SCHOLARLY PUBLICATIONS
School of Computer Engineering
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Journal Name: IEEE Internet of Things Journal **IF: 10.6**

Title: Federated Learning and NFT-Based Privacy-Preserving Medical-Data-Sharing Scheme for Intelligent Diagnosis in Smart Healthcare

Author: Sai S., Hassija V., Chamola V., Guizani M.

Details: Volume 11, Issue 4, Pages 5568 – 5577, 15 February 2024

Abstract: Historical patients' medical data has an important impact on the healthcare industry for providing the best care to patients through intelligent health diagnosis and prediction of diseases. The existing intelligent health diagnosis systems collect data from medical institutions or laboratories and then use machine learning algorithms to predict diseases. But, in most cases, the medical institutions have incomplete medical data of the patients since a patient may consult different specialists (from various hospitals) during the treatment process. To overcome this problem, we build a smart and secure federated learning framework for intelligent health diagnosis with a blockchain-based incentive mechanism and nonfungible tokens (NFTs)-based marketplace. We make use of NFTs to develop clear demarkations on the ownership and accessibility of the data of patients. We create an NFT marketplace that manages access to the historical medical data of patients. A comprehensive incentive mechanism based on several factors, including the quality and relevance of the data, the frequency, regularity of data uploading, etc., is incorporated to encourage and penalize the patients based on their contributions to the global model. We used the Polyak-averaging technique for aggregating local models to form a global model. The extensive analysis shows that the proposed model achieves comparable performance with the centralized machine learning models while affording better security and access to better data. The results also show the efficacy of the proposed blockchain-based incentive mechanism.

URL: https://ieeexplore.ieee.org/document/10231150

SCHOLARLY PUBLICATIONS
School of Computer Engineering
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Journal Name: Journal of Retailing and Consumer Services **IF: 10.4**

Title: Exploring antecedents impacting user satisfaction with voice assistant app: A text mining-based analysis on Alexa services

Author: A. Kumar, P. K. Bala, S. Chakraborty & R. K. Behera

Details: Volume 76, January 2024

Abstract: The Amazon Alexa app is one of the most widely used voice assistant apps to manage customer information-seeking behavior and voice shopping. It provides companionship to the visually impaired and senior citizens. There has not been significant empirical evidence focusing on the determinants of user satisfaction with the voice assistant app. Therefore, this study proposed ten user satisfaction antecedents for the Amazon Alexa app based on 13,363 online user reviews. The Latent Dirichlet Allocation (LDA) technique, regression analysis, dominance analysis, and correspondence analysis were used to analyze these reviews. The regression analysis revealed ten user satisfaction predictors of the Amazon Alexa App. The voice shopping experience with the Alexa app aids caregivers in catering to the needs of elderly individuals by providing convenient shopping, voice-activated control, reminders, smart home integration, and access to information. The result of the dominance analysis shows personal assistance and app update are the most important factors for predicting user satisfaction with the VA app. Moreover, personal assistance and voice-controlled automation experience are the most frequent topics for senior citizens and blind people. The findings of this study can provide valuable insights for business managers in determining the prioritization of key determinants of user satisfaction and offering new competitors a competitive edge in the voice assistant market.

URL: https://www.sciencedirect.com/science/article/pii/S0969698923003375?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Computer Engineering
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Journal Name: **Journal of Retailing and Consumer Services** **IF: 10.4**

Title: Assessing the intention to adopt computational intelligence in interactive marketing

Author: Behera R. K., Bala P. K. & Rana N. P.

Details: Volume 78 , May 2024

Abstract: Interactive marketing (IM) can be used by e-commerce businesses to provide interactive and personalised experiences to e-customers by building sustainable relationships and delivering value. Computational intelligence (CI) is the ability of a machine to learn specific tasks via data or experimental observation for understanding and analysing customer behavioural patterns. Thus, this study explores how e-customers may intend to adopt CI in e-commerce within the boundaries of IM. Using online surveys, the primary data were collected from 315 e-customers of e-commerce businesses. Subsequently, the quantitative approach was used to analyse the data. The finding reveals that using a variety of techniques such as fuzzy logic, learning theory, evolutionary computation, genetic algorithms, and deep learning, CI predicts e-customer behaviour in a changing environment. Such a prediction results in desirable impacts, including more successful IM campaigns and retention actions. Further, CI uses a computational thinking approach, including the specification of the problem, algorithmic expression, solution implementation, and solution evaluation, for the identification and classification of stock-keeping units. This allows e-customers to compare the attributes of similar products.

