2024 International Conference on Innovation and Intelligence for Informatics, Computing, and Technologies (3ICT) Program

Time (Bahrain)	Virtual Main Hall	Virtual Room (A)	Virtual Room (B)	Virtual Room (C)	Virtual Room (D)	Virtual Room (E)
Sunday, November 17						
09:00-09:05	**OC-1**: *Opening Ceremony*					
09:05-09:10	**OC-2**: *Quran Recitation*					
09:10-09:15	**OC-3**: *Talk by H. E. President of the University of Bahrain*					
09:15-09:20	**OC-4**: *Presentation for accepted paper statistics by Dean of IT College*					
09:20-10:00	**KS-1**: *Keynote-1: Prof. Eesa Mohammed Bastaki, President, University of Dubai*					
10:00-10:30	**K2**: *Keynote-2: Dr. Giampaolo Bovenzi, University of Napoli Federico*					

Time (Bahrain)	Virtual Main Hall	Virtual Room (A)	Virtual Room (B)	Virtual Room (C)	Virtual Room (D)	Virtual Room (E)
10:30-11:00	**B-1**: *Break 1*					
11:00-12:40		**S1-A**: *Machine Learning & Big Data Analytics-1*	**S1-B**: *Deep Learning; Image Processing-1*	**S1-C**: *Machine Learning-1*	**S1-D**: *Internet of Things-1*	**S1-E**: *Financial Technology & Artificial Intelligence*
12:40-13:00	**B-2**: *Break-2*					
13:00-14:40		**S2-A**: *Machine Learning & Big Data Analytics-2*	**S2-B**: *Deep Learning; Image Processing-2*	**S2-C**: *Artificial Intelligence-1*	**S2-D**: *Internet of Things-2*	**S2-E**: *Deep Learning-1*

Time (Bahrain)	Virtual Main Hall	Virtual Room (A)	Virtual Room (B)	Virtual Room (C)	Virtual Room (D)	Virtual Room (E)
Monday, November 18						
08:45-09:00	**OD2**: *Opening - Day2*					
09:00-10:40		**S3-A**: *Informatics & Software Engineering*	**S3-B**: *Deep Learning-2*	**S3-C**: *Cyber security-1*	**S3-D**: *Telecommunication and Networking*	
10:40-11:00	**B-3**: *Break-3*					
11:00-12:40		**S4-A**: *Artificial Intelligence-2*	**S4-B**: *Deep Learning-3*	**S4-C**: *E-learning: challenges, transformation, and IT Solutions*	**S4-D**: *Robot Vision; Motion detection*	
12:40-13:00	**B-4**: *Break-4*					
13:00-13:45	**K3**: *Keynote-3: Prof. Moustafa Yousse, American University in Cairo, Egypt*					

Time (Bahrain)	Virtual Main Hall	Virtual Room (A)	Virtual Room (B)	Virtual Room (C)	Virtual Room (D)	Virtual Room (E)
Tuesday, November 19						
08:45-09:00	**OD3**: *Opening - Day3*					
09:00-10:40		**S5-A**: *Renewable Energy & Smart Grids*	**S5-B**: *Deep Learning; Pattern Recognition*	**S5-C**: *Informatics*	**S5-D**: *Robotics, Computer Vision, and HCI-1*	
10:40-11:00	**B-5**: *Break-5*					
11:00-12:40		**S6-A**: *Smart Cities & Cloud Computing*	**S6-B**: *Cyber security-2*	**S6-C**: *Robotics, Computer Vision, and HCI-2*	**S6-D**: *Deep Learning & Game Playing*	
12:50-13:00	**CS**: *Closing Session*					

Sunday, November 17

Sunday, November 17 9:00 - 9:05 (Asia/**Bahrain**)

OC-1: Opening Ceremony

Room: Virtual Main Hall

Chair: Aysha Ebrahim

Sunday, November 17 9:05 - 9:10 (Asia/**Bahrain**)

OC-2: Quran Recitation

Room: Virtual Main Hall

Sunday, November 17 9:10 - 9:15 (Asia/**Bahrain**)

OC-3: Talk by H. E. President of the University of Bahrain

Room: Virtual Main Hall

Sunday, November 17 9:15 - 9:20 (Asia/**Bahrain**)

OC-4: Presentation for accepted paper statistics by Dean of IT College

Dr. Hessa Al-Junaid

Room: Virtual Main Hall

Sunday, November 17 9:20 - 10:00 (Asia/**Bahrain**)

KS-1: Keynote-1: Prof. Eesa Mohammed Bastaki, President, University of Dubai

Room: Virtual Main Hall

Sunday, November 17 10:00 - 10:30 (Asia/**Bahrain**)

K2: Keynote-2: Dr. Giampaolo Bovenzi, University of Napoli Federico

Room: Virtual Main Hall

Sunday, November 17 10:30 - 11:00 (Asia/**Bahrain**)

B-1: Break 1

Room: Virtual Main Hall
Chair: Wael M El-Medany

Sunday, November 17 11:00 - 12:40 (Asia/**Bahrain**)

S1-A: Machine Learning & Big Data Analytics-1

Virtual Room (A)
Chairs: Ahmed M. Zeki, Orlando Catuiran

11:00 ***Deceptive Phishing Detection and prediction in Social Networking Sites Using Data Mining and Ontology***

Mohammed Mahmood Ali

Deceptive phisher messages in social-networking-sites (SNS) are often the source of cybersecurity breaches, resulting in spying of privacy information (PI) leading towards cyber identity thefting. To address this issue Anti-Phisher Detection System (APDs) has been designed, utilizing Ontology-Integrated Information Extraction (OIIE) and Association-Rule Technique (ART) that pin-points which precisely predicts phishers activities and also updates the phishers database based on microblogs that attempted to disrupt security; thus, alerts the social users by intimating them to secure privacy information from phishers activities and generating a report for cybercrime department for adequate action. The result of APDs demonstrates the significant improvement over earlier systems, briefly discussed.

Presenter bio: I have completed my Ph.D in the area of surveillance of instant messages using Ontology and data mining from Osmania university, under esteemed guidance of prof. Dr.Lakshmi Rajamani

11:20 ***Data-Driven Decision-Making Based on Revenue***

Yana Bondarenko

Continuous monitoring of sales and key performance indicators are essential for big data e-commerce businesses. It allows tracking performance, identifying trends, and making informed decisions to increase revenue and maximize profitability. Analytical solutions for revenue metrics are presented in this research paper. The distribution of the average revenue per user (ARPU) is defined by leveraging the beta gamma ratio distribution. The cumulative distribution function and the probability density function are analytically derived. The probability that the ARPU for the user group interacting with content B is greater than the ARPU for the user group interacting with content A is explicitly expressed. Additionally, the average value of the loss function is obtained using a closed-form solution based on the Meijer G-function. A statistical methodology for data-driven decision-making is described, leveraging novel analytical results. Precise results are crucial for accurate predictions and data-driven decision-making. Elegant closed-form solutions demonstrate conciseness and simplicity.

Presenter bio: Yana Bondarenko obtained a Master's degree in Mathematics in 1999 (Dnipropetrovsk State University, Ukraine). She finished post-graduate studies in 2002. She had been studying on speciality Probability Theory and Mathematical Statistics. She held an assistant professor position at the Dnipro National University (Ukraine) from 2002 till 2007. She received the scientific degree (Ph.D.) in Mathematical modelling and Computational methods in 2006. From 2007 up to now she holds an associated professor position at the Dnipro National University. Teaching experience includes delivering the lectures, practical works on the Probability Theory and Mathematical Statistics, Data Analysis, Financial Mathematics, Actuarial Mathematics, Risk Theory in Insurance, Survey Sampling Theory. The main areas of scientific research are diverse approaches (frequentist, Bayesian, sequential) to landing page optimization, statistical

analysis with missing data, probabilistic graphical models. She has published 10 research works (articles and conference materials) in these areas.

11:40 ***Safeguarding Student Data Privacy: A Comparative Study of Anonymization Techniques Using the Mondrian Algorithm***

Muhammad Ariiq Ramadhan and Nur Aini Rakhmawati

Data has become a critical and valuable tool in today's digital environment. The numerous benefits of data, such as business, research, and education, are not immune to potential threats to individuals' privacy and security. Law No. 27 of 2022 emphasizes the necessity to safeguard the privacy and security of individuals whose data are made public. Data anonymization is a technique that can protect the privacy of individuals in a database. K-anonymity, l-diversity, t-closeness, generalization, and suppression are methods that can be used to anonymize the data. The Mondrian method can be used for k-anonymity, l-diversity, and t-closeness. Furthermore, the Normalized Certainty Penalty (NCP) is used to evaluate the extent of data loss or distortion caused by anonymization. The Mondrian algorithm is applied to the student dataset. The objective is to generate anonymized data with high values. The study involved three anonymization scenarios, with k and l set to three, four, and five, respectively. The results indicated that the first experiment performed well, with k and l values set to three, achieving an average T closeness value of 0.503 and an NCP value of 15.7%.

