

KALANA

School of Computer Engineering
Research Magazine

April 2026

Kalinga Institute of Industrial Technology,
Deemed to be University,
Bhubaneswar, Odisha



Education is the most powerful weapon to bring empowerment.

- Achyuta Samanta



KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY
Deemed to be University U/S - 3 of the UGC Act, 1956
SCHOOL OF COMPUTER ENGINEERING

Editorial Board

We are thankful to Respected Founder Dr. Achyuta Samanta for providing such a conducive environment. We are obliged to honourable vice chancellor Dr. Saranjit Singh, Dr. Samaresh Mishra, Director-General (Student Affairs) for his continued support and Prof. Bhabani Shankar Prasad Mishra, Dean (Academics), School of Computer Engineering, for their continued support.

We thank all faculty colleagues and students for their contribution for this edition of Kalana.

Prof. Santwana Sagnika
Faculty



Prof. Saurabh Bilgaiyan
Faculty



Raunaq Ghoshal
Student



Nikita Vishwakarma
Student





Publications

Enhanced framework for COVID-19 prediction with computed tomography scan images using dense convolutional neural network and novel loss function

Recent studies have shown that computed tomography (CT) scan images can characterize COVID-19 disease in patients. Several deep learning (DL) methods have been proposed for diagnosis in the literature, including convolutional neural networks (CNN). But, with inefficient patient classification models, the number of 'False Negatives' can put lives at risk. The primary objective is to improve the model so that it does not reveal 'Covid' as 'Non-Covid'. This study uses Dense-CNN to categorize patients efficiently. A novel loss function based on cross-entropy has also been used to improve the CNN algorithm's convergence. The proposed model is built and tested on a recently published large dataset. Extensive study and comparison with well-known models reveal the effectiveness of the proposed method over known methods. The proposed model achieved a prediction accuracy of 93.78%, while false-negative is only 6.5%. This approach's significant advantage is accelerating the diagnosis and treatment of COVID-19.

***Anand Motwani
Piyush Kumar Shukla
Mahesh Pawar
Manoj Kumar
Uttam Ghosh
Waleed Alnumay
Soumya Ranjan Nayak***

***Computers and
Electrical
Engineering
Elsevier***

A smart and sustainable framework for millet crop monitoring equipped with disease detection using enhanced predictive intelligence

This research aims to develop a smart and sustainable framework by integrating Internet of things (IoT) and deep learning (DL). In the presented framework, a sensory module based automated crop health data gathering system with an improved deep learning-assisted intelligent disease recognition model is developed for the millet crop. Sensors collect data from millet farmland transfer the crop data readings to the cloud server for storage and Raspberry Pi for further detection. A hybrid predictive model, Customized Convolutional neural network (Customized-CNN) model works with the Raspberry Pi to predict the presence of blast and rust disease symptoms in millet. The proposed sustainable model is implemented, and it generates productive outcomes. The recorded accuracy, precision, recall, and f-score values with the customized CNN model were 98.8%, 98.2%, 97.4%, and 97.7%, respectively. The training and testing delays were only 67 s and 88 s, respectively. Also, the model proved to be scalable, as it gave noteworthy performance with diverse crops. The evaluation shows the reliability of the model, and it can be used by farming societies to enhance millet cereal yield in a cost-effective way.

***Sushruta Mishra
Dayal Rohan Volety
Navdeep Bohra
Sultan Alfarhood
Mejdl Safran***

***Alexandria
Engineering
Journal
Elsevier***

An Image Security Model Based on Chaos and DNA Cryptography for IIoT Images

The images generated by smart cameras and sensors in an Industrial Internet of Things (IIoT) ecosystem are at significant risk when transmitted over a public network due to the dynamicity and open nature of the IIoT environment. Encryption is a viable method for safeguarding IIoT digital images. This article addresses an image security framework using chaotic maps and DNA cryptography. The proposed algorithm uses a tent, circle, Chebyshev, and 3-D logistic map in a multilevel fashion to generate three keys. These keys are used for row-column rotation of subblocks, determine the rule to perform DNA encoding-decoding on the subblocks, and generate a key image on which DNA XOR operation is performed to get the encrypted image. The proposed scheme's result analysis illustrates that the average NPCR (99.6566%), UACI (33.4588%), Entropy (7.9971), and larger key-space are better than the existing schemes and are resistant to different attacks.