URL: https://www.sciencedirect.com/science/article/pii/S0969698924000614?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Computer Engineering
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Journal Name: **Applied Soft Computing** **IF: 8.7**

Title: Integrative prognostic modeling for breast cancer: Unveiling optimal multimodal combinations using graph convolutional networks and calibrated random forest

Author: Palmal, Susmita; Arya, Nikhilanand; Saha, Sriparna & Tripathy, Somanath

Details: Volume 154, March 2024

Abstract: The most crucial step in the clinical decision-making process for patients with breast cancer is the accurate prediction of prognosis and survival length. Correct prognosis prediction aids in making the best treatment decision and may even lessen the effects of cancer. To achieve this, we have developed a novel predictive model using multimodal graph convolutional networks with calibrated random forest (MGCN-CalRF) for forecasting the prognosis of breast cancer by combining multiple sources of information or modalities. We have considered six different modalities, namely, mRNASeq, DNA methylation, Copy number variation, miRSeq, Clinical, and Whole slide Image data, which have been retrieved from TCGA Database. We have applied a Graph Convolutional Network for the feature extraction from individual modalities to grasp the structural relationships between data. Further, we concatenated all the extracted features concerning various combinations of modalities aiming to find the optimal combination of available modalities. The concatenated features from the Graph convolutional network are further fed to the Calibrated Classifier Model using Random Forest for the final prediction. It has been observed that the Graph Convolutional model which has been trained with the combination of three modalities, namely Clinical, miRSeq, and Whole slide Image data outperforms not only the combination of other modalities but also the other state-of-the-art models. This model attained accuracy, F1-score, and AUC of 0.771, 0.867, and 0.729, respectively.

URL: https://www.sciencedirect.com/science/article/pii/S1568494624001534?via%3Dihub

SCHOLARLY PUBLICATIONS
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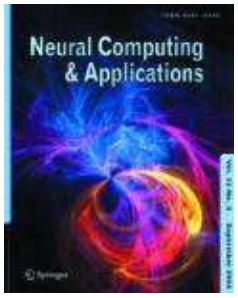
Journal Name: **Neural Computing and Applications** **IF: 6.0**

Title: Local features-based evidence glossary for generic recognition of handwritten characters

Author: T. K .Mishra, M. Kolhar, S. R. Mishra, H. Mohapatra , F. Al-Turjman & Rath A. K.

Details: Volume 36, Issue 02, October 2023

Abstract: Recognition of handwritten characters has been a challenging task so far. There exist thousands of official languages across the globe which are used to communicate through documentation. Optical character recognition (OCR) being the challenging domain in such context where images of such documents are to be recognized either offline or online. Online and offline recognition of documents refer to the approaches whereby the basic operation of character recognition is performed during documentation itself and recognizing characters from stored documents, respectively. Numerous applications from a range of fields like medical transcription, digitization of ancient manuscripts, language translations, etc. are solely dependent on the task of OCR. In this work, an efficient framework is presented for the purpose of handwritten character recognition that can be well utilized for both offline and online processes. The proposed work takes the handwritten character images as input. It applies set of pre-processing such that the samples become suitable for the feature extraction task. The novelty lies in the process of feature extraction whereby three distinct types of feature are considered based on the shape primitives of the images. These features are global to the sample. Subsequently, local shape features are further extracted out of this shape features after suitable quantization process. These local features are the evidences which can be generically used to recognize test samples. These local feature vectors are dubbed as evidences and are preserved into a glossary dubbed as evidence glossary. The efficiency of the proposed scheme is well justified as it utilizes only a fraction of the feature vector and still it can recognize the characters. Other advantages of the proposed work are scale invariance and rotations invariance. Suitable datasets from two distinct languages, namely Odia and English are utilized for evaluating the efficiency of the framework. Comparison of the performance of the framework with six distinct state-of-the-art machine learning models is conducted whereby it outclass the competent in terms of several performance metrics.



URL: https://link.springer.com/article/10.1007/s00521-023-09051-5

SCHOLARLY PUBLICATIONS
School of Computer Engineering
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Journal Name: **Internet of Things** **IF: 5.9**

Title: An SDN-enabled fog computing framework for wban applications in the healthcare sector

Author: Tripathy S.S., Bebortta S., Mohammed M.A., Nedoma J., Martinek R.& Marhoon H.A.

