International Journal
of Innovative Analyses and Emerging Technology

Vol. 4 Issue 2 | **pp.** 1-18 | **e-ISSN:** 2792-4025
Available online @ https://openaccessjournals.eu/index.php/ijiaet

OPEN ACCESS JOURNALS

System for Entropy-Based Product Expiration Alerts for Customers with Serious Issues

Steffi R[1*], Shynu T[2], S. Suman Rajest[3***], R. Regin[4****]**

[1] Department of Electronics and Communication, Vins Christian College of Engineering, Tamil Nadu, India
[2] Department of Biomedical Engineering, Agni College of Technology, Chennai, Tamil Nadu, India
[3] Dhaanish Ahmed College of Engineering, Chennai, Tamil Nadu, India
[4] Department of Computer Science and Engineering, SRM Institute of Science and Technology, Ramapuram, India
* Correspondence: steffi12009@gmail.com
** Correspondence: shynu469@gmail.com
*** Correspondence: sumanrajest414@gmail.com
**** Correspondence: regin12006@yahoo.co.in

Abstract: There is a significant problem with selling things that have expired, particularly among customers who purchase the products from supermarkets or stores. In order to prevent this problem from occurring, it is possible to create a web application that will notify the proprietor of the products that are going to expire. This paper presents three proposed approaches for imbalanced learning in order to handle imbalanced data, which consists of a large set of uploaded products with different expiration dates. The first approach is the Entropy-based Over Sampling approach (EOS), the second approach is the Entropy-based Under Sampling approach (EUS), and the third approach is the Entropy-based Hybrid Sampling approach (EHS), which combines oversampling and undersampling simultaneously as a single approach. When taking into consideration the divisions of information on the product's expiration date, these three methods contribute to the classification of the imbalanced classes, which is known as the Entropy-based Imbalance Degree (EID). Last but not least, we arrange all of the products in accordance with their expiration dates, with the most recent ones being placed at the top. As a result, notifications can be issued on a regular basis to all of the products that have been submitted and will soon expire.

Keywords: entropy-based imbalanced degree, entropy-based under-sampling, optical character recognition, distance metric by balancing KL-divergence, sparsity score entropy.

Citation: R., Steffi, T., Shynu, Rajest, S.S., Regin, R. System for Entropy-Based Product Expiration Alerts for Customers with Serious Issues *International Journal of Innovative Analyses and Emerging Technology* **2024**, 4(2), 1–18.

Received: 11 December 2023
Revised: 12 January 2024
Accepted: 22 January 2024
Published: 17 February 2024

1. Introduction

A great number of premiums have been attracted to the examination network as a result of imbalanced learning. For the purpose of addressing grouping challenges pertaining to sensibly adjusted class circulations, the most outstanding information mining and artificial intelligence processes have been offered [11,12,13]. These days, in the current system that is in place at stores, they are maintaining outdated and expired products; if somebody were to use those products in certain situations, they would be damaged [14,15,16,17]. There are instances in which proprietors of shops alter all of the dates or use a greater amount of cover in order to make it appear as though it was just delivered. The health department is the primary location where these problems are taking place currently [18,19,20,21,22].

In addition, marketing products that have beyond their expiration date is one of the most significant challenges faced by clients who often purchase products from

supermarkets or stores [23,24,25,26,27]. A web application that can be designed to provide notifications to the shopkeeper about products that are about to expire is one solution that can be used to address these difficulties [28,29,30,31,32]. The entropy-based imbalance degree (EID) technology is the primary technology that is used in this context. This technology takes into account the differences in data substance between classes, as opposed to the conventional unevenness percentage [33,34,35,36,37].

Data mining is the process of analysing hidden patterns of data according to different perspectives for the purpose of categorising it into useful information [38,39,40,41]. This information is then collected and assembled in common areas, such as data warehouses, for the purpose of efficient analysis, data mining algorithms, and the facilitation of business decision-making and other information requirements, ultimately with the goal of reducing costs and increasing revenue [42,43,44,45,46,47]. The phrase "data mining" is a misnomer because the objective is not the extraction (mining) of data itself but rather the extraction of patterns and information from enormous amounts of data. It is also a buzzword that is frequently used in the context of large-scale data or information processing (including collection, extraction, warehousing, analysis, and statistics), as well as any application of computer decision support systems, such as artificial intelligence and business intelligence [48,49,50,51].

This strategy is taken in this paper in order to determine the impact that duplicates have on the efficiency of graph mining using this method. It makes a number of suggestions for heuristics to limit the number of duplicates that are produced in order to considerably improve the efficiency of these algorithms [52,53,54,55,56]. These suggestions are based on observation. In addition, we establish their accuracy and do performance analysis for a number of graph features during this process. On the basis of these studies, we are able to select the most appropriate heuristic, regardless of whether or not we know extra information regarding the graphs [57,58,59,60,61].

1.1. Literature review

The authors Li et al. [1] present three different sampling approaches that have been proposed for imbalanced learning. The first approach is the entropy-based oversampling (EOS) approach, the second approach is the entropy-based undersampling (EUS) approach, and the third approach is the entropy-based hybrid sampling (EHS) approach, which combines the oversampling and undersampling approaches. The entropy-based imbalance degree (EID) is a novel class imbalance metric that takes into consideration the differences in information contents between classes rather than the standard imbalance ratio. These three approaches are based on this new metric.

The class imbalance problem is addressed by Seiffert et al. [2], who present RUSBoost, a new approach for addressing the issue. Data sampling and boosting are both components of RUSBoost, which offers a straightforward and effective approach to enhancing classification performance in situations where the training data is not evenly distributed. RUSBoost is a fantastic method for learning from unbalanced data because of its quickness, simplicity, and performance all at the same time.

According to Feng et al. [3,] datasets that have class distributions that are not fairly distributed are common in a variety of real-world areas. To deal with imbalanced datasets, it is essential to acquire the knowledge of an appropriate distance measure, although doing so can be difficult. The purpose of this research is to offer a novel distance metric learning method that is referred to as distance metric by balancing KL-divergence approach in order to tackle this problem (DMBK). For the purpose of describing the differences that exist between various classes, DMBK defines normalised divergences by utilising KL-divergence. After that, it combines the geometric mean with the normalised divergences, and at the same time, it isolates samples from the various classes. A balanced separation of all classes is achieved by the use of this approach, which also eliminates the incorrect similarities that are caused by imbalanced class distributions.

In his proposal, Khan [4] suggested that a customer's smartphone be notified automatically several days before the expiration date of the food that they had purchased. The checkout operator app in the store generates a table that includes the product name and the expiration date, and it is uploaded to the cloud. The table is then automatically downloaded to the cloud on the customer's smartphone, and the customer is ready to receive the expiration date remainders and notification in which the QR code is sufficient to gain knowledge about the expiration date.

Wang et al. [5] present the contributions on three different aspects: (1) the structural properties of individuals in crowd scenes; (2) it incorporates the similarities between their motion and the context; and (3) it is able to automatically determine the group number without the need to tune any parameters or thresholds. Experiments are conducted to determine the usefulness of the proposed framework on real-world crowd films. The results of the experiments indicate that the framework has a promising performance on group detection.

Scazzoli et al. [6] investigate the effects of employing two different image preprocessing strategies in order to assist optical character recognition (OCR) software in accurately obtaining an expiration date from an image of a product that contains it.

The SDE algorithm, as described by Li et al. [7], is capable of performing high-quality sampling for multidimensional data and selecting the representative features by utilising sparsity score entropy (SSE). Furthermore, the clustering results and noises are obtained by utilising a novel density-variable clustering method known as density entropy throughout the clustering process (DE). After automatically determining the border set based on the global minimum of border degrees, DE then runs an adaptive cluster analysis for each local cluster based on the local minimum of border degrees. This process is repeated until the border set is determined. In light of the findings, it was demonstrated that the SDE framework that was suggested was capable of simultaneously detecting sounds and processing data with large dimensions and densities.