Anish Kumar Singh
Kakali Chatterjee
Ashish Singh

***IEEE Transactions
on Industrial
Informatics***

Prediction based mean-value-at-risk portfolio optimization using machine learning regression algorithms for multi-national stock markets

The future performance of stock markets is the most crucial factor in portfolio creation. As machine learning technique is advancing, new possibilities have opened up for incorporating prediction concepts into portfolio selection. A hybrid approach that constitutes machine learning algorithms for stock return prediction and a mean-VaR (value-at-risk) model for portfolio selection is illustrated in this paper as a unique portfolio construction technique. Machine learning regression models such as Random Forest, Extreme Gradient Boosting (XGBoost), Adaptive Boosting (AdaBoost), Support Vector Machine Regression (SVR), k-Nearest Neighbors (KNN), and Artificial Neural Network (ANN) are adopted to forecast stock values for the next period. The stocks with greater prospective returns are chosen in the first stage of this affection. Further, the mean-VaR portfolio optimization model is employed for portfolio selection in the second stage. The monthly datasets of the Bombay Stock Exchange (BSE), India, Tokyo Stock Exchange, Japan, and Shanghai Stock Exchange, China, are used as the research sample, and the findings show that the mean-VaR model with AdaBoost prediction outperforms other models.

***Jyotirmayee Behera
Ajit Kumar Pasayat
Harekrushna Behera
Pankaj Kumar***

***Engineering
Applications of
Artificial
Intelligence***

State-of-the-Art Load Balancing Algorithms for Mist-Fog-Cloud Assisted Paradigm: A Review and Future Directions

The physical gap between the Cloud datacenter and IoT devices causes a huge latency overhead. Furthermore, the centralized datacenter also experiences tremendous power consumption. Fog computing layer is introduced as a complementary layer to Cloud computing in between the IoT and the Cloud layer. Fog computing appears as cutting-edge technology to leverage the large computations in the Fog layer. A Mist layer is placed in between the Fog and IoT layer to enable routing of the requests to Fog nodes and Cloud virtual machines. Many articles propose different load balancing strategies to distribute the loads uniformly in both Fog and Cloud layers. This contribution considers a wide spectrum of reviews as well as research articles into consideration ranging from 2010 to 2022. Besides, a layered architecture is proposed considering the IoT, Mist, Fog, and Cloud layers. Furthermore, research queries are analyzed and answered about the load balancing for these evolving paradigms, critical issues and challenges, and future directions. It is believed that this contribution would be a helping hand for the nascent researchers to get an insight into evolving paradigms, algorithms, issues, challenges, and future directions.

***Subhranshu Sekhar
Tripathy
Kaushik Mishra
Diptendu Sinha Roy
Ali Alferaidi
Wattana Viriyasitavat***

***Archives of
Computational
Methods in
Engineering
Springer***

Shuffled-Xception-DarkNet-53: A content-based image retrieval model based on deep learning algorithm

This paper proposes Shuffled-Xception-DarkNet-53, an advanced version of DarkNet-53 for Content-Based Image Retrieval (CBIR). The proposed model introduced the notion of the Shuffled -Xception module, which uses three sets of 1×1 , 3×3 , and 5×5 size filters using a serial connection in place of a single 3×3 size filter to extract more refined features from the input images. Instead of the standard 2D Convolution operation, 'Group Convolution' is employed in the proposed Shuffled -Xception module to make the training process of the proposed CNN more efficient. Furthermore, 'Group Convolution' improves the co-relations among the filters of the corresponding Shuffled -Xception module, resulting in more informative features. Between every two serial Group Convolution layers of the same size, one Channel Shuffle layer is used to prevent the loss of information flow among the channels of different groups. The proposed method outperformed the twelve compared methods, including conventional and CNN-based CBIR methods, in ten standard image datasets.