Details: Volume 26, July 2024

Abstract: For healthcare systems utilizing Wireless Body Area Networks (WBANs), maintaining the network's diverse Quality of Service (QoS) metrics necessitates effective communication among Fog Computing resources. While fog nodes efficiently handle local requests with substantial processing resources, it is crucial to acknowledge the unpredictable availability of these nodes, potentially resulting in a decline in system performance. This study explores a software-defined fog architecture supporting different healthcare applications in Internet of Things (IoT) environment to ensure consistent specialized medical care amidst evolving health issues. Even minor delays, packet losses, or network overhead could adversely affect patient health. The article establishes a mathematical foundation based on transmitted and sensed data, ensuring each fog node executes an ideal quantity of processes. This study formulates an optimization problem to maximize the utility of fog nodes, leveraging the Lagrangian approach and Karush-Kuhn-Tucker conditions to streamline and resolve the optimization problem. Performance analysis demonstrates a significant reduction in delays by approximately 38 %, 29 %, and 32 %, along with energy savings of roughly 26.89 %, 12.16 %, and 22.50 %, compared to benchmark approaches. This study holds promise in healthcare, cloud-fog simulation, and WBANs, emphasizing the critical need for swift and accurate data processing.

URL: https://www.sciencedirect.com/science/article/pii/S254266052400088X?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Computer Engineering
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Journal Name: Computer Networks **IF: 5.6**

Title: PQCLP: Parameterized quantum circuit based link prediction in dynamic networks

Author: Singh N., Kumar M., Biswas B.

Details: Volume 241, March 2024, Article number 110210

Abstract: Link prediction has been challenging, especially when the network is dynamic and complex. The most effective classical method for performing this task involved using machine learning algorithms with features taken from topological network indices. Even while these traditional ML algorithms perform better, they still require a lot of processing resources as the size and number of features in the network increase. This is the ideal situation where quantum computing may fit, as it provides impressive predictions and speedup arising out of quantum phenomena like superposition, entanglement, parallelization, and high dimensional space. Additionally, relatively little research has been done to examine the full potential of quantum computation for link prediction. A few of the earlier attempts are limited to projecting the features to quantum space and then using quantum-projected kernels with classical ML techniques or using hybrid classifiers by incorporating quantum enhancement in traditional random walks. We propose Parameterized Quantum Circuit based Link Prediction (PQCLP) model where we have used quantum circuits not only for projecting the classical data but also for training and optimization in quantum space using Variational Circuits Aka Ansatz which is a parameterized circuit. Here we employ two quantum methods namely Variational Quantum Classifier (VQC) and Quantum Neural Network Classifier (QNN) having classical equivalence with Support Vector Machines and Neural Networks respectively. We present here a detailed comparison of these models with their classical counterparts, within different feature categories and test ratios, and finally with a few state-of-the-art methods using several performance evaluation metrics.

URL: https://www.sciencedirect.com/science/article/pii/S1389128624000422?ssrnid=4467894&dgcid=SSRN_redirect_SD

Journal Name: Cognitive Computation **IF: 5.4**

Title: Interpreting Black-Box Models: A Review on Explainable Artificial Intelligence

Author: Hassija, Vikas; Chamola, Vinay; Mahapatra, Atmesh; Singal, Abhinandan; Goel, Divyansh;Huang, Kaizhu; Scardapane, Simone; Spinelli, Indro; Mahmud, Mufti; Hussain, Amir

Details: Volume16, Issue1, February 2024, Page45-74

Abstract: Recent years have seen a tremendous growth in Artificial Intelligence (AI)-based methodological development in a broad range of domains. In this rapidly evolving field, large numbers of methods are being reported using machine learning (ML) and Deep Learning (DL) models. Majority of these models are inherently complex and lacks explanations of the decision making process causing these models to be termed as 'Black-Box'. One of the major bottlenecks to adopt such models in mission-critical application domains, such as banking, e-commerce, healthcare, and public services and safety, is the difficulty in interpreting them. Due to the rapid proleferation of these AI models, explaining their learning and decision making process are getting harder which require transparency and easy predictability. Aiming to collate the current state-of-the-art in interpreting the black-box models, this study provides a comprehensive analysis of the explainable AI (XAI) models. To reduce false negative and false positive outcomes of these back-box models, finding flaws in them is still difficult and inefficient. In this paper, the development of XAI is reviewed meticulously through careful selection and analysis of the current state-of-the-art of XAI research. It also provides a comprehensive and in-depth evaluation of the XAI frameworks and their efficacy to serve as a starting point of XAI for applied and theoretical researchers. Towards the end, it highlights emerging and critical issues pertaining to XAI research to showcase major, model-specific trends for better explanation, enhanced transparency, and improved prediction accuracy.