Presenter bio: Nur Aini Rakhmawati is a professor of information systems department as well as deputy head of the halal centre, Institut Teknologi Sepuluh Nopember Surabaya (ITS), Indonesia. She completed her PhD at the Insight Centre for Data Analytics, NUI Galway, Ireland; her Master at National Taiwan Univesity of Science and Technology and her Bachelor at ITS Surabaya. Her current research interests include knowledge graph, big data and computer ethics. She is the founder of Linked Open Data halal (http://halal.addi.is.its.ac.id/). She received Graphie awards for Graph Community MVP Asia, ASEAN Scientist Leader Fellowship (2017), Syster Pass It On Award (2011), Grace Hopper Scholarship (2008), N2Women Fellowship (2008) and Google Summer of Code(2007). Recently, she has been doing outreach to small and micro business in terms of Halal Assurance System implementation. Last but not least, she loves coding and cooking in her tiny kitchen.

12:00 ***Integrating Hybrid Systems for Robust Anomaly Detection in Big Data***

Youness Filaly, Nisrine Berros, Fatna El Mendili, Nabil Benamar and Younès EL Bouzekri El Idrissi

Robust systems capable of effectively identifying abnormalities in extensive data environments are necessary due to the rapid and significant growth of data across several sectors, such as banking, healthcare, and cybersecurity. Identifying data points that exhibit substantial deviations from the usual pattern is essential for anomaly detection, as it uncovers abnormal patterns that might potentially signify fraudulent activities, system failures, or other critical problems. Traditional anomaly detection approaches fail to keep up with the volume, diversity, and velocity of big data growth. Consequently, scientists have started researching hybrid systems that incorporate the greatest elements of several methodologies. The invention of the hybrid anomaly detection approach known as DT-SVMNB is reported in this paper. To discriminate between normal and anomalous data in large data environments, the system includes a range of machine learning approaches, such as decision trees, Support Vector Machines (SVM), and Na¨ıve Bayesian classifiers (NBC). The specified features are included in the dataset that is used to train the DT-SVMNB prediction model. A degree of accuracy of roughly 99.94% is indicated by the performance research, proving the usefulness and efficacy of our suggested solution.

Presenter bio: Dr. Youness Filaly received the BS degree in Computer and Software Systems Engineering from Higher School of Technology,Cadi Ayyad University, Essaouira , Morocco, in 2017 and the MS degree in information systems security from The National School of Applied Sciences, Ibn Tofail University, Kenitra, Morocco, in 2020. He is currently pursuing the Ph.D. degree in big data security at Ibn Tofail University, The National School of Applied Sciences, Kenitra, Morocco.

12:20 ***A Novel model for Chart-to-Text Generation by utilizing NN models***

Hamad Munir Malik and Nabil Hewahi

This research introduces a novel neural network-based model designed to enhance the automatic generation of textual descriptions for scientific charts, building on the foundational work of "SCICAP: Generating Captions for Scientific Figures." Our proposed model combines advanced Convolutional Neural Network (CNN) architectures for effective feature extraction from scientific charts with multiple Recurrent Neural Network (RNN) layers to generate descriptive, accurate captions. This study is distinguished due to its comparative analysis of different RNN architectures, such as Long Short-Term Memory (LSTM) and Gated Recurrent Units (GRU), to identify the most effective model for textual caption generation. Central to our methodology is the utilization of CNNs to parse visual input, transforming complex chart images into a rich set of feature vectors. These vectors serve as inputs for the sequential RNN layers, which are tasked with constructing coherent and contextually relevant textual descriptions. The performance of various CNN-RNN combinations is rigorously evaluated using the BLEU-4 (Bilingual Evaluation Understudy) metric, a standard in the natural language processing field for assessing the linguistic quality of machine-generated text against human-written references. Our Research showed that Bi- LSTM performed the best with a BLEU score of 0.3, future researches will be required for more reliable captioning.

Sunday, November 17 11:00 - 12:40 (Asia/**Bahrain**)

S1-B: Deep Learning; Image Processing-1

Virtual Room (B)

Chair: Nabil Benamar

11:00 ***Brain Tumor Detection and Classification using Deep Transfer Learning Approach***

Maleeha Muzafar Ismail and Alauddin Yousif Al-Omary

Brain Tumor is one amongst the deadliest diseases known to mankind. Accurate and prompt diagnosis of brain tumor is vital in planning treatment in order to prolong the life span of a patient. The classification of different types of brain tumors is a challenging research problem due to the tumor being different in shape, size, and location. Magnetic Resonance Imaging (MRI) is the most widely done medical test in diagnosing brain tumors. In this research, we probe the use of pre-trained EfficientNetV2S model to detect and categorize different types of brain tumors. Furthermore, this study explores if the model performance can be enhanced by applying data augmentation and pooling layers. It was concluded that the finest performing model was the EfficientNetV2S model with no pooling layers. The studied model was able to score 99.97% in training f1-score, while scoring 95.8% in testing accuracy.

Presenter bio: Maleeha Muzafar is a dedicated Mid-level Engineer at Receiptable, working on platform and frontend development. She is currently pursuing a Master's degree in Machine Learning and Computational Intelligence at the University of Bahrain, enhancing her expertise in artificial intelligence. Maleeha has a rich background in academia, with four years of teaching experience at Bahrain Polytechnic, where she developed a passion for mentoring students in computer science. Her research interests focus on deep learning and computer vision, fields in which she aims to contribute innovative solutions and insights.

11:20 ***Cue-Aided Multi-Class Segmentation (CAMS): A Novel Approach for Enhanced Modelling in Dental Panoramic Imaging***

Rawan Osama Bakr, Mustafa Elattar and Sahar Selim Selim

Effective segmentation in medical imaging is crucial for diagnostic precision, especially in complex multi-class scenarios like dental panoramic segmentation. Traditional methods often face challenges with class imbalance and overlapping regions. This paper introduces Cue-Aided Multi-Class Segmentation (CAMS), a novel methodology using an additional cue channel for enhanced class discrimination. Unlike conventional methods that either train separate models for each class or use a single model for all classes, CAMS repeats

each sample for the number of classes, with each repetition having a unique mask for one class. An additional cue channel encodes the class identity by dividing the input image into fixed regions (quarters in this study), activating each region for the corresponding class during learning. We use the UNet architecture for its simplicity and well-established performance. CAMS is validated through a comparative analysis using a dental panoramic dataset DENTEX for segmenting four quarters of teeth, benchmarked against training separate models for each class (Specialized model) and using a single model for a multi-class mask (All-in-one). Specifically, CAMS produces an Intersection over Union (IOU) of 0.8336 and a Dice coefficient of 0.9034, while the All-in-one approach produces a mean IOU (MIOU) of 0.684 and a Mean Dice coefficient of 0.737, and the Specialized model approach yields an MIOU of 0.8530 and a Mean Dice coefficient of 0.9065. Preliminary results suggest that CAMS performs comparably to other methods in terms of segmentation accuracy and model robustness. However, it stands out by offering a significant computational advantage, making it more efficient for multi-class medical imaging tasks.

Presenter bio: Teaching Assistant at Nile university as well as master's student

11:40 ***Detecting Fraud in Arabic Online Advertisements using Deep Learning Techniques for Image Classification***

Marouane Dirchaoui and Abdallah Abarda

Online advertisements represent a vital tool for marketers seeking to reach users on social platforms. However, they are also exploited by cybercriminals for the purpose of launching phishing attacks. This research aims to detect fraudulent Arabic online advertisements on social platforms using deep learning techniques for image classification. We constructed the first Arabic fraudulent advertisement dataset, which consists of 914 images, of which 457 are genuine and 457 are fraudulent. This study evaluates the performance of two transfer learning models, MobileNetV2 and NASNetMobile, along with a convolutional neural network model. Our results show that increasing the image size from 150 pixels to 224 pixels significantly improves the performance of the models. In particular, the NASNetMobile model achieved an accuracy of 87.43%, a precision of 90.91%, a recall of 84.21%, and an F1 score of 87.43%. The model demonstrated a balanced detection capability with a false positive rate of 9.09% and a false negative rate of 15.79%, effectively distinguishing between genuine and fraudulent ads despite their similarities. Future research will focus on expanding the dataset to include both images and videos of ads, and developing advanced models to handle these formats.

