and interdependent; thus, it is important to include all of these aspects when calculating the relative importance of each in causing pipeline degradation. Any model for risk-based inspections or predictions rests on these criteria (Figure 2).

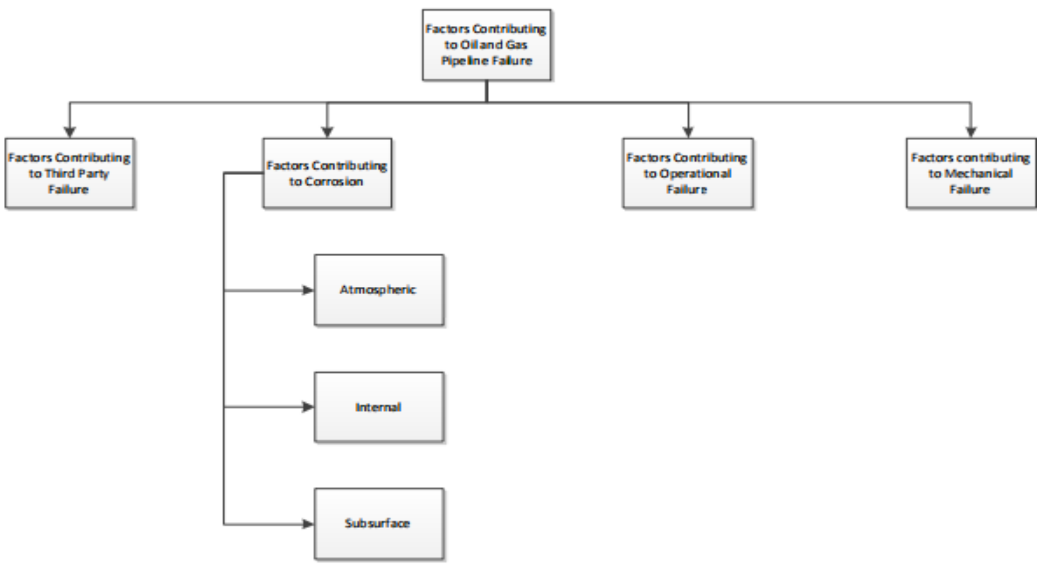

Figure 2: Types of Factors Contributing to Pipeline Failure

The extraction and transportation of oil and gas in the oil and gas sector is facilitated by a network of pipes that connect various points within the industry. Pipelines develop problems when they undergo specific types of deterioration. Here, we train our model using the failure dataset by loading it into the system. The training algorithm will go to work after the dataset has been loaded, which takes some time because of the vast amount of data involved. Various kinds of failures were extracted and preprocessed from the loaded datasets. The next step was to determine the overall failure count and categorise them accordingly [123-131]. The oversampling approach is utilised in this case due of the dataset's numerous skewed calculations.

Oversampling using SMOTE:

The Synthetic Minority Oversampling Technique, or SMOTE, involves creating new elements for a minority class in close proximity to preexisting ones. After restoring the imbalanced dataset type to an appropriate count, it will proceed to provide the necessary information for training the model. The module training dataset will be used to train our learning system. In order to guarantee the data's integrity, the loaded dataset will first undergo preprocessing. Next, oversampling is implemented. The last step is to train the dataset to anticipate the failure. Here, the algorithm will figure out what kind of oil and gas pipeline malfunction it is likely to encounter. As soon as a problem arises, the operator of that section will look for a way to fix it. In order to retrieve the mistake, the operator can communicate with the model. We will give you with the solution [132-135].

In the extremely unlikely event if a previously unseen failure type materialises in this module, we will examine it, incorporate its characteristics and potential remedies into the model, and train it accordingly. Modifying the training model for different kinds of circumstances is what this subject is all about. Finding mistakes is the point of testing. Finding any and all potential issues with a product is what testing is all about. In doing so, it enables the testing of functioning components, subassemblies, assemblies, and final goods. The goal of software testing is to prevent software systems from failing in an unacceptable way and to guarantee that they work as intended. Different kinds of examinations are available. There is a distinct need for each test type.

One way to look about software engineering is as a spiral. Software requirement analysis is the first step after system engineering in defining software's role; it's during this phase that software's information domain, functions, behaviour, performance, restrictions, and validation criteria are defined. Design and, finally, coding are the next steps as we spiral downward. Software development is like a spiral staircase; with each turn, the level of abstraction decreases.