URL: https://link.springer.com/article/10.1007/s12559-023-10179-8

SCHOLARLY PUBLICATIONS
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Journal Name: **Biomedical Signal Processing and Control** **IF: 5.1**

Title: Classification of non-small cell lung cancer types using sparse deep neural network features

Author: A. K. Swain, A. Swetapadma , J. K. Rout & B. K. Balabantaray

Details: Volume 87, January 2024

Abstract: Most of the non-small cell lung cancer is clinically examined using CT/PET images. But an accurate diagnosis by the radiologist is difficult while classifying the type of non-small cell cancer, which may lead to misdiagnosis. Hence, a method is required to accurately identify different types of non-small cell lung cancers, such as adeno-carcinoma and squamous cell carcinoma for providing proper treatment to patients. One of the practical and feasible solution is deep learning based method that has the ability to adapt and learn. However, most of the deep learning methods have complexity issues. Hence, some optimization is required to make the networks less complex. The objective of the work is to use less complex methods for classifying the non-small cell lung cancer. In this work, dense neural network (VGG-16 and Resnet-50) that has complex structures and sparse neural networks (inceptio v3) that are less complex are used. Deep learning methods are employed to obtain features from CT images and accurately classify non-small cell lung cancer. To evaluate the method, 60 adenocarcinoma patients and 60 squamous cell carcinoma patients are considered. The sensitivity, specificity, and accuracy of the Inception v3 network are found to be 96.66 %, 99.12 % and 98.29 % respectively. Observations indicate that the inception v3 model outperforms VGG-16 and ResNet-50. Also, the inception v3 network that is a sparse neural network has less computational overhead as compared to the other two networks. Sparse deep learning techniques may help radiologists accurately classify non-small cell lung cancer using CT images.

URL: https://www.sciencedirect.com/science/article/pii/S1746809423009187?via%3Dihub

SCHOLARLY PUBLICATIONS
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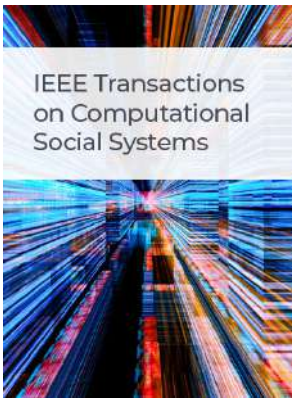
Journal Name: IEEE Transactions on Computational Social Systems **IF: 5.0**

Title: Captionomaly: A Deep Learning Toolbox for Anomaly Captioning in Social Surveillance Systems

Author: Goyal A., Mandal M., Hassija V., Aloqaily M., Chamola V.

Details: Volume 11, Issue 1, Pages 207 – 215, 1 February 2024

Abstract: Real-time video stream monitoring is gaining huge attention lately with an effort to fully automate this process. On the other hand, reporting can be a tedious task, requiring manual inspection of several hours of daily clippings. Errors are likely to occur because of the repetitive nature of the task causing mental strain on operators. There is a need for an automated system that is capable of real-time video stream monitoring in social systems and reporting them. In this article, we provide a tool aiming to automate the process of anomaly detection and reporting. We combine anomaly detection and video captioning models to create a pipeline for anomaly reporting in descriptive form. A new set of labels by creating descriptive captions for the videos collected from the UCF-Crime (University of Central Florida-Crime) dataset has been formulated. The anomaly detection model is trained on the UCF-Crime, and the captioning model is trained with the newly created labeled set UCF-Crime video description (UCFC-VD). The tool will be used for performing the combined task of anomaly detection and captioning. Automated anomaly captioning would be useful in the efficient reporting of video surveillance data in different social scenarios. Several testing and evaluation techniques were performed. Source code and dataset: https://github.com/Adit31/Captionomaly-Deep-Learning-Toolbox-for-Anomaly-Captioning.



URL: https://ieeexplore.ieee.org/document/10021309

SCHOLARLY PUBLICATIONS
School of Computer Engineering
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Journal Name: IEEE Transactions on Consumer Electronics **IF: 4.3**

Title: Towards Multi-Modal Deep Learning-Assisted Task Offloading for Consumer Electronic Devices Over An IoT-Fog Architecture

Author: Tripathy S.S., Bebortta S., Haque M.I.U., Zhu Y., Gadekallu T.R.