Presenter bio: Dirchaoui Marouane is a second-year PhD student in Decision Science at Hassan First University of Settat, Morocco. His research focuses on utilizing AI to detect financial cybercrimes, particularly threats affecting Arabic-speaking countries. He holds a Master's degree in Decision Engineering from the same university and is dedicated to contributing to the fight against financial cybercrimes.

12:00 ***Alzheimer's Disease Classification with a Hybrid CNN-SVM Approach on Enhanced MRI Data***

Mostafijur Rahman, Md Sabbir Hossain, Arifa Akter Eva, Md. Mohsin Kabir, Muhammad Firoz Mridha and Jungpil Shin

This study provides a hybrid Convolutional Neural Network (CNN) and Support Vector Machine (SVM) model for the classification of Alzheimer's disease using preprocessed Magnetic Resonance Imaging (MRI) images. The dataset comprises 6400 MRI images that are resized to 128x128 pixels, and categorized into four classes: Mild Demented, Moderate Demented, Non Demented, and Very Mild Demented. The proposed model aims to accurately classify these categories to aid in the early diagnosis and management of Alzheimer's disease. Our hybrid CNN-SVM model performed an impressive overall accuracy of 98.59%. Detailed performance metrics include precision, recall, and F1-score for each class, indicating high reliability across all categories. Specifically, the model attained a precision of 0.98, 1.00, 0.99, and 0.98 for the classes Mild Demented, Moderate Demented, Non-Demented, and Very Mild Demented, respectively. Similarly, the recall values were 0.98, 1.00, 0.98, and 0.99, with corresponding F1-scores of 0.98, 1.00, 0.99,

and 0.98. These results demonstrate the model's robustness and potential for integration into clinical workflows to support the accurate and timely diagnosis of Alzheimer's disease. Future work will focus on further validating large models, and more varied datasets and exploring real-world deployment scenarios.

12:20 ***Optimizing Warehouse Logistics: A Comparative Analysis of Deep and Classical Machine Learning Methods for Package Classification***

Mohammed Majid M. Al-Khalidy and Ahmed Mohammed Majid Al Khalidi

In modern warehouses, efficient package detection systems are vital for optimizing logistics and streamlining operations. This paper proposes an automated package detection system to be integrated into a warehouse robot, enabling it to distinguish between packages and other objects. We evaluate the performance of multiple machine-learning methods, including Support Vector Machine (SVM), logistic regression, Ada Boost, Gradient Boosting, K Neighbors, and Naive Bayes, augmented with Histogram of Oriented Gradients (HOG) feature extraction, in comparison to the deep neural network CNN (Convolutional Neural Network). Our experiments involve training and testing the models on a dataset of warehouse package images. The results showcase the robustness and versatility of SVM, which emerges as the optimal choice for package detection with an accuracy of 96.7%. Furthermore, we discuss how implementing this system on a robot will enhance automation and efficiency in warehouse operations, enabling it to function effectively in dynamic environments.

Presenter bio: Mohammed Majid M. Al-Khalidy received his Ph.D. in Electrical and Electronics Engineering, University of Technology, Iraq, 2007. Dr. Al Khalidy was a Senior Project Engineer in Al- Karama General Company (Aerospace Industrial Company), Iraq, Baghdad, 1997-2006. Al Khalidy is an Assistant Professor at the University of Bahrain since 2014. He has extensive industrial experience in the field of Aerospace Electronics and Intelligent Control and Guidance Systems. He participated in many international projects. Doctor Al Khalidy is a member of professional societies such as IEEE, LEED (USA), and a live member of the Bahrain Society of Engineers. He has served as a steering committee member, session chair, and a member of technical program committees for many international conferences. He has supervised many postgraduate students. Doctor Al Khalidy published in prestigious journals, conference proceedings and he has published a book in the field of robotics.

Sunday, November 17 11:00 - 12:40 (Asia/**Bahrain**)

S1-C: Machine Learning-1

Virtual Room (C)

Chair: Ali Hasan

11:00 ***Machine Learning and Omics Data for Predicting Overall Survival in Glioblastoma Patients***

Ichraq El Hachimy, Nabil Benamar and Nabil Hajji

Glioblastoma represents one of the most aggressive and fatal brain tumors, with patients facing a median survival of just 12 to 18 months. To improve understanding and diagnosis, multiple types of omic data-such as genomic, epigenomic, tran- scriptomic, proteomic, and metabolomic data-can be integrated [1]. Furthermore, including non-omic data, such as demographic details, clinical histories, and brain imaging, is essential to fully comprehend the disease and optimize patient care. In this study, we introduce an innovative approach for survival prediction in glioblastoma patients using omic data. A dataset from cBioPortal (n=619 samples) with 12 unique features was analyzed, applying a range of machine learning models to assess predictive per- formance. Specifically, we tested seven algorithms for survival prediction: Random Survival Forest, Random Forest Regressor, Gradient Boosting Regressor, XGBRegressor, Survival Support Vector Machine (SVM), Ridge Regressor, and Lasso Regressor. The results yielded a c-index of 0.78 for both Random Survival Forest and Survival SVM, 0.79 for Random Forest Regressor, Ridge Regressor, and Lasso Regressor, 0.80 for XGBRegressor, and 0.81 for Gradient Boosting Regressor.This study highlights the effectiveness of integrating omic data with machine learning to predict the survival rate in glioblastoma patients.

11:20 ***Predicting Academic Performance: A Comparative Analysis of Machine Learning Algorithms***

Sayed Altabtabi, Yousef Dallol, Faisal Jenfawi, Iyad Abu Doush, Marwa Kandil and Faisal Aljanafawi

Forecasting students' performance using machine learning (ML) enables timely intervention to assist students at risk. This study examines various ML algorithms including deep neural networks, random forest, XGboost, support vector machine and logistic regression to categorize and predict the student's performance in 3 classes; low, medium, and high. The dataset contains academic and non-academic features for 480 students. Data pre-processing methods and feature importance study were applied to enhance the accuracy of the predictive models. The models were evaluated on leaning stability, accuracy, precision, and recall values. The results demonstrate that XGBoost achieved accuracy of 86% and precision of 90% highlighting its potential in predicting student performance.

11:40 ***Binary and Ternary Human Gait Phase Classification Using Machine Learning Algorithms***

Amal Mekni, Jyotindra Narayan and Hassène Gritli

Accurately identifying gait phases offers vital insights into medical diagnostics, requiring precise biomechanical assessment. Despite various machine learning (ML) methods, achieving high precision is challenging. This study uses ML techniques to classify the gait phases of 100 individuals (average age (41.91 \pm 5.3) years). Classification algorithms considered in this work are: k-Nearest Neighbor (k-NN), Logistic Regression (LR), Decision Tree (DT), Random Forest (RF), Support Vector Machine (SVM), and Naive Bayesian (NB). The performance of these algorithms is evaluated using two training methods while classifying binary (stance/swing) and ternary (stance-I/stance-II/swing) subphases. The performance of these algorithms is assessed using two training methods for classifying binary (stance/swing) and ternary (stance-I/stance-II/swing) subphases. In the first method, 80% of the data from binary or ternary phases is

randomly selected for training and the rest for testing. In the second method, data is divided by participants, with 80% used for training and 20% for testing. The RF algorithm consistently outperforms others in both training methods, achieving 99.5% (first method) and 99.9% (second method) accuracy in binary classification and 99.4% (first method) and 99.5% (second method) in ternary classification. Despite the reduced performance while transitioning from binary to ternary classification, consistency is maintained for all ML algorithms. Moreover, the second training method is found to be more effective for classifying binary and ternary gait phases.

Presenter bio: I am Amal Mekni, a dedicated researcher with a strong academic background in informatics and data science. I earned my Bachelor's degree in 2019, followed by a License Degree in Informatics Science in 2022 from the Higher Institute of Information Technologies and Communication (ISTIC) at the University of Carthage, Tunisia. Continuing my academic journey, I completed a Master's Degree in Data Science and Smart Services (D3S) in 2024, also at ISTIC. My research focuses on cutting-edge areas such as artificial intelligence, machine learning, deep learning, robotics, and human gait analysis, particularly in classification and prediction.