Another way to look at software testing approach is via the lens of the spiral. Starting at the very top of the software development life cycle (SDL), unit testing zeroes in on individual code units. Integration testing, the next rung on the testing hierarchy, places emphasis on the design and construction of the software architecture and marks the end of the testing process spiral. As we continue to spiral outward, we reach validation testing, the process of checking the built software against the criteria defined in software requirements analysis. System testing, which includes testing the software and other parts of the system, is the last step.

To check if two or more pieces of software can function together as one, developers use integration tests. Screen or field basic outcomes are the primary focus of event-driven testing. After unit testing proved that each component was satisfactory on its own, integration tests confirmed that the whole was accurate and consistent. The goal of integration testing is to identify and fix issues that occur when different parts are used together. In accordance with the business and technical requirements, system documentation, and user guides, functional tests systematically prove that the tested functionalities are available. The goals, critical functionalities, or unique test cases are the focal points of functional test planning and execution. Business process flows, data fields, established processes, and subsequent processes should also be thoroughly tested. Prior to the completion of functional testing, further tests are discovered, and the effective value of the current tests is established.

It is the job of system testers to verify that all parts of an integrated software system work as expected. To guarantee known and predictable results, it tests a setup. The configuration-oriented system integration test is a type of system test. The foundation of system testing lies in the documentation and flow of processes, with an emphasis on the integration points and pre-driven process connections.

Conclusion

In accordance with the suggested system, a machine learning model has been developed that accounts for data imbalances through the use of over-sampling, forecasts when faults will occur and how to fix them, and incorporates new data on pipeline failures into its predictions. While fixing a problem in the industry doesn't take much work, identifying it is a pain. The oil and gas production industries will see a decrease in both cost and efficiency as a result of this. In the oil and gas industry, machine learning will not fully supplant human operators. In the future, we want to analyse data from sensors in the oil and gas sector to better monitor all machinery types, and we want to apply machine learning techniques for predictive maintenance to make pipelines and other equipment last longer.

References

1. F. Bao et al., “Probabilistic natural mapping of gene-level tests for genome-wide association studies,” Brief. Bioinform., vol. 19, no. 4, pp. 545–553, 2018.
2. Y. Deng, “Information transduction capacity reduces the uncertainties in annotation-free isoform discovery and quantification,” Nucleic Acids Res, vol. 45, no. 15, 2017.
3. J. Wu, J. He, and Y. Liu, “ImVerde: Vertex-Diminished Random Walk for learning network representation from imbalanced data,” arXiv [cs.SI], 2018.
4. Z. Akata, F. Perronnin, Z. Harchaoui, and C. Schmid, “Good practice in large-scale learning for image classification,” IEEE Trans. Pattern Anal. Mach. Intell, vol. 36, no. 3, pp. 507–520, 2014.
5. S. Wang, L. L. Minku, D. Ghezzi, D. Caltabiano, P. Tino, and X. Yao, “Concept drift detection for online class imbalance learning,” in The 2013 International Joint Conference on Neural Networks (IJCNN), 2013.
6. T. X. Tran, X. P. Nguyen, D. N. Nguyen, D. T. Vu, M. Q. Chau, et al., “Effect of poly-alkylene-glycol quenchant on the distortion, hardness, and microstructure of 65Mn steel,” CMC-Computers Materials & Continua, vol. 67, no. 3, pp. 3249–3264, 2021.