Details: Pages 1-1, 2024

Abstract: Internet of Things (IoT) devices along with associated software have proliferated at an unprecedented pace, presenting the challenge of high energy use combined with latency during complex, time-sensitive transactions. Fog computing, i.e., a distributed computing paradigm, may be a potential remedy. However, despite these efforts, it is highly strenuous to regulate service latency and energy efficiency within the fog computing layer for IoT centered consumer electronics. In our research, we propose an algorithm called Dynamic Deep Reinforcement learning-based Task Offloading (DDTO). Therefore, in multi-modal IoT-Fog systems, the intelligent distribution of fog computing resources by DDTO is considered on the basis of resources constraints and the timeliness of completion of tasks. We use a log-normal distribution to describe delay and energy consumption so as to make up for varying modalities. Besides, a task prioritization problem, which is described as an integer programming problem, that minimizes service latency and energy consumption in fog servers is further described. DDTO yields better performance than a conventional Q–learning with respect to long-term expected rewards since it uses task priority weights derived from statistical latency and energy data. Experimental results demonstrate the benefits of DDTO on reducing service latency and consumption of energy, when compared to benchmark strategies, discussing issues with multiple modalities within IoT-Fog systems.

URL: https://ieeexplore.ieee.org/document/10438859

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Journal Name: IEEE Transactions on Consumer Electronics **IF: 4.3**

Title: A Blended Deep Learning Intrusion Detection Framework For Consumable Edge-Centric IoMT Industry

Author: Alzubi J.A., Alzubi O.A., Qiqieh I., Singh A.

Details: Pages 1-1, 2024

Abstract: The demand for medical sensors in the Smart Healthcare System (SHS) creates an intelligent Internet of Medical Things (IoMT) system. This system plays an important role in detecting the vital parameters of the human body. However, security and privacy issues in terms of network vulnerability have arisen due to the transmission of data and lack of control over the data. The Intrusion Detection System (IDS) is one of the security solutions to identify various threats and vulnerabilities in the consumable edge-centric IoMT industry. Several IDS techniques have been developed in previous years. However, a real-time and highly accurate attack detection system in the edge-centric IoMT industry is needed. This paper proposes a blended deep learning framework that leverages the strengths and capabilities of different deep learning architectures. The proposed model combined Convolutional Neural Network (CNN) and Long Short-Term Memory (LSTM) to recognize the latest intruders accurately and defend the healthcare data. The major outcome of the proposed framework is to detect different attacks during data transmission at the edge of the network with high accuracy and efficiency. The proposed model was analyzed on the CSE-CIC-IDS 2018 systematic dataset containing two distinct classes of profiles. The experimental results demonstrate that the proposed framework's accuracy is higher than the existing approach.

URL: https://ieeexplore.ieee.org/document/10382176

SCHOLARLY PUBLICATIONS
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Journal Name: Computers **IF: 4.2**

Title: Brain Tumour Classification Using Noble Deep Learning Approach with Parametric Optimization through Metaheuristics Approaches.

Author: Nayak, Dillip Ranjan; Padhy, Neelamadhab; Mallick, Pradeep Kumar; Bagal, Dilip Kumar; Kumar,Sachin

Details: Volume 13, Issue 1, 2024

Abstract: Deep learning has surged in popularity in recent years, notably in the domains of medical image processing, medical image analysis, and bioinformatics. In this study, we offer a completely autonomous brain tumour segmentation approach based on deep neural networks (DNNs). We describe a unique CNN architecture which varies from those usually used in computer vision. The classification of tumour cells is very difficult due to their heterogeneous nature. From a visual learning and brain tumour recognition point of view, a convolutional neural network (CNN) is the most extensively used machine learning algorithm. This paper presents a CNN model along with parametric optimization approaches for analysing brain tumour magnetic resonance images. The accuracy percentage in the simulation of the above-mentioned model is exactly 100% throughout the nine runs, i.e., Taguchi's L9 design of experiment. This comparative analysis of all three algorithms will pique the interest of readers who are interested in applying these techniques to a variety of technical and medical challenges. In this work, the authors have tuned the parameters of the convolutional neural network approach, which is applied to the dataset of Brain MRIs to detect any portion of a tumour, through new advanced optimization techniques, i.e., SFOA, FBIA and MGA.

URL: https://www.mdpi.com/2073-431X/11/1/10

SCHOLARLY PUBLICATIONS
School of Computer Engineering
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Journal Name: Frontiers of Computer Science **IF: 4.2**

Title: DNACDS: Cloud IoE big data security and accessing scheme based on DNA cryptography

Author: Singh, Ashish; Kumar, Abhinav; Namasudra, Suyel

Details: Volume 18, Issue 1, Article No. 181801, 2024

Abstract: The Internet of Everything (IoE) based cloud computing is one of the most prominent areas in the digital big data world. This approach allows efficient infrastructure to store and access big real-time data and smart IoE services from the cloud. The IoE-based cloud computing services are located at remote locations without the control of the data owner. The data owners mostly depend on the untrusted Cloud Service Provider (CSP) and do not know the implemented security capabilities. The lack of knowledge about security capabilities and control over data raises several security issues. Deoxyribonucleic Acid (DNA) computing is a biological concept that can improve the security of IoE big data. The IoE big data security scheme consists of the Station-to-Station Key Agreement Protocol (StS KAP) and Feistel cipher algorithms. This paper proposed a DNA-based cryptographic scheme and access control model (DNACDS) to solve IoE big data security and access issues. The experimental results illustrated that DNACDS performs better than other DNA-based security schemes. The theoretical security analysis of the DNACDS shows better resistance capabilities.