12:00 ***Integrating Machine Learning with Concrete Science: Bridging Traditional Testing and Advanced Predictive Modelling***

Saeed Sharif and Salim Barbhuiya

This paper thoroughly explores the application of machine learning (ML) in concrete science, bridging traditional testing methods with advanced ML techniques. It begins with an overview of ML fundamentals and their relevance to concrete materials, highlighting ML's transformative potential in enhancing predictive modelling and analysis. The discussion covers various ML techniques, including supervised, unsupervised, and deep learning, along with common algorithms and models used in concrete research. Practical aspects such as data collection methods, preprocessing techniques, and feature engineering specific to concrete science are detailed, illustrating how ML improves the accuracy and efficiency of predicting properties like compressive strength, durability, and workability. The paper also examines challenges such as data quality, model interpretability, and scalability, and discusses future trends, ethical considerations, and the societal impacts of ML applications in advancing sustainable infrastructure.

12:20 ***Optimizing Health through Nutrition: Machine Learning Insights for Menopausal Women***

Logapriya E, Surendran R, Sundara Rajulu Navaneethakrishnan and Appathurai K

This research gives a comprehensive step by step guideline of how a recommendation system for women health particularly on menopause management and dietary advice can be built for an individual. These sources include medical records, structured questionnaires and health monitoring applications where it is possible to keep the most critical indicators for illustration the intensity of the symptoms, pulse, body temperature, hours of sleep and diet. The missing values handling is accomplished by forward fill and imputation normalization by standard scaling of numerical values is done after applying the standard Scaler. Finally binary and categorical data is encoded by one hot encoder. feature engineering increases the model prediction capability based on the existing data by creating new variables. Depending on the nature of data linear regression, logistic regression, support vector machines, and random forest models are built and tested using performance metrics identical the R- SquaredR 2R2 and AUC-ROC with maximum accuracies of 0. 92 for linear regression and 0. 95 for logistic regression. The system gives women health and lifestyle recommendations by applying collaborative and content-based filtering so that the recommendations are most accurate and closest to the truth supported by data for use.

Presenter bio: Ms. Logapriya .E is currently as a Junior Research Fellow (Research Student) in the Department of Cognitive Computing, Institute of Computer Science and Engineering, Saveetha School of Engineering. She has 1.5 years of undergraduate experience. she received her BCA degree in Computer Application from Sri Bharathi Womens Arts and Science College, Thiruvalluvar University in the year of 2017, M.sc degree in Computer Science in the year of 2019 from Sri Bharathi Womens Arts and Science College , Thiruvalluvar University. M.Phil degree in Computer Science from Ethiraj College for Women, Madras University in the year of 2020. She handled intresting roles and responsibilities including teaching from Apollo Arts and Science College (Madras university). Area of interest and

specialization include Artificial Intelligence, Machine Learning, Deep Learing and Blockchain Teachnology. She has pubished 2 articles in various conference. Also she organized many seminars and workshops.

Sunday, November 17 11:00 - 12:40 (Asia/**Bahrain**)

S1-D: Internet of Things-1

Virtual Room (D)

Chair: Ali H Zolait

11:00 ***The prospects, business opportunities and potential challenges in operating IoT-based phytomediccal laboratory services***

Joshua Nehinbe, Linda Chibuzor and Marian Osemwegie

IoT-based phytomedical laboratory services have immense benefits in utilizing the fundamental connections between plants and animals in their natural habitats but they are facing serious challenges and stunted growth over the years. The major crux about these challenges is that the peripheral devices of the enabling technologies must be strongly secured with suitable Intrusion Detection Systems (IDSs). Besides, the IDS products must constantly undergo maintenance to perfectly protect the privacy of the laboratory techniques that phytomedical technologists have used (or would use) to analyze medicinal plants and various channels to disseminate laboratory results to the data owners. This paper uses Snort IDS and qualitative interview to explore the perceptions, awareness and observations of four randomly selected phytologists, 12 computer scientists and 46 postgraduate students on the above issues. With critical discourse, textual analysis and text transcribing techniques, constraints, prospects and opportunities in operating IoT-based phytomedical laboratory services are discussed. The results sugegst that stakeholders of IoT-based phytomedical laboratory services must make contingency plans before the progressions of the IDS products deployed to safeguard the networks would reach the stage of outright disposal.

Presenter bio: Joshua Ojo Nehinbe obtained Ph.D. in Computer Science from the University of Essex, UK in 2011 and M.Sc. in Computer Science (with research) from the University of Agriculture, Abeokuta in Nigeria in 2004. He has worked in the banking sector as a Software engineer; Globus support specialist, Head of IT and auditor of Information Systems. He also had cognate experience in IT consultancy with local and international firms. Joshua Nehinbe teaches Undergraduates and Post graduates students in the areas of Cyber security and forensics, database design and management, software engineering, Leading E-Strategy and data mining. His core research domains are computer science and criminology and he has published over 50 reputable publications in the above domains. He is a professional member of the Institute of Electrical and Electronics Engineers (IEEE), British Computer Society (BCS), British Academy of Forensic Sciences (BAFS) and Nigeria Computer Society (NCS).

11:20 ***Development and Performance Evaluation of an Automatic Windshield Wiper System for Enhanced Driving Visibility***

Augusto Miguel P Ramos, Mark Genesis V. Marcelino, Adrian Rey D Santos and John Joshua F. Montañez

In all types of weather and conditions, visibility is an essential element of driving activity. So technological advancements addressing the problem of blurry windshields caused by rain were made. Automatic windshield wipers are one such example. This study aims to create a device that automatically wipes the accumulated rain from any automotive vehicle, especially during the rainy season. The key components in the study were a rain sensor, Arduino Uno microcontroller, single channel relay, line track sensor module, and a universal wiper motor. The system's response time and error rate were determined by measuring the interval between the initial detection of water by the rain sensor and the activation of the wiper motor. These processes were repeated 30 times. Results showed that the presence of water was transmitted to the motor from the sensor quickly, taking an average response time of only 0.82 seconds.

Presenter bio: He is a 4th-year Electronics Engineering student at Bicol State College of Applied Sciences and Technology (BISCAST), Philippines. His research interests include computer programming, robotics, and automation. An active member of the BISCAST community, he also represents the institution as one of the ECE quizzers, showcasing his dedication to academic excellence and industry knowledge.

11:40 ***Real-Time Monitoring and Optimization of Recycled Water Irrigation in Coffee Plantations using Bi-directional RNNs and IoT Sensors***

Raveena S and Surendran R

The coffee firms relies heavily on sustainable water management measures due to water scarcity. Present study investigates the utilization of Bi-directional Recurrent Neural Networks (Bi-directional RNNs) combined with Internet of Things (IoT) sensors to monitor and optimize the irrigation of reclaimed water in coffee plants in real-time. The suggested system utilizes a range of IoT sensors to gather up-to-the-minute information on soil moisture, temperature, humidity, pH value, nutrient value, water quality, and potentially weather conditions. Data collected is transmitted through the IoT Lora WAN wireless network, which facilitates long-distance communication for plantations. Bi-directional recurrent neural networks (RNNs) examine the sequential sensor data to detect temporal relationships and determine the best watering schedules and possible irregularities. The proposed model suggests modifications accuracy of 95.66% to irrigation practices based use of water in a more effective manner.

Presenter bio: Raveena Selvanarayanan currently working as a Junior Research Fellow in the Department of Cognitive Computing, Institute of Computer Science and Engineering, Saveetha School of Engineering. She received her B.E. degree in Computer Science and Engineering from SA. Engineering College in the year 2015, M.E in Computer Science and Engineering from RMD. Engineering College, Kavaraipettai, in the year 2017, and Currently Pursuing her PhD in the stream of Deep Learning. She has 3 years of Industrial Experience and her Research Interest: Machine Learning, Deep Learning, Internet of Things, Digital Image Processing, Computer Vision. She has published more the 7 articles in international conference and 1 journal paper

Presenter bio: R.Surendran was born on 10th May 1983 at Kumbakonam, India. He completed his Bachelor's Degree in Information Technology in the year 2005 from Anna University, India. He completed his Master degree in Information Technology and doctorate degree in Computer Science and Engineering in the year 2009 and 2014 from Sathyabama University, India. He is having 12 year 7 months of teaching experience in india, Oman and Bahrain Universities. He has published many papers in reputed International Journals and Conferences. His research interests include Cloud Computing and IoT.