7. D. N. Nguyen, A. T. Hoang, X. D. Pham, M. T. Sai, M. Q. Chau, et al., "Effect Of Sn Component On Properties And Microstructure Cu-Ni-Sn Alloys," Jurnal Teknologi, vol. 80, no. 6, Aug. 2018.
8. M. Q. Chau, A. T. Hoang, T. T. Truong, and X. P. Nguyen, "Endless story about the alarming reality of plastic waste in Vietnam," Energy Sources, Part A: Recovery, Utilization, and Environmental Effects, pp. 1–9, 2020.
9. O. Fabela, S. Patil, S. Chintamani, and B. H. Dennis, "Estimation of effective thermal conductivity of porous media utilizing inverse heat transfer analysis on cylindrical configuration," in Volume 8: Heat Transfer and Thermal Engineering, 2017.
10. S. Patil, S. Chintamani, B. H. Dennis, and R. Kumar, "Real time prediction of internal temperature of heat generating bodies using neural network," Therm. Sci. Eng. Prog., vol. 23, no. 100910, p. 100910, 2021.
11. S. Patil, S. Chintamani, J. Grisham, R. Kumar, and B. H. Dennis, "Inverse determination of temperature distribution in partially cooled heat generating cylinder," in Volume 8B: Heat Transfer and Thermal Engineering, 2015.
12. I. Khalifa, H. Abd Al-glil, and M. M. Abbassy, "Mobile hospitalization," International Journal of Computer Applications, vol. 80, no. 13, pp. 18–23, 2013.
13. I. Khalifa, H. Abd Al-glil, and M. M. Abbassy, "Mobile hospitalization for Kidney Transplantation," International Journal of Computer Applications, vol. 92, no. 6, pp. 25–29, 2014.
14. M. M. Abbassy and A. Abo-Alnadr, "Rule-based emotion AI in Arabic Customer Review," International Journal of Advanced Computer Science and Applications, vol. 10, no. 9, 2019.
15. M. M. Abbassy and W. M. Ead, "Intelligent Greenhouse Management System," 2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS), 2020.
16. M. M. Abbassy, "Opinion mining for Arabic customer feedback using machine learning," Journal of Advanced Research in Dynamical and Control Systems, vol. 12, no. SP3, pp. 209–217, 2020.
17. M. M. Abbassy, "The human brain signal detection of Health Information System IN EDSAC: A novel cipher text attribute based encryption with EDSAC distributed storage access control," Journal of Advanced Research in Dynamical and Control Systems, vol. 12, no. SP7, pp. 858–868, 2020.
18. M. M. and S. Mesbah, "Effective e-government and citizens adoption in Egypt," International Journal of Computer Applications, vol. 133, no. 7, pp. 7–13, 2016.
19. M.M.Abbassy, A.A. Mohamed "Mobile Expert System to Detect Liver Disease Kind", International Journal of Computer Applications, vol. 14, no. 5, pp. 320–324, 2016.
20. R. A. Sadek, D. M. Abd-alazeem, and M. M. Abbassy, "A new energy-efficient multi-hop routing protocol for heterogeneous wireless sensor networks," International Journal of Advanced Computer Science and Applications, vol. 12, no. 11, 2021.
21. S. Derindere Köseoğlu, W. M. Ead, and M. M. Abbassy, "Basics of Financial Data Analytics," Financial Data Analytics, pp. 23–57, 2022.
22. W. Ead and M. Abbassy, "Intelligent Systems of Machine Learning Approaches for developing E-services portals," EAI Endorsed Transactions on Energy Web, p. 167292, 2018.
23. W. M. Ead and M. M. Abbassy, "A general cyber hygiene approach for financial analytical environment," Financial Data Analytics, pp. 369–384, 2022.

24. W. M. Ead and M. M. Abbassy, “IOT based on plant diseases detection and classification,” 2021 7th International Conference on Advanced Computing and Communication Systems (ICACCS), 2021.
25. W. M. Ead, M. M. Abbassy, and E. El-Abd, “A general framework information loss of utility-based anonymization in Data Publishing,” Turkish Journal of Computer and Mathematics Education, vol. 12, no. 5, pp. 1450–1456, 2021.
26. A. M. El-Kady, M. M. Abbassy, H. H. Ali, and M. F. Ali, “Advancing Diabetic Foot Ulcer Detection Based On Resnet And Gan Integration,” Journal of Theoretical and Applied Information Technology, vol. 102, no. 6, pp. 2258–2268, 2024.
27. M. M. Abbassy and W. M. Ead, “Fog computing-based public e-service application in service-oriented architecture,” International Journal of Cloud Computing, vol. 12, no. 2–4, pp. 163–177, 2023.
28. AbdulKader, H., ElAbd, E., & Ead, W. (2016). Protecting Online Social Networks Profiles by Hiding Sensitive Data Attributes. Procedia Computer Science, 82, 20–27.
29. Fattoh, I. E., Kamal Alsheref, F., Ead, W. M., & Youssef, A. M. (2022). Semantic sentiment classification for covid-19 tweets using universal sentence encoder. Computational Intelligence and Neuroscience, 2022, 1–8.
30. Ead, W. M., Abdel-Wahed, W. F., & Abdul-Kader, H. (2013). Adaptive Fuzzy Classification-Rule Algorithm In Detection Malicious Web Sites From Suspicious URLs. Int. Arab. J. E Technol., 3, 1–9.
31. Abdelazim, M. A., Nasr, M. M., & Ead, W. M. (2020). A survey on classification analysis for cancer genomics: Limitations and novel opportunity in the era of cancer classification and Target Therapies. Annals of Tropical Medicine and Public Health, 23(24).
32. Alsheref, F. K., Fattoh, I. E., & M.Ead, W. (2022). Automated prediction of employee attrition using ensemble model based on machine learning algorithms. Computational Intelligence and Neuroscience, 2022, 1–9.
33. Haq, M. A., Ahmed, A., Khan, I., Gyani, J., Mohamed, A., Attia, E.-A., Mangan, P., & Pandi, D. (2022). Analysis of environmental factors using AI and ML methods. Scientific Reports, 12(1), 13267.
34. Haq, M. A., Ghosh, A., Rahaman, G., & Baral, P. (2019). Artificial neural network-based modeling of snow properties using field data and hyperspectral imagery. Natural Resource Modeling, 32(4).
35. Haq, M. A., & Baral, P. (2019). Study of permafrost distribution in Sikkim Himalayas using Sentinel-2 satellite images and logistic regression modelling. Geomorphology, 333, 123–136.
36. Haq, M. A., Alshehri, M., Rahaman, G., Ghosh, A., Baral, P., & Shekhar, C. (2021). Snow and glacial feature identification using Hyperion dataset and machine learning algorithms. Arabian Journal of Geosciences, 14(15).
37. Mangan, P., Pandi, D., Haq, M. A., Sinha, A., Nagarajan, R., Dasani, T., Keshta, I., & Alshehri, M. (2022). Analytic Hierarchy Process Based Land Suitability for Organic Farming in the Arid Region. Sustainability, 14(4542), 1–16.
38. Haq, M. A. (2021). DNNBoT: Deep Neural Network-Based Botnet Detection and Classification. Computers Materials and Continua, 71(1), 1769–1788.
39. Haq, M. A. (2022). CDLSTM: A novel model for climate change forecasting. Computers, Materials and Continua, 71(2), 2363–2381.