The Hellinger distance-based oversampling method was proposed by Kumari and Thakar [8] in this particular piece of research. The datasets can be balanced with the help of this technique, which allows for the minority class to be identified with a high degree of precision without compromising the accuracy of the majority class. To accomplish the goal of achieving a balancing ratio, this technology is used to generate new synthetic data. Two conventional classifiers, KNN and C4.5, have been utilised in the testing process, which was carried out on five benchmark datasets. When compared to the classification of unbalanced multi-class datasets, the results demonstrate a twenty percent boost in the accuracy of classification.

Wang et al. [9,10] One of the most widely used algorithms for machine learning is called random projection. This technique may be implemented by neural networks and trained in a very effective manner. Nevertheless, the number of characteristics should be sufficient when applied to a somewhat large-scale data collection. This causes the testing procedure to move at a slower pace and, in certain cases, requires additional storage space. An effective feature selection strategy is shown in order to choose valuable characteristics in a hierarchical fashion. This is done in order to eliminate these issues. In particular, a novel criterion is proposed for the purpose of selecting usable neurons for neural networks, which establishes a new technique for the construction of network architecture.

A radio frequency identification (RFID) sensor that has applications in the food business is proposed and investigated by Honari et al. [10]. This sensor can be utilised to determine the date that goods are no longer edible. The operational principle of the suggested sensor is based on the change in conductivity that occurs in a polymer when it is exposed to ruined food materials. Due to changes in the polymer conductivity at the sensing region, which were altered by exposure to rotten food, the result demonstrates an increase in the read range.

1.2. Problem statement

Purchasing goods on the internet has grown increasingly widespread in recent times. People are more interested in shopping online than they are in going to stores since shopping online provides a reduction in both time and money. For the goal of this, we already have a large number of systems in place. Small and medium-sized businesses that do not have adequate records of their items, as well as businesses that deal with products that have expired, are the entities that are the focus of this initiative [62,63,64,65,66,67]. Shop owners are the only people who can access these kinds of systems. When using certain other systems, the user is required to upload each and every detail, which can be a laborious task. In certain cases, these kinds of technologies are utilised solely for the purpose of reserving resources [68,69,70,71,72,73].

The development of this application, which is suitable for both small and large enterprises, allows for the resolution of all of these shortcomings [74,75,76,77,78,79]. All of the various kinds of data are organised, and notifications are issued in the appropriate manner [80]. Among its many benefits, the most important one is that it resolves problems with expiration dates and plays a significant part in the food sector. It provides consumers with direct contact to the government in order to facilitate the filing of complaints, which enables the government to take necessary actions swiftly [81,82,83,84].

To begin, the customer must first log in with an ID before they are able to make acquisitions. Additionally, after they have logged in, they are able to check the status of the product as well as the expiration date information for any specific product. They have the ability to file a complaint with the government through the mail in the event that they discover any product that has been uploaded after the date on which it was supposed to expire [85,86,87,88,89]. At this point, the administrator group will be responsible for handling all of these data, and they will be able to conduct an investigation by sending a warning email to the shopkeeper about the revocation of their licence [90,91,92,93,94]. If the item is set to expire, the government will tell the store within 15 days of the item's termination. By default, the government will provide information about the date on which the item will no longer be available. After that, the businessperson will present an offer for the particular ID item that is being sought after [95,96,97,98,99,100,101].

The most important technology that is utilised in this context is known as entropy-based Imbalance degree (EID), which takes into account the differences in data content between classes rather than the traditional unevenness proportion (Figure 1).

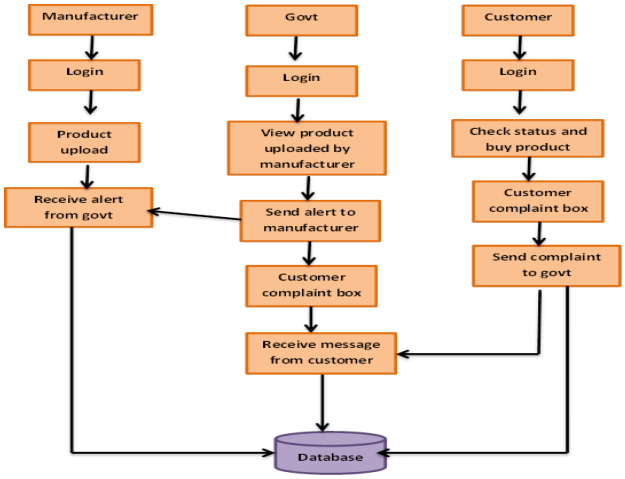

Figure 1. Diagram overview database

In order to complete the development process, it is necessary to have both the software and the hardware for this system. The requirements that are necessary are

exactly as written. The needs of the model are determined through the process of requirements analysis [102,103,104,105,106,107]. The tasks that make up this process include determining the requirements and circumstances necessary to obtain the product by taking into account all of the conceivable user needs [108]. There are two conditions that must be met for the task analysis: input data and output data. The product that is going to be purchased can serve as the input, and the output will provide a ranking of the products depending on the date that they are going to expire. The description of the software and hardware that are required to accomplish the desired functionality is included in the resource requirements brief [109,110,111,112].

Because the hardware requirements have the potential to serve as the foundation for a contract for the implementation of the system, they ought to be a comprehensive and consistent definition of the entire system. They are utilised by software engineers as the initial point of departure for the design of the system. It demonstrates the functionality of the system rather than how it ought to be constructed [113,114,115,116,117].

In other words, the system's specification is contained within the software requirements document. It is necessary for it to incorporate both a definition and a specification of the requirements. Rather than focusing on how the system ought to function, it is a collection of what it ought to do [118,119,120,121,122,123]. The requirements for the software serve as a foundation upon which the software requirements specification can be constructed. During the course of the development activity, it is helpful in calculating costs, organising activities for the team, carrying out tasks, tracking the teams, and tracking the progress of the team [124,125,126,127,128].

A meaningful engineering depiction of something that is going to be built is what design is. The process by which the requirements are converted into a software representation is referred to as software design [129,130,131,132]. The part of software engineering that is responsible for delivering quality is the design phase. The design process is the technique by which the requirements of the customer are appropriately translated into the final product [133,134,135,136,137].

The visual depiction of a system's structure, behaviour, and views is referred to as the configuration of the system architecture [134,135,136,137,138,139]. Within the framework of this design, it is evident that access is granted to both the customer and the shopkeeper, with the government serving as the administrator. He has the ability to browse products and upload details because he is the shopkeeper. The government is obligated to provide the proprietor of the store with information regarding the expiration date. In addition to that, it comes with a user complaint box that may be used to receive complaints from customers [140,141,142,143,144,145]. At long last, consumers who are also users are able to purchase things. In the process of purchasing, they have the ability to send a notification to the government if the item has passed its expiration date [146].

2. Method

The development of the System for Entropy-Based Product Expiration Alerts for Customers with Serious Issues involved a multi-step process integrating data analysis, algorithm development, and user interface design.

1) **Data Collection:** Relevant data sources were identified, including customer purchase history, product expiration dates, and customer health records. Data collection methods were established to gather real-time information on product purchases and customer health conditions.
2) **Data Analysis:** Advanced data analytics techniques, including entropy-based analysis, were applied to the collected data to identify patterns and trends related to product expiration and customer health issues. Statistical analysis was conducted to assess the relationship between product expiration and customer health outcomes.
3) **Algorithm Development:** Based on the findings from the data analysis, algorithms

were developed to predict product expiration dates and identify customers with serious health issues who may be at risk from expired products. The algorithms were refined through iterative testing and validation processes to ensure accuracy and reliability.