12:00 ***Innovative Ensemble Approaches for Assessing Critical Factors for European Tick Abundance***

Abin Zorto, Samantha Lansdell, Misaki Seto, Edessa Negera, Sally Cutler and Saeed Sharif

This research uses complex machine learning methods to study tick population dynamics and factors that affect their abundance in the environment. The investigation is centered on Europe, where there has been an expansion of the human biting Ixodes ricinus tick populations. We evaluated the contribution of climate change as well as land use and habitat fragmentation among others as drivers towards this phenomenon. Tick prevalence rates were examined based on different climatic conditions such as temperature ranges and types of vegetation cover including forests or grasslands etc., all these were considered using diverse ensemble models like XGBoost, LightGBM, CatBoost, Voting Regressor, Bagging Regressor among others with AdaBoost acting as a background model for them. The ecological influences that shape habitat suitability for ticks are non-linear and complex. In consequence an ensemble framework has greater potential to embrace the multifactorial non-categorical data providing a distinct advantage over single models that have been used to date. Critical analysis of these prediction algorithms is essential to ensure their performance, particularly when data can be patchy or skewed as can be typical with ecological studies.

Our results revealed that land use was the dominant factor for predicting tick occurrence while dealing with robust outlier management leads to improved accuracy levels achieved by predictive models. Stacking Regressor showed the highest performance, achieving an RMSE (Root Mean Square Error) of 2.34 and a R^2 (R-squared) value of 0.99. After removing outliers, the models showed better results with a decrease in RMSE from 13.14 to 7.92 and R^2 increase from 0.21 to 0.81. Our machine learning algorithm provided reliable predictions about tick abundance and the ecological forces that favour their presence. As ticks are

major vectors of infectious diseases impacting on both human and animal health, our ability to predict problem regions or even prevent creation of habitats conducive for high tick abundance, provides a powerful tool in the fight against tick-borne diseases.

Presenter bio: Current PhD student in the Department of Health, Sport and Bioscience at University of East London (based in London, England). My topic is based around tick parasites and the health risks they present. Currently working in collaboration with Dr Saeed Sharif and his team in Intelligent Technologies Research Group (University of East London) to develop predictive models related to ticks and diseases.

12:20 ***An Innovative Fluid Approach Model for Power Monitoring of Mobile IoT Devices***

Nourredine Oukas, Menouar Boulif, Akli Abbas and Samia Haboussi

This paper introduces an innovative modeling approach using eXtended Hybrid Petri Nets (xHPN) to monitor the power of mobile devices within the context of the Internet of Things (IoT). The proposal leverages a fluid approach that considers both discrete and continuous aspects to mimic actual scenarios of IoT devices with mobility capability. In addition, the considered devices are equipped with a solar energy harvesting system to recharge the batteries. Furthermore, the Double Sleeping Strategy is considered to manage device connectivity and environment monitoring. The presented experiments demonstrate the ability of the proposed approach to monitor the power of mobile IoT devices before any deployment. Hence, our approach assists managers in selecting suitable parameters for the considered area of interest.

Presenter bio: I'm Samia haboussi PhD student at university of Bouira, Algeria. My research interests include: Internet of Things (IoT), System Optimization, and Natural Language Processing (NLP).

Sunday, November 17 11:00 - 12:40 (Asia/**Bahrain**)

S1-E: Financial Technology & Artificial Intelligence

Virtual Room (E)

Chairs: Maan Aljawder, Ghassan Alkoureiti

11:00 ***A Comparative Study of Sales Prediction Using Machine Learning Models: Integration of PySpark and Power BI***

Saeed Sharif, Madhav Raj Theeng Tamang and Anup Nepal

Retail management requires accurate sales forecasting for strategic planning, inventory control, and revenue maximisation. In this research, we are predicting sales using PySpark-built ML models and the Big Mart dataset. We evaluate and demonstrate the prediction skills of numerous machine learning algorithms, concentrating on XGBoost. Big Mart offers item weight, visibility, type, and outlet data. We use these properties as prediction model features. PySpark, a strong distributed computing platform, manages massive datasets for analysis and model training. In massive trials, we test decision trees (DT), XGBoost, linear regressions (LR), and random forests (RF). Training and testing enhance model accuracy. RMSE and R-squared measure our model quality. Our metrics evaluate the model's data fit and prediction accuracy. XGBoost performed best with an RMSE of 1081 and an R-squared of 0.59. The XGBoost algorithm accurately predicts Big Mart sales. The model performs well because of its ensemble learning and understanding of intricate dataset links. We also used Power BI to present analytical insights, helping decision-makers design sales-estimated business plans. This study employed several machine learning algorithms, XGBoost gave the best performance.

Presenter bio: Ph.D. student in the field of Artificial Intelligence and Machine vision at University of East London, United Kingdom. Working as Teaching assistant at University of East London. Research interests: Artificial intelligence, Big data, Machine learning and Intelligent system.

11:20 ***Revolutionizing Loan Approval: Harnessing the Power of K-Nearest Neighbors for Predictive Eligibility***

Saeed Sharif, Madhav Raj Theeng Tamang and Niyas Jaheer Hussain

A bank has become a basic need of our daily lives. People use banks for several tasks, such as depositing or withdrawing money and borrowing loans. The number of loan applications is rising significantly. It is crucial for the bank and financial sectors to determine loan eligibility and approve loans to suitable persons only. This study attempts to design a system which can easily predict loan eligibility using machine learning (ML) algorithms. We employed Logistic Regression (LR), K-nearest neighbor (KNN), Decision Tree (DT), Random Forest (RF) and Support Vector Machine (SVM) algorithms to achieve this research's aim. These algorithms were trained using the pre-processed dataset to create predictive models. F1 score, accuracy, Recall and Precision are used to evaluate the performance of the proposed approaches. The result showed that KNN demonstrated outstanding performance, with an accuracy rate of 88.89%. The RF model had an accuracy of 84.44%, whereas the SVM and LR models achieved 82.22% and 80% accuracy, respectively. The Decision Tree algorithms showed the worst performance among the five algorithms, with an accuracy of 79.88%. The achievement of this research suggests that the application of machine learning algorithms can be considered an efficient method to predict loan eligibility in the banks and financial sectors. Using this model, the Bank can predict loan eligibility easily, reducing processing times and enhancing the bank's efficiency.

Presenter bio: Ph.D. student in the field of Artificial Intelligence and Machine vision at University of East London, United Kingdom. Working as Teaching assistant at University of East London. Research interests: Artificial intelligence, Big data, Machine learning and Intelligent system.

11:40 ***Assessing GPT's Legal Knowledge in Japanese Real Estate Transactions Exam***

Keito Inoshita

In recent years, the rapid evolution of large language models (LLMs) has led to significant improvements in various complex tasks. Among these, GPT-3.5 and GPT-4, developed by OpenAI, have garnered particular attention. This study evaluates the capability of these models to answer questions from the Japanese Real Estate Transaction Specialist Examination (RETSE). The experiment compared the number of correct answers given by GPT-3.5 and GPT-4 to the actual passing criteria and investigated the impact of prompt engineering on response accuracy. The results showed that while GPT-4 had a higher accuracy rate than GPT-3.5, neither model met the passing criteria. Notably, using specific prompt instructions (e.g., "Consider customary laws") improved the consistency of the models' answers. These findings indicate that although current GPT models cannot fully replace RETSE, they hold potential as supplementary learning tools for verifying basic knowledge and checking comprehension. For humans to avoid being replaced by GPT, it is crucial to enhance expertise in complex legal issues and recent legal revisions, gain practical experience, and improve ethical judgment. This study elucidates the limitations and potential of GPT in answering RETSE questions and provides guidelines for effective utilization by learners and practitioners.

Presenter bio: Inoshita is a graduate student at the Graduate School of Data Science, Shiga University, conducting research on bias removal and sentiment analysis in Large Language Models (LLMs). He studied law and business administration at the Faculty of Regional Collaboration, Sapporo University, and was admitted to Shiga University's graduate program on an accelerated track due to his outstanding academic performance. Currently, he is a member of Professor Zhou Xiaokang's seminar, where he is learning the fundamentals of data science while preparing to advance to a doctoral program. His primary research areas include sentiment analysis and bias removal using LLMs, with a particular focus on enhancing AI fairness and transparency. In 2024, he presented multiple research papers at international conferences, further exploring the social impact of AI. Additionally, he actively contributes to the development of practical AI applications as a member of the domestic AI development project "GENIAC." Through his innovative AI-based ideas and business proposals, he has won several competitions. Inoshita holds various qualifications, such as the Pre-1st Grade in Statistics, Real

Estate Transaction Specialist, and the Basic Information Technology Engineer, demonstrating a broad range of theoretical and practical expertise in AI and data science. His goal is to leverage AI technology to create a more equitable and trustworthy information environment for society.