Debanjan Pathak
U.S.N. Raju

***Computers and
Electrical
Engineering
Elsevier***

Unethical use of information access and analytics in B2B service organisations: The dark side of behavioural loyalty

In business-to-business (B2B) service organisations, unethical practices frequently lead to an adverse impact on business. Therefore, B2B must adopt the ethical use of information access and analytics to deliver the best service quality as it positively influences behavioural loyalty. This study explores the unethical use of information access and analytics on B2B relationships to observe the dark side of service quality and behavioural loyalty. A novel conceptual model based on information access, analytics, service quality, customer perceived value and behavioural loyalty is proposed. A quantitative methodology is applied to raw data gathered from 307 respondents of B2B service firms. This study concludes that unethical use of access to privacy and secured information, and unethical use of analytics in sensitive inferences, risk assessment, model drift and eDiscovery results in unfavourable service quality. The unfavourable service quality leads to unfavourable behavioural loyalty. Therefore, acting ethically is essential for long-lasting relationships.

***Rajat Kumar Behera
Pradip Kumar Bala***

***Industrial
Marketing
Management
Elsevier***

Anomaly Detection Using LSTM-Based Variational Autoencoder in Unsupervised Data in Power Grid

This article proposes a deep generative model for anomaly detection in unsupervised power grid data. One-class classifier-based methods suffer from performance degradation when training data contain anomalous samples. Due to the temporal characteristics in most of the power grid datasets, we explore a long short-term memory-variational autoencoder-based deep generative model that can tolerate the moderate presence of anomalous data during training instead of standard data. This work demonstrates the advantage of reconstruction-based methods over clustering-based methods. As part of the reparameterization of the latent layer, a method is proposed by employing wavelet decomposition of the wavelet coefficients found from the high and medium frequency representations of the input time-series data. For further improvement, we have incorporated a logcosh-based cost function instead of the traditional consideration of the L2 norm-based cost function. The numerical results demonstrate an improvement of performance metrics, such as AUC by 0.1-0.2 of our method over other benchmark methods.

Dibyajyoti Guha
Rajdeep Chatterjee
Biplab Sikdar

***IEEE Systems
Journal***

Edge computing based secure health monitoring framework for electronic healthcare system

Nowadays, Smart Healthcare Systems (SHS) are frequently used by people for personal healthcare observations using various smart devices. Processing such a huge amount of data from numerous IoT devices in a short time is quite challenging. Thus, technological frameworks such as edge computing or fog computing can be used as a middle layer between cloud and user in SHS. It reduces the response time for data processing at the lower level (edge level). But, Edge of Things (EoT) also suffers from security and privacy issues. A robust healthcare monitoring framework with secure data storage and access is needed. This paper proposed a Secure Framework based on the Edge of Things (SEoT) for Smart healthcare systems. This framework is mainly designed for real-time health monitoring, maintaining the security and confidentiality of the healthcare data in a controlled manner. This paper included clustering approaches for analyzing bio-signal data for abnormality detection and Attribute-Based Encryption (ABE) for bio-signal data security and secure access. The experimental results of the proposed framework show improved performance with maintaining the accuracy of up to 98.5% and data security.

Ashish Singh
Kakali Chatterjee

Cluster Computing
Springer

TrIDS: an intelligent behavioural trust based IDS for smart healthcare system

The Medical Cyber-Physical Systems (MCPS) are composed of several medical devices and low-cost sensors for real-time diagnosis, monitoring, and decision-making. Often, the MCPS sensitive data are processed by a trusted third party. Thus, the movement of MCPS sensitive data from the data owner to the third party becomes vulnerable to many malicious activities. Also, insider attacks can be easily performed, leaking the patient's confidential data. To overcome such security issues, the MCPS needed an Intrusion Detection System (IDS) to identify malicious activities and monitor network traffic in real-time. This paper proposes an IDS based on the behavioural trust of the Smart Medical Device (SMD) like the Medical Smart Phone (MSP). The trust value of the SMD/MSP can be evaluated using different behavioural parameters with the beta reputation model. A set of decision rules based on the dynamically computed trust degree has been proposed to check the node's intrusive level and alert generation process. The performance of the proposed model shows 93.9% accuracy.

***Ashish Singh
Kakali Chatterjee
Suresh Chandra
Satapathy***

***Cluster Computing
Springer***