40. Haq, M. A. (2021). SMOTEDNN: A Novel Model for Air Pollution Forecasting and AQI Classification. Computers Materials and Continua, 71(1), 1403–1425.
41. Haq, M. A., Azam, M. F., & Vincent, C. (2021). Efficiency of artificial neural networks for glacier ice-thickness estimation: A case study in western Himalaya, India. Journal of Glaciology, 67(264), 671–684.
42. Haq, M. A. (2022). CNN Based Automated Weed Detection System Using UAV Imagery. Computer Systems Science and Engineering, 42(2), 837–849.
43. R. Oak, M. Du, D. Yan, H. Takawale, and I. Amit, "Malware detection on highly imbalanced data through sequence modeling," in Proceedings of the 12th ACM Workshop on Artificial Intelligence and Security - AISec'19, 2019.
44. Haq, M. A., & Khan, M. Y. A. (2022). Crop Water Requirements with Changing Climate in an Arid Region of Saudi Arabia. Sustainability, 14(13554), 1–24.
45. Haq, M. A. (2021). Intellligent sustainable agricultural water practice using multi sensor spatiotemporal evolution. Environmental Technology (United Kingdom).
46. Haq, M. A., Khan, M. A. R., & Alshehri, M. (2022). Insider Threat Detection Based on NLP Word Embedding and Machine Learning. Intelligent Automation and Soft Computing, 33(1), 619–635.
47. Haq, M. A. (2021). Development of PCCNN-Based Network Intrusion Detection System for EDGE Computing. Computers Materials and Continua, 71(1), 1729–1750.
48. Haq, M. A. (2022). Machine Learning-based Classification of Hyperspectral Imagery. International Journal of Computer Science and Network Security, 22(4), 1–10.
49. Haq, M. A., & Ahmed, A. (2022). On Interesting Correlation between Meteorological Parameters and COVID-19 Pandemic in Saudi Arabia. International Journal of Computer Science and Network Security, 22(4), 1–10.
50. Haq, M. A. (2022). Planetscope Nanosatellites Image Classification Using Machine Learning. Computer Systems Science and Engineering, 42(3), 1031–1046.
51. Haq, M. A., Baral, P., Yaragal, S., & Pradhan, B. (2021). Bulk processing of multi-temporal modis data, statistical analyses and machine learning algorithms to understand climate variables in the indian himalayan region. Sensors, 21(21).
52. Srinath Venkatesan, "Design an Intrusion Detection System based on Feature Selection Using ML Algorithms", MSEA, vol. 72, no. 1, pp. 702–710, Feb. 2023
53. Srinath Venkatesan, "Identification Protocol Heterogeneous Systems in Cloud Computing", MSEA, vol. 72, no. 1, pp. 615–621, Feb. 2023.
54. 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.
55. Srinath Venkatesan, "Perspectives and Challenges of Artificial Intelligence Techniques in Commercial Social Networks"Volume 21, No 5 (2023).
56. 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.
57. Srinath Venkatesan, "Challenges of Datafication: Theoretical, Training, And Communication Aspects of Artificial Intelligence" Ion exchange and adsorption. Volume 23, Issue 1, 2023.