4) **System Implementation:** The developed algorithms were integrated into a user-friendly system interface designed to provide real-time alerts to customers with serious health issues when purchasing products approaching expiration. The system was implemented using scalable and secure technology infrastructure to support efficient operation and data management.
5) **Evaluation:** The performance of the System for Entropy-Based Product Expiration Alerts was evaluated through usability testing and feedback from users. Metrics such as alert accuracy, timeliness, and user satisfaction were assessed to measure the system's effectiveness in providing timely and relevant alerts to customers with serious health issues.

Through this methodological approach, the System for Entropy-Based Product Expiration Alerts for Customers with Serious Issues was developed to enhance customer safety and satisfaction by proactively alerting them to potential health risks associated with expired products.

3. Results and Discussion

The classification of balancing data can be accomplished by a variety of data mining and machine learning techniques, as is common knowledge. This algorithm was developed expressly for the purpose of dealing with data that is uneven. The processing of numerous products causes the expiration dates of those products to become unbalanced, and here in our project, we classify such expiration dates. Therefore, in order to sample the data, we are utilising the EID technique.

The absolute difference between each statistic in each particular data collection is added together in the calculation that is denoted by the letter D.

$$\mathrm{EID} = 1/\mathrm{m} \sum_{r=1}^{m} |n_r - \varepsilon| s.t. \varepsilon = 1/\mathrm{m} \sum_{h=1}^{m} n_h \quad (1)$$

The balance is done where EID ϵ [0,1] and when EID = 0. Through the use of sampling procedures, newly created data can reduce the degree of imbalance it possesses. The function that is the objective:

$$\{X_{new}\} opt = \arg\min (\mathrm{EID}) \quad (2)$$

Class 1 and Class 2 are considered to be minority classes, whereas Class 3 is considered to be the majority class. Each and every data set has three classes. In addition, it offers three distinct methods for carrying out categorization calculations. These are referred to as EOS, which stands for entropy-based oversampling, EUS, which stands for entropy-based under sampling, and entropy-based hybrid sampling [147,148,149,150,151,152,153].

Refining the plans, specifications, and estimations is an essential part of the detailed design process. In order to provide a more comprehensive comprehension of the functionalities, the modules are described using a diagrammatic format [154,155,156,157,158]. It provides specifics regarding the user's participation in the suggested model as well as their work. In the Unified Modeling Language (UML), which is a standard language for modelling real-world objects and systems, use case diagrams are something that are regularly utilised [159,160,161,162,163,164,165,166]. Sequence diagrams depict, in the form of parallel vertical lines, various processes or objects that are active at the same time, and, in the form of horizontal arrows, the messages that are passed back and forth between these processes or objects in the order in which they take

place (Figure 2).

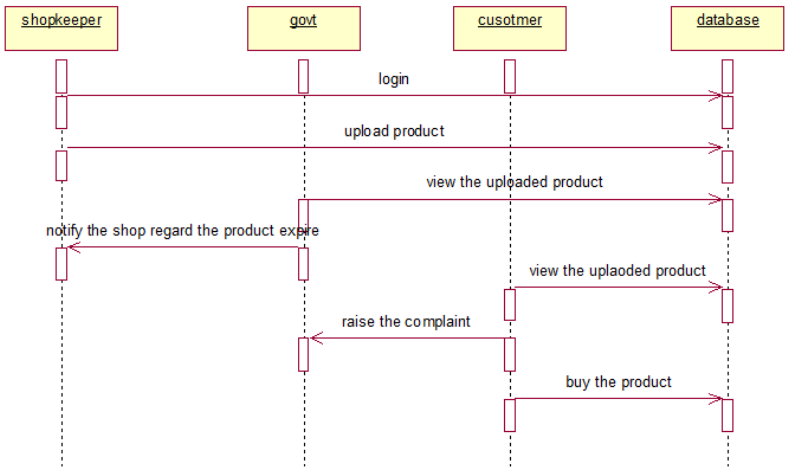

Figure 2. Sequence diagram

3.1. Data-flow diagram

Data-flow diagrams, often known as DFDs, are used to illustrate the flow of data within a system or process (usually an information system). In addition to this, the DFD offers details regarding the outputs and inputs of each entity, as well as the process itself. Data flow diagrams do not contain any control flow, decision rules, or loops. They also do not contain any loops. In accordance with the data, a flowchart can be used to represent particular operations [167,168,169].

The most important part of our assignment is this module. For the purpose of our project, we are leveraging JSP to create structure. Here, we provide our approval to the verification of the login client and server (Figure 3).

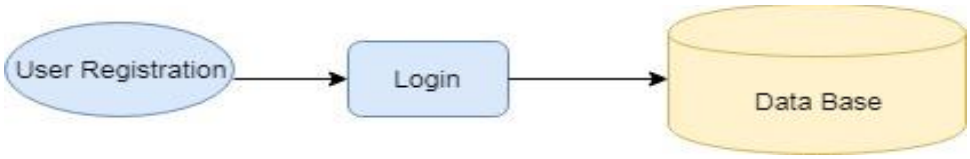

Figure 3. User interface module

In this section, the proprietor uploads all of the things that are currently accessible, along with the dates of termination and manufacturing. The shopkeeper is responsible for filling out all of the item details, which will then be saved in the shopkeeper's information database as well as with the government's database (Figure 4).

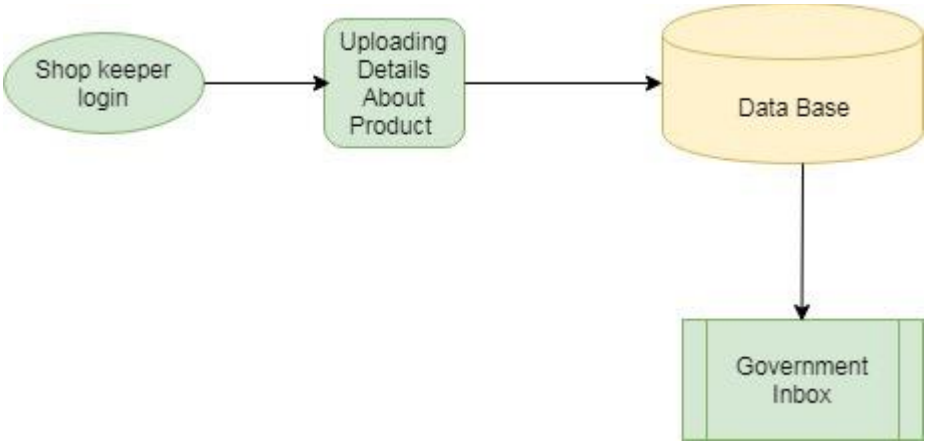

Figure 4. Product upload module

All of the products that were uploaded by the shopkeeper are collected in this section of the database. The government is able to monitor the products and send notifications to the shopkeeper automatically (by utilising the EID algorithm) before the product's expiration date, which is twenty days away. To begin, the user is required to create an account in the customer account. The user is able to search for any product once they have successfully logged into their account. They have the ability to search by utilising the product ID. Users have the ability to directly compose a letter and send it to the government in the event that they discover any incorrect or expired product (Figure 5).