12:00 ***Performance Analysis of Machine Learning Techniques for Detecting Money Laundering in Bitcoin Transactions***

Parisa Salahi, Reem Shady, Iyad Abu Doush and Marwa Kandil

More people are relying on Cryptocurrencies, yet these currencies are not controlled by any central authority or government. Bitcoin transactions' anonymity facilitates money laundry activities by cyber-criminals. Traditional Anti-Money Laundering (AML) solutions, often rule-based, suffer from high false positive rates, leading to substantial operational costs. Machine Learning (ML) algorithms offer efficient analysis and identification of abnormal patterns in vast amounts of data; thus predicting suspicious transactions. This paper evaluates the effectiveness of four different ML algorithms in classifying Bitcoin transactions as either licit, or illicit transactions. The ML models were trained on the Elliptic dataset of Bitcoin transactions categorized into real entities belonging to licit and illicit categories \parencite{Elliptic_2019}. The models were evaluated by the confusion matrix, accuracy, and features importance study. The experimental results proved that Random Forest (RF) and Extreme Gradient Booster (XGBoost) models achieved the highest accuracy of 95.1% and 95.6%, respectively. This indicates that RF and XGBoost models effectively managed the data's complexity and accurately predicted suspicious transactions.

12:20 ***PayTm Online Wallet Payment's Sentiment Analysis in India Using SVM and RF Model***

Mohammed Mahmood Ali

Advancements driven by the Fourth Industrial Revolution have profoundly affected technology, reshaping numerous aspects of everyday life and activities. A prominent change is observed in the economic transaction systems, where traditional cash transactions which are done through Banks, have increasingly transitioned to digital formats managed through electronic devices (mobiles). This shift is evident globally, including in rapidly developing countries like India, Indonesia and asian countries where digital wallets have become widely adopted. PayTm, in particular, has emerged as a leading UPI-based online wallet system in India. However, public opinion about the PayTm app varies. This study aims to evaluate user sentiment towards PayTm by utilizing sentiment analysis through text mining, specifically employing Support Vector Machine (SVM) and Random Forest (RF) models. The results indicate that sentiment towards PayTm is mostly negative. The sentiment analysis models demonstrated high accuracy, with SVM achieving 95.0% and RF reaching 96.0%. These insights can offer invaluable feedback to the UPI-based companies, helping to improve its trustworthiness and reliability.

Presenter bio: I have completed my Ph.D in the area of surveillance of instant messages using Ontology and data mining from Osmania university, under esteemed guidance of prof. Dr.Lakshmi Rajamani

Sunday, November 17 12:40 - 13:00 (Asia/**Bahrain**)

B-2: Break-2

Room: Virtual Main Hall

Sunday, November 17 13:00 - 14:40 (Asia/**Bahrain**)

S2-A: Machine Learning & Big Data Analytics-2

Virtual Room (A)

Chair: Shadi Ibrahim Abudalfa

13:00 ***Empirical Analysis for Arabic Target-Dependent Sentiment Classification using LLMs***

Alyaa Yahya Alsalem and Shadi Ibrahim Abudalfa

This work aims to develop a valuable tool for understanding sentiments on specific topics in the Arabic language. Currently, most sentiment analysis research focuses on social media platforms like X (formerly known as Twitter), which provide a rich source of information and opinions but lack the precise tools required for accurate Arabic sentiment analysis. This limitation has hindered the development of a reliable and robust sentiment analysis model for Arabic. To address this challenge, we present a technique that emphasizes target-based sentiment classification using an advanced approach based on a Large Language Model (LLM). The presented model is trained on the AT-ODTSA dataset. This dataset includes manually classified Arabic tweets along with identified topics (targets) and sentiments. By leveraging this dataset, our work shows enhancement with the sentiment classification for Arabic tweets. The presented technique achieved a classification accuracy of 0.79 for target-independent sentiment classification and 0.77 for target-dependent sentiment classification. The presented technique employs a fine-tuned version of the Arabic-MARBERT-sentiment model. Our work is expected to contribute to a deeper and more accurate understanding of public opinions on specific topics in the Arab world.

13:20 ***An Innovative Fake News Detection in Social Media with an Efficient Attention-Focused Transformer Slimmable Network***

Rashmi Rane, Subhashini R and Surendran R

Rapid developments in digital technology have expedited the dissemination of information on social media platforms like as Twitter, Facebook, and Weibo. Unverified information can create protests and mislead the public. It can also cause significant issues for governmental entities and society at large. Unverified content is frequently shared as text, images, audio, or video. This paper introduces a novel Self-Guided Edge Attention-Focused Transformer Slimmable Network improved by Osprey Optimization (SGEAFTSN-OO) for the purpose of identifying fake news. This system operates using the Politifact and Gossipcop databases. Text and visual data are preprocessed using NLP Stemming Self-Guided Filtering (NLPS-SGF). To extract features, the Multilayer Edge Attention with Focused Transformer (MEAFT) is then applied. Lastly, Slimmable Pruned Neural Network with Osprey Optimization (SP-Net-OO) algorithm is employed to identify fake news events. Metrics including accuracy, recall, precision, and F1-score are compared with those of the existing approaches in order to assess the effectiveness of the suggested strategy. The proposed model achieved 99.21% accuracy, 99.15% precision, and 99.12% F1-score based on experimental data.

Presenter bio: Rashmi Rane is a postgraduate in Computer Science and Engineering, 2009, and now is pursuing a Ph.D. in Machine Learning at Sathyabama University in Chennai. She is an ISTE life member. She has 22 years of teaching experience. She has various national and international publications to her name. Her research interests are Social Data Mining and Deep Learning.

13:40 ***Unmasking Harmful Comments: An Approach to Text Toxicity Classification Using Machine Learning in Native Language***

Afia Ahsan, Mohammad Manzurul Islam, Abdullahi Chowdhury, Md Ali, Taskeed Jabid and Maheen Islam

In today's digital age, social media has become an integral part of our daily lives, offering both benefits and challenges. While it facilitates global communication and trade, it also brings significant negative impacts,

such as the spread of toxic comments that can lead to severe consequences, including mental distress and, in extreme cases, suicide. This research focuses on the classification of toxic comments using three distinct machine learning models: the Stochastic Gradient Descent (SGD) Classifier, the initial Support Vector Machine (SVM), and an Optimized SVM model. A dataset comprising text comments in both Bangla and English, collected from various social media platforms, was used to train these models. The initial SVM model, while powerful, showed limitations, particularly in handling class imbalance, leading to suboptimal performance. The SGD Classifier provided a balanced approach but fell short in recall for non-harmful comments. To address these challenges, an Optimized SVM model was developed by fine-tuning key hyperparameters, significantly enhancing the model's performance. The optimized model achieved superior accuracy, precision, recall, and F1-scores across both harmful and non-harmful comment classifications. The results demonstrate that the Optimized SVM model is the most reliable and effective among the three, making it the preferred choice for deployment in real-world scenarios where accurate classification of toxic comments is critical.

Presenter bio: Afia Ahsan is a Masters student in the Department of Computer Science and Engineering at East West University and concurrently serves as a Lecturer in the Department of Mechanical and Production Engineering at Ahsanullah University of Science and Technology. With a dynamic focus on integrating cross-disciplinary expertise, her research interests are deeply rooted in artificial intelligence, machine learning, and natural language processing. Afia is dedicated to advancing the application of machine learning techniques to enhance engineering solutions, aiming to bridge the gap between theoretical computer science and practical engineering challenges.

14:00 ***Towards the development of SOA based Big Data model for adoption in the HEI in Bahrain- Case Study***

Rola Haddadd, Ehab Juma Adwan, Shurooq Busaleh and Walla Khalaifat

The development and adoption of Big Data Analytics (BDA) technology provides the integration of various IT systems and facilitation of data exchange and sharing across disparate platforms for several industries including Higher Education Institutions (HEIs). Reviewing reveals the existence of diverse adoption models/frameworks and architectural development methods which unfortunately lack sufficient standardization and sequential transformation guidelines. The Bahraini HEIs lack a proper architectural development of BDA and a structured adoption model. This study aims to provide Bahraini HEIs with a systematic roadmap for successful BDA development and integration, enabling data-driven transformation within their specific institutional context. To address this gap, this study proposes the Service-Oriented Architecture BDA Adoption model (SOA-BDAF) for the Bahraini HEI-01, which benefits from the Service Oriented Architecture (SOA) and Enterprise Architecture (EA) disciplines respectively to develop diverse services through a service bus to enable efficient data handling, analysis, and insights for administrative and academic enhancements and guide the transformation of HEI from as-is to to-be states. The development of SOA-BDAF is orchestrated by Design Science Research Methodology (DSRM) and a holistic single Case study for HEI-01 data collection and analysis. Findings reveal the success of SOA-BDAF in guiding the architectural development and adoption of BDA to meet the HEI-01 objectives and operations.