58. 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
59. 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.
60. 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).
61. Srinath Venkatesan, Sandeep Bhatnagar, Iván Mesias Hidalgo Cajo, Xavier Leopoldo Gracia Cervantes, "Efficient Public Key Cryptosystem for wireless Network", Neuroquantology, Vol. 21, No 5, pp. 600-606, (2023).
62. T. Khoshtaria, D. Datuashvili and A. Matin, "The impact of brand equity dimensions on university reputation: an empirical study of Georgian higher education," Journal of Marketing for Higher Education, Vol. 30 no 2, pp. 239-255, 2020.
63. T. Khoshtaria, A. Matin, M. Mercan and D. Datuashvili, "The impact of customers' purchasing patterns on their showrooming and webrooming behaviour: an empirical evidence from the Georgian retail sector," International Journal of Electronic Marketing and Retailing, Vol. 12, No. 4, pp. 394-413, 2021.
64. Matin, T. Khoshtaria, M. Marcan, and D Datuashvili, "The roles of hedonistic, utilitarian incentives and government policies affecting customer attitudes and purchase intention towards green products," International Review on Public and Nonprofit Marketing, Vol. 19, pp. 709–735, 2022.
65. Matin, T. Khoshtaria and N Todua, "The Impact of Social Media Influencers on Brand Awareness, Image and Trust in their Sponsored Content: An Empirical Study from Georgian Social Media Users," International Journal of Marketing, Communication and New Media, Vol. 10, No. 18, 2022.
66. Matin, T. Khoshtaria, and G. Tutberidze, "The impact of social media engagement on consumers' trust and purchase intention," International Journal of Technology Marketing, Vol. 14, No. 3, pp.305 – 323
67. Khoshtaria, T., & Matin, A. "Qualitative investigation into consumer motivations and attitudes towards research shopping in the Georgian market". Administration and Management, Vol 48, pp 41-52, 2019.
68. Santoso, L.W., Wilistio, A., Dewi, L.P. (2016), "Mobile Device Application to locate an Interest Point using Google Maps", International Journal of Science and Engineering Applications, Vol. 5 No. 1.
69. Santoso, L.W. Yulia (2014), "Analysis of the Impact of Information Technology Investments – A Survey of Indonesian Universities", ARPN JEAS, Vol. 9 No. 12.
70. Santoso, L.W. (2020) "Adaptive Educational Resources Framework for eLearning using Rule-Based System," The 4th Int. Conf. on Information and Communication Technology for Intelligent Systems (ICTIS), Ahmedabad, India, 15-16 May 2020.
71. Santoso, L.W. (2019) "Cloud Technology: Opportunities for Cybercriminals and Security Challenges," The 12th International Conference on Ubi-Media Computing, Bali Indonesia, 6-9 August 2019.
72. S. S. Banait, S. S. Sane, D. D. Bage and A. R. Ugale, "Reinforcement mSVM: An Efficient Clustering and Classification Approach using reinforcement and supervised Technique,