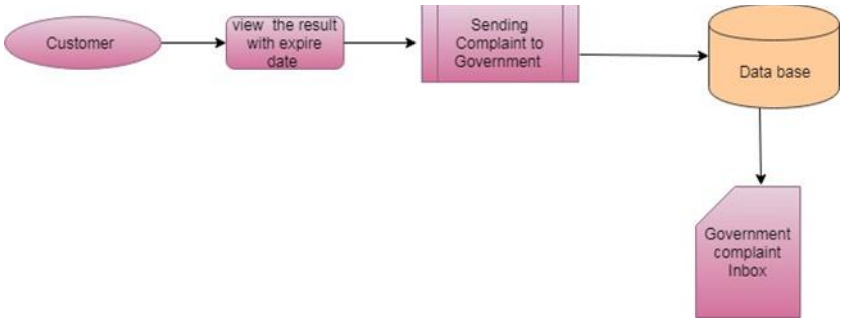

Figure 5. User complaint box module

In the event that the consumer files a complaint with the government over the products, the government will receive the message in their complaint box, and they will then send a notification of caution to the proprietor of the shop. This warning notification from the government can be received by the shopkeeper in the mailbox that is designated for the shopkeeper's product status.

4. Conclusion

In this article, we introduce a web app that may notify users when products are about to expire. To solve this problem of learning multi-class classifications, we employ three novel entropy-based learning strategies. To measure the class irregularity, the suggested methods employ novel entropy-based unevenness degrees as an alternative to traditional methods for imbalanced expiration details. EOS is data dependent, meaning it relies on the most prevalent part class's data. EOS continues to oversample many classes until their data content reaches the largest one. Based on EID's findings, EHS oversamples minority classes while undersampling the majority, all because it relies on the usual data substance of many classes. Both real-world and synthetic data sets benefit most from this method. Even if it works, new ways of handling massive amounts of data

are needed. Future iterations may also incorporate monitoring. Therefore, it is a respectable programme that meets all the needs of a basic business to manage its inventory. Perhaps we should enable automation in the input ways in the future so we can improve. We can ensure that all organisations have complete access to this initiative because of its significant importance in the food business. The provided system can be equipped with a bar code scanner or any other type of scanner to facilitate the input process and eliminate human mistake. The feedback form has the potential to be automated.

References

[1] L. Li, H. He, and J. Li, "Entropy-based sampling approaches for multi-class imbalanced problems," IEEE Trans. Knowl. Data Eng., vol. 32, no. 11, pp. 2159–2170, 2020.

[2] C. Seiffert, T. M. Khoshgoftaar, J. Van Hulse, and A. Napolitano, "RUSBoost: Improving classification performance when training data is skewed," in 2008 19th International Conference on Pattern Recognition, 2008.

[3] L. Feng, H. Wang, B. Jin, H. Li, M. Xue, and L. Wang, "Learning a distance metric by balancing KL-divergence for imbalanced datasets," IEEE Trans. Syst. Man Cybern. Syst., vol. 49, no. 12, pp. 2384–2395, 2019.

[4] T. Khan, "A cloud-based smart expiry system using QR code," in 2018 IEEE International Conference on Electro/Information Technology (EIT), 2018.

[5] Q. Wang, M. Chen, F. Nie and X. Li, "Detecting Coherent Groups in Crowd Scenes by Multiview Clustering," in IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 42, no. 1, pp. 46-58, 1 Jan. 2020.

[6] D. Scazzoli, G. Bartezzaghi, D. Uysal, M. Magarini, M. Melacini, and M. Marcon, "Usage of Hough transform for expiry date extraction via optical character recognition," in 2019 Advances in Science and Engineering Technology International Conferences (ASET), 2019.

[7] S. Li, L. Li, J. Yan, and H. He, "SDE: A novel clustering framework based on sparsity-density entropy," IEEE Trans. Knowl. Data Eng., vol. 30, no. 8, pp. 1575–1587, 2018.

[8] A. Kumari and U. Thakar, "Hellinger distance based oversampling method to solve multi-class imbalance problem," in 2017 7th International Conference on Communication Systems and Network Technologies (CSNT), 2017.

[9] Q. Wang, J. Wan, F. Nie, B. Liu, C. Yan, and X. Li, "Hierarchical feature selection for random projection," IEEE Trans. Neural Netw. Learn. Syst., vol. 30, no. 5, pp. 1581–1586, 2019.

[10] M. M. Honari, H. Saghlatoon, R. Mirzavand, and P. Mousavi, "An RFID sensor for early expiry detection of packaged foods," in 2018 18th International Symposium on Antenna Technology and Applied Electromagnetics (ANTEM), 2018.

[11] E. Geo Francis and S. Sheeja, "An optimized intrusion detection model for wireless sensor networks based on MLP-CatBoost algorithm," Multimedia Tools and Applications, 2024.

[12] E. Geo Francis and S. Sheeja, "SHAKE-ESDRL-based energy efficient intrusion detection and hashing system," Annals of Telecommunications, 2023,

[13] E. Geo Francis and S. Sheeja, "Intrusion detection system and mitigation of threats in IoT networks using AI techniques: A review," Engineering and Applied Science Research, 2023, vol. 50, no. 6, pp. 633–645, https://ph01.tci-thaijo.org/index.php/easr/article/view/250974

[14] E. Geo Francis and S. Sheeja, "A Novel RDAE Based PSR-QKD Framework for Energy Efficient Intrusion Detection," 2022 International Conference on Knowledge Engineering and Communication Systems (ICKES), Chickballapur, India, 2022, pp. 1-6.

[15] E. Geo Francis and S. Sheeja, "Towards an Optimal Security Using Multifactor Scalable Lightweight Cryptography for IoT," 2022 3rd International Conference on Communication, Computing and Industry 4.0 (C2I4), Bangalore, India, 2022, pp. 1-6.

[16] E. Geo Francis, S. Sheeja and Joseph Jismy, "A Three-layer Convolution Neural Network Approach for Intrusion Detection in IoT," 2023 Eleventh International Conference on Intelligent Computing and Information Systems (ICICIS), Cairo, Egypt, 2023, pp. 261-268.

[17] E. Geo Francis, S. Sheeja and E. F. Antony John, "IoT Intrusion Detection Using Two-Tier-Convolutional Deep-Learning Model," 2023 International Conference on IoT, Communication and Automation Technology (ICICAT), Gorakhpur, India, 2023, pp. 1-7.

[18] D. K. Sharma and R. Tripathi, "4 Intuitionistic fuzzy trigonometric distance and similarity measure and their properties," in Soft Computing, De Gruyter, 2020, pp. 53–66.

[19] D. K. Sharma, B. Singh, M. Anam, R. Regin, D. Athikesavan, and M. Kalyan Chakravarthi, "Applications of two separate methods to deal with a small dataset and a high risk of generalization," in 2021 2nd International Conference on Smart Electronics and Communication (ICOSEC), 2021.

[20] D. K. Sharma, B. Singh, M. Anam, K. O. Villalba-Condori, A. K. Gupta, and G. K. Ali, "Slotting learning rate in deep neural networks to build stronger models," in 2021 2nd International Conference on Smart Electronics and Communication (ICOSEC), 2021.

[21] K. Kaliyaperumal, A. Rahim, D. K. Sharma, R. Regin, S. Vashisht, and K. Phasinam, "Rainfall prediction using deep mining strategy for detection," in 2021 2nd International Conference on Smart Electronics and Communication (ICOSEC), 2021.

[22] I. Nallathambi, R. Ramar, D. A. Pustokhin, I. V. Pustokhina, D. K. Sharma, and S. Sengan, "Prediction of influencing atmospheric conditions for explosion Avoidance in fireworks manufacturing Industry-A network approach," Environ. Pollut., vol. 304, no. 119182, p. 119182, 2022.

[23] H. Sharma and D. K. Sharma, "A Study of Trend Growth Rate of Confirmed Cases, Death Cases and Recovery Cases of Covid-19 in Union Territories of India," Turkish Journal of Computer and Mathematics Education, vol. 13, no. 2, pp. 569–582, 2022.