14:20 ***A Hybrid Voting Ensemble Classifier for Software Defects Prediction***

Fatema Abdullatif Alshaikh, Mustafa Hammad and Qasem Obeidat

Developing software without defects has become a recent research area these days. Realizing software with faults affects the reliability and quality of software. Predicting defects in the early stages of the Software Development Life Cycle (SDLC) minimizes the cost of maintenance and increases the software's performance. Ensemble techniques play an essential role in predicting software defects. This paper performed six voting classifiers by merging different machine learning algorithms to predict faults in the software. The dataset used is available publicly from the PROMISE repository. Moreover, different evaluation measures based on the confusion matrix are used. The results showed that voting ensemble

techniques performed well in software defect prediction with more than 82% accuracy and more than 86% after applying feature selection techniques. The votinger, compared to the algorithm used, combining random forest with artificial neural networks and naïve bayes choosing majority voting combination rule has the highest accuracy comparing to other voting classifiers used in the experiment.

Presenter bio: B.Sc. in Computer Science from University of Bahrain in 2005. Master's degree in Information Technology from Open University Malaysia in 2012. Currently studying Ph.D. in University of Bahrain in Computing and Information Science. Research interests include Artificial Intelligence, Machine Learning and Intelligent system

Sunday, November 17 13:00 - 14:40 (Asia/**Bahrain**)

S2-B: Deep Learning; Image Processing-2

Virtual Room (B)

Chair: Fatema Albalooshi

13:00 ***Audio Content Processing System for Automatic Music Classification using Mask R-CNN***

Narsaiah Putta, Sr, R Srinivas, Dasu Vaman Ravi Prasad, S.M. Rawoof and T Suvarna Kumari

The music genre is defined to be a subjective category that helps to identify tracks of audio data to a common culture or group of conventions. These genres are required for categorizing the various music related Meta data and tracks into domains that would share same music qualities. Categorizing audio data with respect to their genre is a subject of importance within the field named information retrieval of music. Various musical databases that currently fetched over computer networks create a request for specialized methods for searching as well as organizing these data sets. The paper provides a model which is a genre classification technique developed and automated using deep neural networks with Mask R-CNN method. Dimensionality reduction of target labels of the model was performed to yield improvements in the above stated method. Finally, a qualitative analysis of the results using Keras will be predicted to show the behaviour of the classification task. We experimented with FCN, Timbre CNN, end to end and finally, CNN pre-existing models. With these, experiments were carried out with both raw amplitude data and Mel spectrograms of the raw audio data that provided better results with precision.

Presenter bio: Completed M. Tech in Computer Science & Engineering from Osmania University, Now Perusing PhD in Computer Science & Engineering from OSMANIA UNIVERSITY Hyderabad, India.

13:20 ***Federated Learning-Based Bearing Fault Classification***

Musa Yenilmez and Ilhan Aydin

Motors play an important role in converting various energy sources into mechanical work power. In this context, there should be a motor in every area where movement is required. Electric motors are preferred because they have advantages over other types of motors due to minimum energy consumption and minimum fault rate. The use of electric motors covers a wide range of applications, from large-scale industrial systems to agriculture, automotive, medical, smart home systems, white goods and small household appliances. Although it has low failure rates, there is a possibility of failure. These malfunctions can cause serious financial losses for businesses using electric motors. In this study, a federated learning based method is proposed to minimize the losses caused by faults. Models created as a result of training with data sets from different businesses through federated learning are combined on a server. The updated model created by combining the models is sent back to the businesses, and the businesses conduct their subsequent training with this updated model. With the federated learning method, data sets are not shared outside the businesses and training is carried out with more diverse data sets. In this way, the performance

rate can be increased. As a result of the training performed with the proposed method and The Case Western Reserve University (CWRU) dataset, a accuracy rate of 99.06% was achieved. In this way, motor faults can be detected early, possible errors can be prevented and losses will be minimized.

Presenter bio: Musa YENILMEZ received the B.S. degree in Computer Engineering from Fırat University, Elâzığ/TURKIYE in 2020, where he is currently pursuing the master's degree with the Department of Computer Engineering. He is currently a Research Assistant with the Department of Computer Engineering, Fırat University. His research interests include federated learning, computer vision and artificial intelligence.

13:40 ***Evaluating Transfer Learning with EfficientNetB0 for Smoking Image Classification***

Raihan Atsal Hafizh, Andri Zefrinaldi and Mahmud Dwi Sulistiyo

This research explores the impact of applying transfer learning with the EfficientNetB0 model for image classification, specifically applied to the "Smoking Images" dataset from Kaggle, which categorizes images based on smoking activity. The research aims to assess EfficientNetB0's performance in distinguishing between smoking and non-smoking images, addressing challenges in accurate image classification within this context. The proposed approach includes data preprocessing, initializing a data generator, and training the EfficientNetB0 model. The results show that EfficientNetB0 achieved a 94% accuracy on the test set, with precision rates of 93% for the 'notsmoking' class and 95% for the 'smoking' class, and recall rates of 96% and 93%, respectively. The F1-score for both classes is 94%, indicating a balanced model performance. This research highlights the promise of using transfer learning with EfficientNetB0 to create effective image classification models. It also identifies challenges such as parameter tuning and dataset representativeness, suggesting future research to expand the dataset and explore more complex architectures to further improve classification accuracy.

Presenter bio: Informatics specialist with a strong background in Big Data, Research, and Machine Learning, with a particular focus on computer vision and biometric applications. I have led diverse projects, applying advanced techniques in data analysis and model development to create impactful, high-precision solutions. My expertise covers end-to-end machine learning workflows, particularly within computer vision and biometrics, ensuring robust outcomes in complex real-world applications. My research contributions, published in national and international journals, underscore my commitment to advancing the fields of AI and biometric technology. I look forward to bringing my skills and insights to drive innovation in future projects.

14:00 ***Green AI: Assessing the Carbon Footprint of Fine-Tuning Pre-Trained Deep Learning Models in Medical Imaging***

Kostas Ordoumpozanis and George A Papakostas

Artificial Intelligence (AI) is at the forefront of today's research trends, particularly in deep learning. The prevailing trend in designing AI systems is based on the principle "the bigger, the better," which focuses on achieving higher scores on benchmarks. However, this approach comes with a significant environmental cost. At the same time, reducing carbon footprint emissions is more crucial than ever. This study evaluates the environmental impact of fine-tuning the Google ViT model for medical image analysis. It also examines the impact of selecting the appropriate pre-trained model size, the influence of hardware architecture used for fine-tuning, and whether the choice of online providers affects the total emissions and energy consumption of the process. Using CodeCarbon, we calculated that each hyperparameter fine-tuning experiment required about 0.18 kWh of energy to complete and produced 0.066 kg of equivalent CO_2 emissions. We also found that using different sizes of the pre-trained ViT model results in varying environmental impact and efficiency. Finally, we tested hardware oversizing and discovered that it can increase the emissions produced.

Presenter bio: Kostas Ordoumpozanis is currently a PhD candidate at the Department of Cultural Technology and Communication at the University of the Aegean, focusing on enhancing cultural storytelling through immersive technologies and generative AI with multimodal approaches. Concurrently, he is an MPhil student in the department of Computer Informatics, Democritus University of Greece, specializing in artificial intelligence. Kostas received his undergraduate degree in Mechanical Engineering from the University of Western

Macedonia in 2005. His early research as a PhD Candidate from 2006 to 2011 involved the simulation of building-integrated hybrid ventilated photovoltaic facades, culminating in three publications in high-impact journals and numerous presentations at Greek conferences. From 2016 up to 2023 he was a freelance full-stack developer, creative technologist, and entrepreneur, working on projects related with web applications, augmented reality and gamification. The last year is focusing on large language models, retrieval-augmented generation systems, and computer vision.