”International Journal of Intelligent Systems and Applications in Engineering (IJISAE), Vol.35, no.1S, p .78-89. 2022.
73. S. S. Banait, S. S. Sane and S. A. Talekar, “An efficient Clustering Technique for Big Data Mining” , International Journal of Next Generation Computing (IJNGC) , Vol.13, no.3, pp.702-717. 2022.
74. S. A. Talekar , S. S. Banait and M. Patil.. “Improved Q- Reinforcement Learning Based Optimal Channel Selection in CognitiveRadio Networks,” International Journal of Computer Networks & Communications (IJCNC), Vol.15, no.3, pp.1-14, 2023.
75. S. S. Banait and S. S. Sane, “Novel Data Dimensionality Reduction Approach Using Static Threshold, Minimum Projection Error and Minimum Redundancy, “ Asian Journal of Organic & Medicinal Chemistry (AJOMC) , Vol.17, no.2, pp.696-705, 2022.
76. S. S. Banait and S. S. Sane, “Result Analysis for Instance and Feature Selection in Big Data Environment, “International Journal for Research in Engineering Application & Management (IJREAM), Vol.8, no.2, pp.210-215, 2022.
77. G. K. Bhamre and S. S. Banait, “Parallelization of Multipattern Matching on GPU, “International Journal of Electronics, Communication & Soft Computing Science and Engineering, Vol.3, no.3, pp.24-28, 2014.
78. B. Nemade and D. Shah, “An IoT based efficient Air pollution prediction system using DLMNN classifier,” Phys. Chem. Earth (2002), vol. 128, no. 103242, p. 103242, 2022.
79. B. Nemade and D. Shah, “An efficient IoT based prediction system for classification of water using novel adaptive incremental learning framework,” J. King Saud Univ. - Comput. Inf. Sci., vol. 34, no. 8, pp. 5121–5131, 2022.
80. B. Nemade, “Automatic traffic surveillance using video tracking,” Procedia Comput. Sci., vol. 79, pp. 402–409, 2016.
81. N. Kaur and S. D. Tiwari, “Role of particle size distribution and magnetic anisotropy on magnetization of antiferromagnetic nanoparticles,” J. Phys. Chem. Solids, vol. 123, pp. 279–283, 2018.
82. N. Kaur and S. D. Tiwari, “Thermal decomposition of ferritin core,” Appl. Phys. A Mater. Sci. Process., vol. 125, no. 11, 2019.
83. N. Kaur and S. D. Tiwari, “Role of wide particle size distribution on magnetization,” Appl. Phys. A Mater. Sci. Process., vol. 126, no. 5, 2020.
84. N. Kaur and S. D. Tiwari, “Evidence for spin-glass freezing in NiO nanoparticles by critical dynamic scaling,” J. Supercond. Nov. Magn., vol. 34, no. 5, pp. 1545–1549, 2021.
85. N. Kaur and S. D. Tiwari, “Estimation of magnetic anisotropy constant of magnetic nanoparticles,” in DAE Solid State Physics Symposium 2019, 2020.
86. Haq, M. A. (2021). Deep Learning Based Modeling of Groundwater Storage Change. Computers Materials and Continua, 70(3), 4599–4617.
87. Haq, M. A., Jain, K., & Menon, K. P. R. (2014). Modelling of Gangotri glacier thickness and volume using an artificial neural network. International Journal of Remote Sensing, 35(16), 6035–6042.
88. Haq, M. A., Baral, P., Yaragal, S., & Rahaman, G. (2020). Assessment of trends of land surface vegetation distribution, snow cover and temperature over entire Himachal Pradesh using MODIS datasets. Natural Resource Modeling, 33(2).
89. Haq, M. A., Rahaman, G., Baral, P., & Ghosh, A. (2020). Deep Learning Based Supervised Image Classification Using UAV Images for Forest Areas Classification. Journal of the Indian Society of Remote Sensing., 49, 601–606.