[24] A. L. Karn et al., "Designing a Deep Learning-based financial decision support system for fintech to support corporate customer's credit extension," Malays. J. Comput. Sci., pp. 116–131, 2022.

[25] A. L. Karn et al., "B-lstm-Nb based composite sequence Learning model for detecting fraudulent financial activities," Malays. J. Comput. Sci., pp. 30–49, 2022.

[26] P. P. Dwivedi and D. K. Sharma, "Application of Shannon entropy and CoCoSo methods in selection of the most appropriate engineering sustainability components," Cleaner Materials, vol. 5, no. 100118, p. 100118, 2022.

[27] A. Kumar, S. Singh, K. Srivastava, A. Sharma, and D. K. Sharma, "Performance and stability enhancement of mixed dimensional bilayer inverted perovskite (BA2PbI4/MAPbI3) solar cell using drift-diffusion model," Sustain. Chem. Pharm., vol. 29, no. 100807, p. 100807, 2022.

[28] Sarkar, P. & Sharma, K. (2021). A Study on the Persistent issues of the Tourism Sector Faced by the Indian Tourists. Journal of Decision Making and Leadership (1), (1), pp.29-36.

[29] Kakkad, P., Sharma, K. & Bhamare, A. (2021). An Empirical Study on Employer Branding To Attract And Retain Future Talents. Turkish Online Journal of Qualitative Inquiry, 2021, Vol 12(6), pp.7615

[30] Nayak, K. M., & Sharma, K. (2019). Measuring Innovative Banking User's Satisfaction Scale. Test Engineering and Management Journal, 81(2019), 4466-4477.

[31] Farheen, Makrani & Kuldeep, Sharma (2023). A Study on Customer Satisfaction towards traditional Taxis in South Mumbai. Electronic International Interdisciplinary Research Journal, 12 I(a) (2023), 15-28.

[32] Vora, K., Sharma Kuldeep & Kakkad, Poonam (2020). Factors Responsible for Poor Attendance of Students in Higher Education with respect to Undergraduate - Commerce Colleges in Mumbai. BVIMSR's Journal of Management Research, 12 (1), 2020, 1-9.

[33] L. J, A. Manoj, G. Nanma, and P. Srinivasan, "TP-Detect: trigram-pixel based vulnerability detection for Ethereum smart contracts," Multimed. Tools Appl., vol. 82, no. 23, pp. 36379–36393, 2023.

[34] Lohith, K. Singh, and B. Chakravarthi, "Digital forensic framework for smart contract vulnerabilities using ensemble models," Multimed. Tools Appl., 2023, Press.

[35] Lohith J J and Bharatesh Cahkravarthi S B, "Intensifying the lifetime of Wireless Sensor Network using a centralized energy accumulator node with RF energy transmission," in 2015 IEEE International Advance Computing Conference (IACC), Bangalore, India, pp. 180-184, 2015.

[36] S. Parthasarathy, A. Harikrishnan, G. Narayanan, L. J., and K. Singh, "Secure distributed medical record storage using blockchain and emergency sharing using multi-party computation," in 2021 11th IFIP International Conference on New Technologies, Mobility and Security (NTMS), 2021.

[37] G. Kannan, M. Pattnaik, G. Karthikeyan, Balamurugan, P. J. Augustine, and Lohith, "Managing the supply chain for the crops directed from agricultural fields using blockchains," in 2022 International Conference on Electronics and Renewable Systems (ICEARS), Tuticorin, India, pp. 908-913, 2022.

[38] R. Singh et al., "Smart healthcare system with light-weighted blockchain system and deep learning techniques," Comput. Intell. Neurosci., vol. 2022, pp. 1–13, 2022.

[39] J. J. Lohith, A. Abbas, and P. Deepak, "A Review of Attacks on Ad Hoc On Demand Vector (AODV) based Mobile Ad Hoc Networks (MANETS)," International Journal of Emerging Technologies and Innovative Research, vol. 2, no. 5, pp. 1483–1490, 2015.

[40] Sharma, Kuldeep & Poddar, Sandeep (2018). An Empirical Study on Service Quality at Mumbai Metro-One Corridor. Journal of Management Research and Analysis (JMRA), 5(3), 2018, 237-241.

[41] Sharma, Kuldeep (2015). Travel Demand for Air-conditioner buses in Kalyan-Dombivali Region. Tactful Management Research Journal, 9 (2015), 44-50.

[42] Vora, K. & Sharma Kuldeep (2018). Factors Influencing Participation of Female Students in Higher Education w.r.t Commerce Colleges in Mumbai. International Journal of Advance and Innovative Research, 5, 3 (VI), 2018, 127-130.

[43] Kuldeep Sharma and Poulami Sarkar (2024). A Study on the Impact of Environmental Awareness on the Economic and Socio-Cultural Dimensions of Sustainable Tourism. International Journal of Multidisciplinary Research & Reviews, Vol 03, No. 01, pp. 84-92.

[44] D. Durgesh Kumar & Sharma Kuldeep (2023). Perception Based Comparative Analysis of Online Learning and Traditional Classroom-Based Education Experiences in Mumbai. Research Journey, Issue 330(B), pp. 79-86.

[45] S. P. Mohanty, U. Choppali, and E. Kougianos, "Everything you wanted to know about smart cities: The Internet of things is the backbone," IEEE Consum. Electron. Mag., vol. 5, no. 3, pp. 60–70, 2016.

[46] M. A. B. Shemaili, C. Y. Yeun, and M. J. Zemerly, "Lightweight mutual authentication protocol for securing RFID applications," Int. J. Internet Technol. Secur. Trans., vol. 2, no. 3/4, p. 205, 2010.

[47] F. Ayoub and K. Singh, "Cryptographic techniques and network security," IEE Proc., vol. 131, no. 7, p. 684, 1984.

[48] R. K. Sheth, "Analysis of cryptography techniques," Int. J. Res. Adv. Eng., vol. 1, no. 2, p. 1, 2015.

[49] R. Bhanot and R. Hans, "A review and comparative analysis of various encryption algorithms," Int. J. Secur. Appl., vol. 9, no. 4, pp. 289–306, 2015.

[50] I. Lee, S. Jeong, S. Yeo, and J. Moon, "A novel method for SQL injection attack detection based on removing SQL query attribute values," Math. Comput. Model., vol. 55, no. 1–2, pp. 58–68, 2012.

[51] D. Johnson, A. Menezes, and S. Vanstone, "The elliptic curve digital signature algorithm (ECDSA)," Int. J. Inf. Secur., vol. 1, no. 1, pp. 36–63, 2001.

[52] S. Zhang and M. A. Karim, "Color image encryption using double random phase encoding," Microw. Opt. Technol. Lett., vol. 21, no. 5, pp. 318–323, 1999.

[53] C. Butpheng, K.-H. Yeh, and H. Xiong, "Security and privacy in IoT-cloud-based e-health systems-A comprehensive review," Symmetry (Basel), vol. 12, no. 7, p. 1191, 2020.

[54] E. Mosqueira-Rey, D. Alonso-Ríos, V. Moret-Bonillo, I. Fernández-Varela, and D. Álvarez-Estévez, "A systematic approach to API usability: Taxonomy-derived criteria and a case study," Inf. Softw. Technol., vol. 97, pp. 46–63, 2018.

[55] R. Sikder, M. S. Khan, M. S. Hossain, and W. Z. Khan, "A survey on android security: development and deployment hindrance and best practices," TELKOMNIKA, vol. 18, no. 1, p. 485, 2020.