URL: https://link.springer.com/article/10.1007/s11704-022-2193-3

SCHOLARLY PUBLICATIONS
School of Computer Engineering
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Journal Name: **Soft Computing** **IF: 4.1**

Title: Intelligent fault diagnostic system for rotating machinery based on IoT with cloud computing and artificial intelligence techniques: a review

Author: M. Maurya , I. Panigrahi, D. Dash & C. Malla

Details: Volume 36, Issue 02, October 2023

Abstract: The important part of mechanical equipment is rotating machinery, used mostly in industrial machinery. Rolling element bearings are the utmost dominant part in rotating machinery, so even small defects in these components could result in catastrophic system failure and enormous financial losses. Hence, it is crucial to create consistent and affordable condition monitoring and fault diagnosis systems that estim ate severity level and failure modes and to create an appropriate maintenance strategy. The studies reveal that the fault diagnostic system focuses on single fault diagnosis of the shaft-bearing system. However, in real scenarios, the occurrence of a single fault is very unlikely. Thus, multifault diagnosis of the shaft-bearing system is of greater significance. This paper aims at steadily and broadly summarizing the development of the intelligent multifault diagnostic and condition monitoring systems. In addition, there is a rapid development of application of Internet of things, cloud computing and artificial intelligence techniques for fault diagnosis. In this paper, we summarize the study of various fault diagnostic system built on the architecture and application of these cutting-edge technologies for predictive maintenance of mechanical equipment.

URL: https://link.springer.com/article/10.1007/s00500-023-08255-0

SCHOLARLY PUBLICATIONS
School of Computer Engineering
KIIT Deemed to be University

Journal Name: **Heliyon** **IF: 4.0**

Title: FedHealthFog: A federated learning-enabled approach towards healthcare analytics over fog computing platform

Author: Tripathy S.S., Bebortta S., Chowdhary C.L., Mukherjee T., Kim S., Shafi J. & Ijaz M.F.

Details: Volume 10, Issue 05, March 2024

Abstract: The emergence of federated learning (FL) technique in fog-enabled healthcare system has leveraged enhanced privacy towards safeguarding sensitive patient information over heterogeneous computing platforms. In this paper, we introduce the FedHealthFog framework, which was meticulously developed to overcome the difficulties of distributed learning in resource-constrained IoT-enabled healthcare systems, particularly those sensitive to delays and energy efficiency. Conventional federated learning approaches face challenges stemming from substantial compute requirements and significant communication costs. This is primarily due to their reliance on a singular server for the aggregation of global data, which results in inefficient training models. We present a transformational approach to address these problems by elevating strategically placed fog nodes to the position of local aggregators within the federated learning architecture. A sophisticated greedy heuristic technique is used to optimize the choice of a fog node as the global aggregator in each communication cycle between edge devices and the cloud. The FedHealthFog system notably accounts for drop in communication latency of 87.01%, 26.90%, and 71.74%, and energy consumption of 57.98%, 34.36%, and 35.37% respectively, for three benchmark algorithms analyzed in this study. The effectiveness of FedHealthFog is strongly supported by outcomes of our experiments compared to cutting-edge alternatives while simultaneously reducing number of global aggregation cycles. These findings highlight FedHealthFog's potential to transform federated learning in resource-constrained IoT environments for delay-sensitive applications.

URL: https://www.sciencedirect.com/science/article/pii/S2405844024024472?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Computer Engineering
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Journal Name: **IEEE Access** **IF: 3.9**

Title: Game-Theoretic Resource Allocation and Dynamic Pricing Mechanism in Fog Computing

Author: Bandopadhyay, Anjan; Swain, Sujata; Singh, Raj; Sarkar, Pritam; Bhattacharyya, Siddhartha & Mrsic, Leo

Details: Volume 12, April 2024

Abstract: Fog computing is a promising and challenging paradigm that enhances cloud computing by enabling efficient data processing and storage closer to data sources and users. This paper introduces a game-theoretic approach called GTRADPMFC (Game-Theoretic Resource Allocation and Dynamic Pricing Mechanism in Fog Computing) to address resource allocation and dynamic pricing challenges in fog computing environments with limited resources. The proposed model features non-cooperative competition among fog nodes for resources and dynamic pricing mechanisms to encourage efficient resource utilization. Theoretical analysis and simulations demonstrate that GTRADPMFC improves resource efficiency and overall fog computing system performance. Additionally, the paper discusses how to handle situations with insufficient samples and provide flexibility for users unable to meet completion time requirements. GTRADPMFC effectively manages resource allocation by establishing pricing in fog computing, considering potential delays in completion time. This is achieved through research, simulations, convergence analysis, complexity evaluation, and optimization guarantees.