90. Baral, P., & Haq, M. A. (2020). Spatial prediction of permafrost occurrence in Sikkim Himalayas using logistic regression, random forests, support vector machines and neural networks. Geomorphology, 371, 107331.
91. Naeem, A. B., Senapati, B., Islam Sudman, M. S., Bashir, K., & Ahmed, A. E. M. (2023). Intelligent road management system for autonomous, non-autonomous, and VIP vehicles. World Electric Veh. J, 14(9).
92. A. M. Soomro et al., “Constructor development: Predicting object communication errors,” in 2023 IEEE International Conference on Emerging Trends in Engineering, Sciences and Technology (ICES&T), 2023.
93. A. M. Soomro et al., “In MANET: An improved hybrid routing approach for disaster management,” in 2023 IEEE International Conference on Emerging Trends in Engineering, Sciences and Technology (ICES&T), 2023.
94. B. Senapati and B. S. Rawal, “Adopting a deep learning split-protocol based predictive maintenance management system for industrial manufacturing operations,” in Lecture Notes in Computer Science, Singapore: Springer Nature Singapore, 2023, pp. 22–39.
95. Biswaranjan Senapati, B., Rawal, B.S. (2023). Adopting a Deep Learning Split-Protocol Based Predictive Maintenance Management System for Industrial Manufacturing Operations. In: Hsu, CH., Xu, M., Cao, H., Baghban, H., Shawkat Ali, A.B.M. (eds) Big Data Intelligence and Computing. DataCom 2022. Lecture Notes in Computer Science, vol 13864. Springer, Singapore.
96. Sabugaa, M., Senapati, B., Kupriyanov, Y., Danilova, Y., Irgasheva, S., Potekhina, E. (2023). Evaluation of the Prognostic Significance and Accuracy of Screening Tests for Alcohol Dependence Based on the Results of Building a Multilayer Perceptron. In: Silhavy, R., Silhavy, P. (eds) Artificial Intelligence Application in Networks and Systems. CSOC 2023. Lecture Notes in Networks and Systems, vol 724. Springer, Cham.
97. Senapati, B., & Rawal, B. S. (2023). Quantum communication with RLP quantum resistant cryptography in industrial manufacturing. Cyber Security and Applications, 100019, 100019.
98. H.A.A. Alsultan and K. H. Awad "Sequence Stratigraphy of the Fatha Formation in Shaqlawa Area, Northern Iraq," Iraqi Journal of Science ,vol. 54, no.2F, p.13-21, 2021.
99. H.A.A. Alsultan , M.L. Hussein, , M.R.A. Al-Owaidi , A.J. Al-Khafaji and M.A. Menshed "Sequence Stratigraphy and Sedimentary Environment of the Shiranish Formation, Duhok region, Northern Iraq", Iraqi Journal of Science, vol.63, no.11, p.4861-4871, 2022.
100. H.A.A. Alsultan , F.H.H. Maziqa and M.R.A. Al-Owaidi "A stratigraphic analysis of the Khasib, Tanuma and Sa’di formations in the Majnoon oil field, southern Iraq," Bulletin of the Geological Society of Malaysia, vol. 73, p.163 – 169, 2022 .
101. I.I. Mohammed, and H. A. A. Alsultan "Facies Analysis and Depositional Environments of the Nahr Umr Formation in Rumaila Oil Field, Southern Iraq," Iraqi Geological Journal, vol.55, no.2A, p.79-92, 2022.
102. I.I. Mohammed, and H. A. A. Alsultan "Stratigraphy Analysis of the Nahr Umr Formation in Zubair oil field, Southern Iraq," Iraqi Journal of Science, vol. 64, no. 6, p. 2899-2912, 2023.
103. Mohd Akbar, Irshad Ahmad, Mohsina Mirza, Manavver Ali, Praveen Barmavatu “Enhanced authentication for de-duplication of big data on cloud storage system using machine learning approach”, Cluster Computing, Springer Publisher , 2023. https://link.springer.com/article/10.1007/s10586-023-04171-y

104. 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.
105. Akhilesh Kumar Sharma, Shamik Tiwari, Gaurav Aggarwal, Nitika Goenka, Anil Kumar, Prasun Chakrabarti, Tulika Chakrabarti, Radomir Gono, Zbigniew Leonowicz, Michal Jasiński , "Dermatologist-Level Classification of Skin Cancer Using Cascaded Ensembling of Convolutional Neural Network and Handcrafted Features Based Deep Neural Network", IEEE Access , 10 : 17920-17932, 2022.
106. 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.
107. 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.
108. 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.
109. 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.
110. B. Senapati, R. Regin, S. S. Rajest, P. Paramasivan, and A. J. Obaid, "Quantum Dot Solar Cells and Their Role in Revolutionizing Electrical Energy Conversion Efficiency," FMDB Transactions on Sustainable Energy Sequence, vol. 1, no. 1, pp. 49–59, 2023.
111. 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.
112. Chakrabarti P. ,Chakrabarti T., Sharma M . , Atre D, Pai K.B., "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.
113. Chakrabarti P., Bane S.,Satpathy B.,Goh M, Datta B N , Chakrabarti T., "Compound Poisson Process and its Applications in Business", Lecture Notes in Electrical Engineering, 601, pp.678-685,2020.
114. Chakrabarti P., Satpathy B., Bane S., Chakrabarti T., Chaudhuri N.S. , Siano P., "Business forecasting in the light of statistical approaches and machine learning classifiers", Communications in Computer and Information Science , 1045, pp.13-21, 2019.
115. J. Angelin Jeba, S. Rubin Bose, R. Regin, M.B. Sudhan, S. Suman Rajest and P. Ramesh Babu "Efficient Real-time Tamil Character Recognition via Deep Vision Architecture," AVE Trends In Intelligent Computing Systems, vol. 1, no. 1, pp. 1 –16, 2024.
116. K. D. Jasper, M.N. Jaishnav, M. F. Chowdhury, R. Badhan and R. Sivakani "Defend and Secure: A Strategic and Implementation Framework for Robust Data Breach Prevention," AVE Trends In Intelligent Computing Systems, vol. 1, no. 1, pp. 17 –31, 2024.
117. Kothi N., Laxkar P. Jain A. , Chakrabarti P., "Ledger based sorting algorithm", Advances in Intelligent Systems and Computing, 989, pp. 37-46, 2020.