[56] G. S. Chhabra, V. P. Singh, and M. Singh, "Cyber forensics framework for big data analytics in IoT environment using machine learning," Multimed. Tools Appl., vol. 79, no. 23–24, pp. 15881–15900, 2020.

[57] N. Sultana, N. Chilamkurti, W. Peng, and R. Alhadad, "Survey on SDN based network intrusion detection system using machine learning approaches," Peer Peer Netw. Appl., vol. 12, no. 2, pp. 493–501, 2019.

[58] Groenewald, E. (2024). Assessing the Role of Leadership in Shaping EDI Policies and Initiatives in Hospitality Industries: A Systematic Review and Meta-analysis Review. International Multidisciplinary Journal of Research for Innovation, Sustainability, and Excellence (RISE), 1(1), 13-19.

[59] Groenewald, E. (2024). Inclusive Workplaces: The Key Strategies for Sustainable Diversity Practices. International Multidisciplinary Journal of Research for Innovation, Sustainability, and Excellence, 1(1), 156-161.

[60] Groenewald, E., & Kilag, O. K. (2024). Automating Finances: Balancing Efficiency and Job Dynamics in Accounting and Auditing. International Multidisciplinary Journal of Research for Innovation, Sustainability, and Excellence (RISE), 1(2), 14-20.

[61] Groenewald, E., & Kilag, O. K. (2024). E-commerce Inventory Auditing: Best Practices, Challenges, and the Role of Technology. International Multidisciplinary Journal of Research for Innovation, Sustainability, and Excellence (RISE), 1(2), 36-42.

[62] 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.

[63] V. K. Nomula, R. Steffi, and T. Shynu, "Examining the Far-Reaching Consequences of Advancing Trends in Electrical, Electronics, and Communications Technologies in Diverse Sectors," FMDB Transactions on Sustainable Energy Sequence, vol. 1, no. 1, pp. 27–37, 2023.

[64] P. S. Venkateswaran, F. T. M. Ayasrah, V. K. Nomula, P. Paramasivan, P. Anand, and K. Bogeshwaran, "Applications of artificial intelligence tools in higher education," in Advances in Business Information Systems and Analytics, IGI Global,USA, pp. 124–136, 2023.

[65] Groenewald, E., Kilag, O. K., Cabuenas, M. C., Camangyan, J., Abapo, J. M., & Abendan, C. F. (2023). The Influence of Principals' Instructional Leadership on the Professional Performance of Teachers. Excellencia: International Multi-disciplinary Journal of Education (2994-9521), 1(6), 433-443.

[66] S. Venkatasubramanian, Jaiprakash Narain Dwivedi, S. Raja, N. Rajeswari, J. Logeshwaran, Avvaru Praveen Kumar, "Prediction of Alzheimer's Disease Using DHO-Based Pretrained CNN Model", Mathematical Problems in Engineering, vol. 2023, Article ID 1110500, 11 pages, 2023.

[67] S.Venkatasubramanian, A.Suhasini, S.Hariprasath, " Maximization Of Network Lifetime Using Energy Efficient Super Clustering Protocol Based On Ldha-Tsro In MANET", Journal of Data Acquisition and Processing, 2023, 38 (3), pp. 523-537 .

[68] T. Chen, J. Blasco, J. Alzubi, and O. Alzubi "Intrusion Detection". IET Publishing, vol. 1, no. 1, pp. 1-9, 2014.

[69] J. A. Alzubi, R. Jain, O. Alzubi, A. Thareja, and Y. Upadhyay, "Distracted driver detection using compressed energy efficient convolutional neural network," J. Intell. Fuzzy Syst., vol. 42, no. 2, pp. 1253–1265, 2022.

[70] J. A. Alzubi, O. A. Alzubi, M. Beseiso, A. K. Budati, and K. Shankar, "Optimal multiple key-based homomorphic encryption with deep neural networks to secure medical data transmission and diagnosis," Expert Syst., vol. 39, no. 4, 2022.

[71] S. Abukharis, J. A. Alzubi, O. A. Alzubi, S. Alamri, and T. O. Tim O\'Farrell, "Packet error rate performance of IEEE802.11g under Bluetooth interface," Res. J. Appl. Sci. Eng. Technol., vol. 8, no. 12, pp. 1419–1423, 2014.

[72] O. A. Alzubi, I. Qiqieh, and J. A. Alzubi, "Fusion of deep learning based cyberattack detection and classification model for intelligent systems," Cluster Comput., vol. 26, no. 2, pp. 1363–1374, 2023.

[73] A. Jafar, O. A. Alzubi, G. Alzubi, and D. Suseendran, "+ A Novel Chaotic Map Encryption Methodology for Image Cryptography and Secret Communication with Steganography," International Journal of Recent Technology and Engineering, vol. 8, no. IC2, 2019.

[74] S. Samadi, M. R. Khosravi, J. A. Alzubi, O. A. Alzubi, and V. G. Menon, "Optimum range of angle tracking radars: a theoretical computing," Int. J. Electr. Comput. Eng. (IJECE), vol. 9, no. 3, p. 1765, 2019.

[75] N. Al-Najdawi, S. Tedmori, O. A. Alzubi, O. Dorgham, and J. A. Alzubi, "A Frequency Based Hierarchical Fast Search Block Matching Algorithm for Fast Video Video Communications," International Journal of Advanced Computer Science and Applications, vol. 7, no. 4, 2016.

[76] Sholiyi A., O'Farrell T., Alzubi O., and Alzubi J., "Performance Evaluation of Turbo Codes in High Speed Downlink Packet Access Using EXIT Charts", International Journal of Future Generation Communication and Networking, Vol. 10, No. 8, August 2017.

[77] J. A. Alzubi, O. A. Alzubi, A. Singh, and T. Mahmod Alzubi, "A blockchain-enabled security management framework for mobile edge computing," Int. J. Netw. Manage., vol. 33, no. 5, 2023.

[78] S. Venkatasubramanian et al., "An Advanced Ticket Manager - Fuzzy Logic Based Aodv Routing Protocol (TM-FLAODV) In MANET", Skybold report, Vol 18, No 3 (2023), | pp. 233-249

[79] Venkatasubramanian, S., Hariprasath, S., "Aquila Optimization-Based Cluster Head Selection and Honey Badger-Based Energy Efficient Routing Protocol in WSN", Proceedings of the International Conference on Intelligent Computing, Communication and Information Security. ICICCIS 2022. Algorithms for Intelligent Systems. Springer, Singapore, pp 273–290.

[80] Venkatasubramanian, Suhasini, and Vennila, "Cluster Head Selection using Spotted Hyena Optimizer for Energy-Efficient Routing in MANET," IAENG International Journal of Computer Science, vol. 50, no.3, pp1122-1129, 2023

[81] Khan, S., & Alfaifi, A. (2020). Modeling of Coronavirus Behavior to Predict It's Spread. International Journal of Advanced Computer Science Applications, 11(5), 394-399.

[82] 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.

[83] AlAjmi, M. F., Khan, S., & Sharma, A. (2013). Studying Data Mining and Data Warehousing with Different E-Learning System. International Journal of Advanced Computer Science and Applications, 4(1), 144-147.

[84] Khan, S., & Altayar, M. (2021). Industrial internet of things: Investigation of the applications, issues, and challenges. International Journal of Advanced Applied Sciences, 8(1), 104-113.

[85] Khan, S. (2020). Artificial Intelligence Virtual Assistants (Chatbots) are Innovative Investigators. International Journal of Computer Science Network Security, 20(2), 93-98.

[86] AlAjmi, M., & Khan, S. (2015). Part of Ajax And Openajax In Cutting Edge Rich Application Advancement For E-Learning. Paper presented at the INTED2015 Proceedings.