URL: https://ieeexplore.ieee.org/document/10488387

SCHOLARLY PUBLICATIONS
School of Computer Engineering
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Journal Name: **IEEE ACCESS** **IF: 3.9**

Title: An Efficient Hybrid Feature Selection Technique Toward Prediction of Suspicious URLs in IoT Environment

Author: Mohanty, Sanjukta; Acharya, Arup Abhinna; Gaber, Tarek; Panda, Namita; Eldesouky, Esraa & Hameed, Ibrahim A.

Details: Volume 12, April 2024

Abstract: With the growth of IoT, a vast number of devices are connected to the web. Consequently, both users and devices are susceptible to deception by intruders through malicious links leading to the disclosure of personal information. Hence, it is essential to identify suspicious URLs before accessing them. While numerous researchers have proposed several URL detection approaches, the machine learning-based technique stands out as particularly effective because of its ability to detect zero-day attacks; however, its success depends on the type and dimension of features utilized. In earlier research, only the lexical features of URLs were employed for classification to attain high detection speeds. However, this approach does not allow for the retrieval of comprehensive information about a website. Hence, to enhance the security of IoT devices, both lexical and page content-based features of URLs must be considered. To improve the performance of the model, the researchers extract informative features using different Feature Selection Techniques (FSTs), including filter and wrapper methods. However, challenges such as the demand for more resources, time, and handling of high-dimensional datasets encountered by individual FSTs have driven the development of hybrid FSTs. Nevertheless, the combination of a filter-based FST and a wrapper search-based Genetic Algorithm (GA) is used in the identification of malicious URLs as well as the detection of malicious links in the IoT devices research studies. Therefore, the proposed approach leverages the advantages of a variety of features and explores a hybrid FST to produce the optimal feature subset to evaluate the boosting estimators with specific hyperparameter configurations. Our proposed approach effectively fills the research gap associated with previous methodologies research 99% while keeping the computational costs minimal, making it suitable for resource-constrained devices in detecting malignant URLs.

URL: https://ieeexplore.ieee.org/document/10489965

SCHOLARLY PUBLICATIONS
School of Computer Engineering
KIIT Deemed to be University

Journal Name: **IEEE Access** **IF: 3.9**

Title: Recent Advances in Quantum Computing for Drug Discovery and Development

Author: Kumar G., Yadav S., Mukherjee A., Hassija V., Guizani M.

Details: March 2024

Abstract: The preservation of human health is of utmost importance, and unrestricted availability of medications is essential for the sustenance of overall wellness. Pharmaceuticals, which consist of a wide range of therapeutic substances utilized to diagnose, treat, and improve various diseases and conditions, play a crucial part in the field of healthcare. However, the drug research and development process is widely recognized for its lengthy duration, demanding nature, and substantial expenses. To enhance the effectiveness of this complex process, interdisciplinary groups have converged, giving rise to the field known as “Bioinformatics”. The emergence and future advancements of Quantum Computing (QC) technologies have the potential to significantly enhance and accelerate the complex process of drug discovery and development. This paper explores various disciplines, such as Computer-Aided Drug Design (CADD), quantum simulations, quantum chemistry, and clinical trials, that stand to gain significant advantages from the rapidly advancing field of quantum technology. This study aims to explore a range of fundamental quantum principles, intending to facilitate a thorough understanding of this revolutionary technology.

URL: https://ieeexplore.ieee.org/document/10466774

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Journal Name: **IEEE Access** **IF: 3.9**

Title: Privacy and Security Concerns in Generative AI: A Comprehensive Survey

Author: Golda A., Mekonen K., Pandey A., Singh A., Hassija V., Chamola V. & Sikdar B.

Details: Volume 12, 2024

Abstract: Generative Artificial Intelligence (GAI) has sparked a transformative wave across various domains, including machine learning, healthcare, business, and entertainment, owing to its remarkable ability to generate lifelike data. This comprehensive survey offers a meticulous examination of the privacy and security challenges inherent to GAI. It provides five pivotal perspectives essential for a comprehensive understanding of these intricacies. The paper encompasses discussions on GAI architectures, diverse generative model types, practical applications, and recent advancements within the field. In addition, it highlights current security strategies and proposes sustainable solutions, emphasizing user, developer, institutional, and policymaker involvement.