118. M. Al-Mokdad, “China and Qatar's Partnership in Future Energies and its Impact on Middle Eastern Geopolitics,” AVE Trends In Intelligent Technoprise Letters, vol. 1, no. 1, pp. 50–59, 2024.
119. M. Usman and A. Ullah, “Blockchain Technology Implementation in Libraries: An Overview of Potential Benefits and Challenges,” AVE Trends In Intelligent Computing Systems, vol. 1, no. 1, pp. 42 –53, 2024.
120. P. Jani, D. Nanban, J. Selvan, N. Richardson, R. Sivakani, and R. Subhashni, “Studying Price Dynamics of Bus Services Using Machine Learning Algorithms,” AVE Trends In Intelligent Computing Systems, vol. 1, no. 1, pp. 54 –65, 2024.
121. P. P. Anand, G. Jayanth, K. S. Rao, P. Deepika, M. Faisal, and M. Mokdad “Utilising Hybrid Machine Learning to Identify Anomalous Multivariate Time-Series in Geotechnical Engineering,” AVE Trends In Intelligent Computing Systems, vol. 1, no. 1, pp. 32-41, 2024.
122. P.P. Anand, U. K. Kanike, P. Paramasivan, S. S. Rajest, R. Regin, S. S. Priscila, “Embracing Industry 5.0: Pioneering Next-Generation Technology for a Flourishing Human Experience and Societal Advancement,” FMDB Transactions on Sustainable Social Sciences Letters, vol. 1, no. 1, pp. 43–55, 2023.
123. P.S. Venkateswaran, S. Singh, P. Paramasivan, S. S. Rajest, M. E. Lourens, R. Regin, “A Study on The Influence of Quality of Service on Customer Satisfaction Towards Hotel Industry,” FMDB Transactions on Sustainable Social Sciences Letters, vol. 1, no. 1, pp. 1–11, 2023.
124. 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.
125. Patidar H. , Chakrabarti P., “A Tree-based Graphs Coloring Algorithm Using Independent Set”, Advances in Intelligent Systems and Computing, 714, pp. 537-546, 2019.
126. 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.
127. 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.
128. R S Gaayathri, S. S. Rajest, V. K. Nomula, R. Regin, “Bud-D: Enabling Bidirectional Communication with ChatGPT by adding Listening and Speaking Capabilities,” FMDB Transactions on Sustainable Computer Letters., vol. 1, no. 1, pp. 49–63, 2023.
129. S. S. Priscila, S.S. Rajest, S. N. Tadiboina, R. Regin and S. András, “Analysis of Machine Learning and Deep Learning Methods for Superstore Sales Prediction,” FMDB Transactions on Sustainable Computer Letters., vol. 1, no. 1, pp. 1–11, 2023.
130. S. Sajini, L. T. Reddi, R. Regin, S. S. Rajest, “A Comparative Analysis of Routing Protocols for Efficient Data Transmission in Vehicular Ad Hoc Networks (VANETs),” FMDB Transactions on Sustainable Computing Systems., vol. 1, no. 1, pp. 1–10, 2023.
131. Shah K., Laxkar P. , Chakrabarti P., “A hypothesis on ideal Artificial Intelligence and associated wrong implications”, Advances in Intelligent Systems and Computing, 989, pp.283-294, 2020.
132. 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.

133. Tiwari M., Chakrabarti P , Chakrabarti T., “Performance analysis and error evaluation towards the liver cancer diagnosis using lazy classifiers for ILPD”, Communications in Computer and Information Science , 837, pp.161-168,2018.
134. Tiwari M., Chakrabarti P, Chakrabarti T., “Novel work of diagnosis in liver cancer using Tree classifier on liver cancer dataset (BUPA liver disorder)” , Communications in Computer and Information Science , 837, pp.155-160, 2018.
135. Verma K., Srivastava P. , Chakrabarti P., “Exploring structure oriented feature tag weighting algorithm for web documents identification”, Communications in Computer and Information Science ,837, pp.169-180, 2018.