[87] Khan, S., Moorthy, G. K., Vijayaraj, T., Alzubaidi, L. H., Barno, A., & Vijayan, V. (2023). Computational Intelligence for Solving Complex Optimization Problems. Paper presented at the E3S Web of Conferences.

[88] Khan, S., Alqahtani, S., & Applications. (2023). Hybrid machine learning models to detect signs of depression. J Multimedia Tools, 1-19.

[89] Rao, M. S., Modi, S., Singh, R., Prasanna, K. L., Khan, S., & Ushapriya, C. (2023). Integration of Cloud Computing, IoT, and Big Data for the Development of a Novel Smart Agriculture Model. Paper presented at the 2023 3rd International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE).

[90] Khan, S., Fazil, M., Imoize, A. L., Alabduallah, B. I., Albahlal, B. M., Alajlan, S. A., . . . Siddiqui, T. (2023). Transformer Architecture-Based Transfer Learning for Politeness Prediction in Conversation. Sustainability, 15(14), 10828.

[91] Batool, Kiran; Zhao, Zhen-Yu; Irfan, Muhammad; Żywiołek, Justyna (2023): Assessing the role of sustainable strategies in alleviating energy poverty: an environmental sustainability paradigm. w: Environmental science and pollution research international 30 (25), s. 67109–67130.

[92] Nayyar, Anand; Żywiołek, Justyna; Rosak Szyrocka, Joanna; Naved, Mohd (2023): Advances in distance learning in times of pandemic. First edition. Boca Raton, FL: Chapman & Hall/CRC Press.

[93] Zywiolek, Justyna; Matulewski, Marek; Santos, Gilberto (2023): The Kano Model As A Tool For Assessing The Quality Of Hunting Tourism - A Case From Poland. w: IJQR 17 (3), s. 1097–1112.

[94] Żywiołek, Justyna (2018): Monitoring of information security system elements in the metallurgical enterprises. w: MATEC Web Conf. 183, s. 1007.

[95] Żywiołek, Justyna (2019): Personal data protection as an element of management security of information. w: Multidisciplinary Aspects of Production Engineering 2 (1), s. 515–522.

[96] Żywiołek, Justyna; Schiavone, Francesco: The Value of data sets in Information and Knowledge Management as a Threat to Information Security, Garcia-Perez, Alexeis; Simkin, Lyndon (red.), w: European Conference on Knowledge Management, s. 882–891, dostępne na stronie internetowej: https://tinyurl.com/ECKM21.

[97] Żywiołek, Justyna; Schiavone, Francesco (2021): Perception of the Quality of Smart City Solutions as a Sense of Residents' Safety. w: Energies 14 (17), s. 5511.

[98] Tak, A. (2023). Succeeding Against the Odds: Project Management in Complex IT Scenarios. Journal of Technology and Systems, 5(2), 41–49.

[99] Tak, A. (2023). Artificial Intelligence and Machine Learning in Diagnostics and Treatment Planning. Journal of Artificial Intelligence & Cloud Computing, 2(1), 1-6.

[100] Tak, A. (2022). The Role of Artificial Intelligence in US Healthcare Information. International Journal of Science and Research, 11(12), 1302-1308.

[101] Gaurav Kumawat, Santosh Kumar Viswakarma, Prasun Chakrabarti , Pankaj Chittora, Tulika Chakrabarti , Jerry Chun-Wei Lin, "Prognosis of Cervical Cancer Disease by Applying Machine Learning Techniques", Journal of Circuits, Systems, and Computers, 2022.

[102] 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.

[103] 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.

[104] 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.

[105] 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.

[106] 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.

[107] 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.

[108] 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.

[109] 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.

[110] 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.

[111] 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.

[112] 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.

[113] 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.

[114] 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.

[115] 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.

[116] Tak, A. (2022). Advanced AI Applications in Gaming with Cloud-Powered Media and Entertainment Experiences. Journal of Artificial Intelligence & Cloud Computing, 1(1), 1-4.

[117] Tak, A. (2021). Comprehensive Study of AI-Driven Market Forecasting Models and Their Applicability. International Journal of Science and Research, 10(2), 1705-1709.

[118] A. Bhardwaj, J. Pattnayak, D. Prasad Gangodkar, A. Rana, N. Shilpa and P. Tiwari, "An Integration of Wireless Communications and Artificial Intelligence for Autonomous Vehicles for the Successful Communication to Achieve the Destination," 2023 3rd International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE), Greater Noida, India, 2023, pp. 748-752.

[119] A. Bhardwaj, R. Raman, J. Singh, K. Pant, N. Yamsani and R. Yadav, "Deep Learning-Based MIMO and NOMA Energy Conservation and Sum Data Rate Management System," 2023 3rd International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE), Greater Noida, India, 2023, pp. 866-871.

[120] A. Bhardwaj, S. Rebelli, A. Gehlot, K. Pant, J. L. A. Gonzáles and F. A., "Machine learning integration in Communication system for efficient selection of signals," 2023 3rd International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE), Greater Noida, India, 2023, pp. 1529-1533.

[121] A. Chaturvedi, A. Bhardwaj, D. Singh, B. Pant, J. L. A. Gonzáles and F. A., "Integration of DL on Multi-Carrier Non-Orthogonal Multiple Access System with Simultaneous Wireless Information and Power Transfer," 2022 11th International Conference on System Modeling & Advancement in Research Trends (SMART), Moradabad, India, 2022, pp. 640-643.

[122] 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.

[123] 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.

[124] A. Uthiramoorthy, A. Bhardwaj, J. Singh, K. Pant, M. Tiwari and J. L. A. Gonzáles, "A Comprehensive review on Data Mining Techniques in managing the Medical Data cloud and its security constraints with the maintained of the communication networks," 2023 International Conference on Artificial Intelligence and Smart Communication (AISC), Greater Noida, India, 2023, pp. 618-623.

[125] 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.
[126] 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.
[127] B. Nemade, "Automatic traffic surveillance using video tracking," Procedia Comput. Sci., vol. 79, pp. 402–409, 2016.
[128] 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.
[129] B. Senapati and B. S. Rawal, "Quantum communication with RLP quantum resistant cryptography in industrial manufacturing," Cyber Security and Applications, vol. 1, no. 100019, p. 100019, 2023.
[130] 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.
[131] D. S. Das, D. Gangodkar, R. Singh, P. Vijay, A. Bhardwaj and A. Semwal, "Comparative Analysis of Skin Cancer Prediction using Neural Networks and Transfer Learning," 2022 5th International Conference on Contemporary Computing and Informatics (IC3I), Uttar Pradesh, India, 2022, pp. 367-371.
[132] E. Vashishtha and H. Kapoor, "Enhancing patient experience by automating and transforming free text into actionable consumer insights: a natural language processing (NLP) approach," International Journal of Health Sciences and Research, vol. 13, no. 10, pp. 275-288, Oct. 2023.
[133] K. Shukla, E. Vashishtha, M. Sandhu, and R. Choubey, "Natural Language Processing: Unlocking the Power of Text and Speech Data," Xoffencer International Book Publication House, 2023, p. 251.
[134] Kanike, U.K. (2023), Impact of Artificial Intelligence to improve the supply chain resilience in Small Medium Enterprises, International Conference on New Frontiers on the Global Stage of Multidisciplinary Research 2023
[135] Kanike, U.K. (2023), Impact of ICT-Based Tools on Team Effectiveness of Virtual Software Teams Working from Home Due to the COVID-19 Lockdown: An Empirical Study, International Journal of Software Innovation, Vol.10, No.1, P.1-20.
[136] Kanike, Uday Kumar, "An Empirical Study on the Influence of ICT-Based Tools on Team Effectiveness in Virtual Software Teams Operating Remotely During the COVID-19 Lockdown." Dissertation, Georgia State University, 2023.
[137] Mandvikar, S. (2023). Indexing robotic process automation products. International Journal of Computer Trends and Technology, 71(8), 52–56.
[138] Meng, F., Jagadeesan, L., & Thottan, M. (2021). Model-based reinforcement learning for service mesh fault resiliency in a web application-level. arXiv preprint arXiv:2110.13621.
[139] Meng, F., Zhang, L., & Chen, Y. (2023) FEDEMB: An Efficient Vertical and Hybrid Federated Learning Algorithm Using Partial Network Embedding.
[140] Meng, F., Zhang, L., Chen, Y., & Wang, Y. (2023). Sample-based Dynamic Hierarchical Transformer with Layer and Head Flexibility via Contextual Bandit. Authorea Preprints.
[141] Muda, I., Almahairah, M. S., Jaiswal, R., Kanike, U. K., Arshad, M. W., & Bhattacharya, S. (2023). Role of AI in Decision Making and Its Socio-Psycho Impact on Jobs, Project Management and Business of Employees. Journal for ReAttach Therapy and Developmental Diversities, 6(5s), 517-523.
[142] 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).