URL: https://ieeexplore.ieee.org/document/10478883

SCHOLARLY PUBLICATIONS
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Journal Name: **IEEE Access** **IF: 3.9**

Title: A Survey on Available Tools and Technologies Enabling Quantum Computing

Author: Singh P., Dasgupta R., Singh A., Pandey H., Hassija V., Chamola V. & Sikdar B.

Details: Volume 12, 2024

Abstract: In the contemporary era of scientific and technical innovations, we are witnessing remarkable progress in the realm of quantum computing. Today's phase is referred to as the second quantum revolution, characterized by ongoing research and progress in the hardware, software, and applications of quantum computers. While the theoretical foundations of quantum computing have been in place for decades, the practical tools and technologies that have emerged in recent years have catapulted this field from theory into reality. This paper provides a brief overview of the fundamental principles of quantum computing and explores the various technologies that support them. From quantum programming languages and simulators to quantum hardware platforms and software development kits, these tools have paved the way for groundbreaking research, experimentation, and the exploration of quantum's boundless potential. Furthermore, it addresses the current developments, existing challenges, ongoing improvements, and future prospects in this dynamic field. Authors

URL: https://ieeexplore.ieee.org/document/10497574

SCHOLARLY PUBLICATIONS
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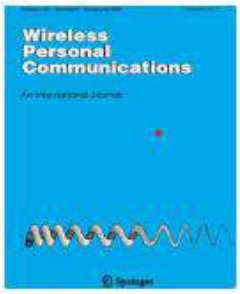
Journal Name: **Wireless Personal Communication** **IF: 2.2**

Title: High Payload Image Steganography Using DNN Classification and Adaptive Difference Expansion

Author: Dash, Shreela; Behera, Dayal Kumar; Swetanisha, Subhra; Das, Madhabananda

Details: Volume 134, April 2024

Abstract: The primary intention of this study is to enhance the capacity while ensuring visual integrity and maintaining privacy. A novel information-hiding method based on Adaptive embedding and Machine Learning classifier is proposed. To improve the capacity, the private message is compressed using Adaptive Huffman Encoding. The cover image blocks are classified based on the collected features from each block, determining the ideal Embedding Capacity (EC). The suggested approach has been verified in three distinct categories: the effectiveness of ML classifier, embedding method efficiency, and its robustness. DNN block classifier outperforms the LR and RF classifiers with 99% validation accuracy. The embedding approach with DNN as the block classifier got a PSNR close to 50 at an embedding rate of 1.22 bpp. The robustness of the proposed method is demonstrated with random addition of S&P to the Stego image at 0.5bpp of EC. The proposed scheme sustain S&P noise with accuracy 77% for 50% noise density.



URL: https://link.springer.com/article/10.1007/s11277-024-10944-4

SCHOLARLY PUBLICATIONS
School of Computer Engineering
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Journal Name: **International Journal of System Assurance Engineering and Management** **IF: 2.0**

Title: A dissection of agile software development in changing scenario and the sustainable path ahead

Author: Chakravarty, Krishna; Singh, Jagannath

Details: March 2024

Abstract: In the recent years some unprecedented changes in business processes have been observed due to pandemic. The world has experienced the power of information technology to sail through this testing times. A huge number of software have been created and used during this pandemic. Agile is the most popular software development methodology in the current decade and its key values are frequent interactions, development of working software, customer collaboration and response to change. These values are heavily dependent on interactions among key stakeholders like developers, testers, scrum masters and customers. Now due to pandemic situation, software development process itself has undergone a few key changes i.e. shifting the workspace to home, restricted travels, challenges in collaborative work in global platform, etc. The research work takes a deep dive into the impact of COVID-19 specially on the health of the software, work environment factors including challenges and survival strategies. The health of a software is investigated by software metrics like productivity, customer satisfaction, defect counts. The work environment aspects include employee motivation, work life balance, ease of global team management, etc. A survey is conducted to collect feedback from more than 4000 IT professionals working on 177 different projects. Finally the results are analyzed both quantitatively and qualitatively and a sustainable future path is suggested with mixed mode of work. To verify the strength and internal consistency of the survey, Cronbach Alpha coefficient method is implemented. The suggested future mode of work is also validated by evidence of implementation of revised work policies in different organization across the globe.

URL: https://link.springer.com/article/10.1007/s13198-024-02283-1