[143] R. Boina, A. Achanta, and S. Mandvikar, "Integrating data engineering with intelligent process automation for business efficiency," International Journal of Science and Research, vol. 12, no. 11, pp. 1736–1740, 2023.

[144] R. Regin, S. S. Rajest, Shynu T, & Steffi. R. (2023). Relationship Between Employee Loyalty and Job Satisfaction in an Organization. European Journal of Life Safety and Stability (2660-9630), 36(12), 54-73.

[145] Rajest, S. S., Regin, R., T, Shynu., & R, Steffi. (2023). Treatment Method for Sewage Water Used in Horticulture. European Journal of Life Safety and Stability, 36(12), 11-27.

[146] Razeghi, M., Dehzangi, A., Wu, D., McClintock, R., Zhang, Y., Durlin, Q., ... & Meng, F. (2019, May). Antimonite-based gap-engineered type-II superlattice materials grown by MBE and MOCVD for the third generation of infrared imagers. In Infrared Technology and Applications XLV (Vol. 11002, pp. 108-125). SPIE.

[147] S. Mandvikar and A. Achanta, "Process automation 2.0 with generative AI framework," Int. J. Sci. Res. (Raipur), vol. 12, no. 10, pp. 1614–1619, 2023.

[148] S. Mandvikar, "Augmenting intelligent document processing (IDP) workflows with contemporary large language models (LLMs)," International Journal of Computer Trends and Technology, vol. 71, no. 10, pp. 80–91, 2023.

[149] S. Mandvikar, "Factors to Consider When Selecting a Large Language Model: A Comparative Analysis," International Journal of Intelligent Automation and Computing, vol. 6, no. 3, pp. 37–40, 2023.

[150] S. Silvia Priscila, S. Suman Rajest, R. Regin, Shynu T, & Steffi. R. (2023). Classification of Satellite Photographs Utilizing the K-Nearest Neighbor Algorithm. Central Asian Journal of Mathematical Theory and Computer Sciences, 4(6), 53-71.

[151] S. Suman Rajest, R. Regin, Shynu T, & Steffi. R. (2023). An Approach Based on Machine Learning for Conducting Sentiment Analysis on Twitter Data. International Journal of Human Computing Studies, 5(12), 57-76.

[152] S. Suman Rajest, R. Regin, Shynu T, & Steffi. R. (2023). Using Voice Guidance, an Intelligent Walking Assistance Mechanism for the Blind. Central Asian Journal of Theoretical and Applied Science, 4(11), 41-63. Retrieved from https://cajotas.centralasianstudies.org/index.php/CAJOTAS/article/view/1335

[153] S. Suman Rajest, R. Regin, Shynu T, & Steffi. R. (2024). Analysis of Sentimental Bias the Implementation of Supervised Machine Learning Algorithms. International Journal of Innovative Analyses and Emerging Technology, 4(1), 8–33.

[154] S. Suman Rajest, S. Silvia Priscila, R. Regin, Shynu T, & Steffi. R. (2023). Application of Machine Learning to the Process of Crop Selection Based on Land Dataset. International Journal on Orange Technologies, 5(6), 91-112.

[155] 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.

[156] Shynu T, S. Suman Rajest, R. Regin, & Steffi. R. (2023). Corporate Governance and Family Involvement as Performance Factors. Spanish Journal of Innovation and Integrity, 25(12), 76-94.

[157] Shynu T, S. Suman Rajest, R. Regin, & Steffi. R. (2023). Region Segmentation and Support Vector Machine for Brain Tumour Stage Analysis, Detection, and Automatic Classification. Central Asian Journal of Medical and Natural Science, 25-43.

[158] Steffi. R, Shynu T, S. Suman Rajest, & R. Regin. (2023). A Convolutional Neural Network with a U-Net for Brain Tumor Segmentation and Classification. Central Asian Journal of Medical and Natural Science, 4(6), 1326-1343.

[159] Steffi. R, Shynu T, S. Suman Rajest, & R. Regin. (2023). Performance of Employees in Relation to The Effects of Change Management Practices. Central Asian Journal of Innovations on Tourism Management and Finance, 4(12), 1-23.

[160] Suman Rajest, S., Regin, R., Y, A., Paramasivan, P., Christabel, G. J. A., & T, Shynu. (2023). The Analysis of How Artificial Intelligence Has an Effect on Teachers and The Education System. EAI Endorsed Transactions on E-Learning, 9(4), 1-10.

[161] Sundararajan, V., Steffi, R., & Shynu, T. (2023). Data Fusion Strategies for Collaborative Multi-Sensor Systems: Achieving Enhanced Observational Accuracy and Resilience. FMDB Transactions on Sustainable Computing Systems, 1(3), 112–123.

[162] Tak, A. (2021). Multi-Modal Fusion for Enhanced Image and Speech Recognition in AI Systems. International Journal of Science and Research, 10(6), 1780-1788.

[163] Tak, A. (2021). The Data Mining Techniques for Analyzing Employee Performance and Productivity. International Journal of Science and Research, 10(10), 1575-1578.

[164] Tak, A. (2022). Big Data Analytics in Healthcare: Transforming Information into Actionable Insights. Journal of Health Statistics Reports, 1(3), 1-6.

[165] Tak, A. (2022). The Impact of Electronic Health Records on Patient Care in the US Healthcare System. Journal of Health Statistics Reports, 1(2), 1–7.

[166] Tak, A. (2023). The Role of Cloud Computing in Modernizing Healthcare IT Infrastructure. Journal of Artificial Intelligence & Cloud Computing, 2(2), 1–7.

[167] Tak, A., & Sundararajan, V. (2023, December 2). Pervasive Technologies and Social Inclusion in Modern Healthcare: Bridging the Digital Divide. FMDB Transactions on Sustainable Health Science Letters, 1(3), 118-129.

[168] V. Bansal, A. Bhardwaj, J. Singh, D. Verma, M. Tiwari and S. Siddi, "Using Artificial Intelligence to Integrate Machine Learning, Fuzzy Logic, and The IoT as A Cybersecurity System," 2023 3rd International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE), Greater Noida, India, 2023, pp. 762-769.

[169] V. K. Nomula, R. Steffi, and T. Shynu, "Examining the Far-Reaching Consequences of Advancing Trends in Electrical, Electronics, and Communications Technologies in Diverse Sectors," FMDB Transactions on Sustainable Energy Sequence, vol. 1, no. 1, pp. 27–37, 2023.