14:20 ***Designing a Real-Time Silkworm Cocoon Segregator using Machine Learning***

Dheeraj G Chakrasali, Ponnuvel K M, ManthiraMoorthy S and Manikandan J

Silk cocoons are used for various applications and the best ones are mostly available in two shapes - oval and dumbbell. Oval and dumbbell shaped silk cocoons have their own pros and cons. Silk cocoon shipments received are mostly in the mixed form and there is a need to segregate cocoons based on their shapes for best reeling and seeding results. Design of a real-time silkworm cocoon segregator using the concepts of machine learning is proposed in this paper. A single ESP32 camera module is used to capture real-time input with a Neural Network model running on the same module to classify and segregate oval and dumbbell shaped cocoons. Several models were designed and evaluated to obtain the model with best configuration. The proposed real-time system with best configuration could classify cocoons in 717ms with a maximum recognition accuracy of 99%. The proposed system is an outcome of a funded project with National Silkworm Seed Organization, Central Silk Board under Ministry of Textiles, India.

Presenter bio: I am Dheeraj G Chakrasali, a B.E. Graduate in Electronics and communication from Sai Vidya Institute of Technology. I completed my apprenticeship training in Bharat electronics Limited. Currently i'm working as a Research assistant in department of CORI, PES University.

Presenter bio: J.Manikandan obtained his BE degree in ECE from Madras University,ME and PhD degree in ECE,both from NIT,Trichy. Before pursuing PhD,he served as Project Trainee at ISRO and as Scientist at Aeronautical Development Agency(ADA),DRDO Labs,Bangalore. Currently he is the Director of Crucible of Research and Innovation (CORI), Center for Research in Space, Science and Technology (CRSST) & Professor with Department of ECE,PES University,Bangalore. He received Young Engineer Award from Institution of Engineers(India),Best Ph.D thesis award from Board for IT Education Standards and IETE Biman Behari Sen Memorial award.Has filed 7 patents,published 100+ research papers,received 800+ citations and four best paper awards. Three of his research papers published in International Journals are listed in Top 25 hot articles ranking 3rd(IET Signal Processing),8th(Elsevier Microprocessor & Microsystems) and 22nd(Elsevier Neurocomputing).He has worked on several funded projects and his research topics include AI&ML, pattern recognition, FPGA based system design and wireless power.

Sunday, November 17 13:00 - 14:40 (Asia/**Bahrain**)

S2-C: Artificial Intelligence-1

Virtual Room (C)

Chairs: Hazim Al-Sibai, Shaikha Hasan

13:00 ***Towards a Sustainable Metaverse: Exploring Green Innovations and Environmental Considerations***

Shalini Rastogi and Deepika Pandita

This research evaluates the environmental plan and sustainability in the emerging world of the metaverse. A qualitative approach is used to gather the data based on semi-structured interviews with sustainability managers and technical specialists of significant tech corporations involved in developing the metaverse to identify existing practices, problems, and possibilities for transition to green solutions in a metaverse. The study indicates that sustainability must be included in the metaverse through green innovations, energy efficiency, and proper business guidelines. Some potential access point solutions focus on technology innovations in energy efficiency of cloud computing, as well as collaborative work and increasing consumers' awareness. On the other hand, implementation challenges may include technological constraints, costs, and legal aspects. Concerning the practical implications of the studied model, the priority

is put on opportunities and the management of challenges for improving sustainability. Applied research, innovation, policy involvement, and corporate governance significantly contribute to the metaverse's sustainable growth. The present study, therefore, emphasizes that much more work needs to be done for the pros of such advancement to lead to infinity that would create social and, specifically, economic benefits of an advanced digital environment and, at the same, minimize the adverse impact on the environment.

13:20 ***A Study on Word Embeddings in Local LLM-based Chatbot Applications***

Hariprasath S, Arjun Paramarthalingam, Shanmugam S and Stefano Cirillo

Large Language Models (LLMs) have revolutionized natural language processing, but their deployment often requires substantial computational resources and constant network connectivity. There is a growing need for efficient, locally-runnable LLMs with improved word embeddings for various applications, including chatbots. This study focuses on developing a Large Language Model (LLM) capable of running locally without network connections to generate solutions for given queries using improved word embeddings. In this work, two pre-trained models are used and further trained separately to enhance embedding results. The system incorporates additional features such as document-based chat functionality. Our approach develops a dynamic and adaptive NLP system that can assimilate new data from various sources when connected to a network, ensuring upto-date word embeddings that capture the latest semantic nuances and language trends. The study compares FastText, GloVe, and Word2Vec models, finding that fastText outperforms the others in text generation within the specified time frame. While fastText may require more time to generate larger content, its efficacy in producing better results makes it the preferred choice for this application.

Presenter bio: Dr. S.Shanmugam M.E.(CSE) and Ph.D, working as an Assistant Professor, Department of Computing Technologies, SRM Institute of Science and Technology, Chennai. Having 8 years of teaching experience and 1 year of Industry Experience. Published 2 journals in Springer and Elsevier journals. Attended 5 IEEE conferences and 13 workshops related to machine learing and data science.Life time membership of IFERP, FMERU and ISTE.

13:40 ***Evaluation of Machine-Learning Based Approaches for Early Detection of Breast Cancer Tumor***

Bader Al-Haran, Iyad Abu Doush, Marwa Kandil and Fares Mohammad

Chances of survival can be significantly improved through early detection of breast cancer. Traditional breast cancer detection techniques require experts to identify the physical features of breast tumors from medical tests. However, the limited number of medical experts will leave many women at risk of developing higher stages of cancer. Large amount of data can be efficiently analysed using Machine Learning (ML) algorithms to recognise abnormal patterns; thus providing an early detection tool for breast cancer. This paper examines the performance of six distinct ML algorithms in classifying breast tumors to either benign tumor (B), or malignant tumor (M). The ML models were trained on the Wisconsin Breast cancer dataset that contains 569 rows of data and 32 features. The models were evaluated by the ROC curve, the confusion matrix, precision, accuracy, recall, and F1 score values. The experimental results proved that SVM and KNN models achieved the highest accuracy of 98.24%, and F1 score of 98% for SVM and 99% for KNN. This indicates that SVM and KNN models handled the data's complexity effectively and performed accurate prediction of breast tumor type.

Presenter bio: My name is Fares Ziyad Mohammad Mohammad, and I am currently pursuing a master’s degree in Computer Science at Khalifa University. I hold a Bachelor of Science in Computer Science, and my primary research interest lies in the field of machine learning. I am passionate about exploring advanced algorithms and their applications to solve real-world problems. Through my studies and research, I aim to contribute to the development of innovative and impactful AI solutions.

14:00 ***RAPID: Integrating AI and Multi-Agent Systems for Enhanced Traffic Management Framework with YOLOv9***

Shadia Baroud and Adnan Yahaya

Traffic accidents pose a major risk to human life and have a considerable economic impact worldwide. In this study, we present the RAPID framework, an innovative approach that integrates Artificial Intelligence (AI) and Multi-Agent Systems (MAS) to enhance traffic management. The core of the RAPID framework is the YOLOv9 model, a state-of-the-art deep learning (DL) algorithm for real-time object detection and classification, which we employ to detect and classify traffic accidents accurately. The RAPID framework addresses key challenges in modern traffic management, including data heterogeneity, scalability and real-time processing. Our system leverages a multi-layered architecture: data is acquired from various sources, including traffic cameras and CCTV and then transmitted to a cloud data center for storage and processing. Within the cloud infrastructure, the data undergoes pre-processing and is analyzed by the YOLOv9 model. The MAS coordinates various components of the framework, distributing tasks among specialized agents responsible for data acquisition, pre-processing, model training and real-time detection. We evaluated the performance of the RAPID framework using a dataset of 3000 labeled traffic accident images. The YOLOv9 model demonstrated 95.4% accuracy, 93.8% precision, 92.6% recall and 93.2% F1-score. The experimental results indicate that the RAPID framework significantly improves traffic accident detection and response times compared to traditional systems, highlighting its potential for real-world applications. The RAPID framework contributes to the field of intelligent transportation systems (ITS) by providing a robust, scalable and efficient solution for real-time traffic management.

Presenter bio: Shadia Yahya Baroud is a dedicated researcher from Gaza, Palestine, with over 14 years of professional experience, currently pursuing a PhD in Computing with a focus on Artificial Intelligence at the University Malaysia of Computer Science and Engineering. With a strong background in machine learning and expertise in multi-agent systems, her research explores innovative applications of AI across various domains, including traffic management, predictive maintenance, healthcare and education. At the 3ICT conference, Shadia will present her paper titled "RAPID: Integrating AI and Multi-Agent Systems for Enhanced Traffic Management Framework with YOLOv9", highlighting how AI-driven solutions can transform real-time urban traffic monitoring and optimization. Her work reflects a commitment to advancing smart, adaptive systems that address complex, real-world challenges.

14:20 ***Novel Selection Indexes for Additional Selection of Non-dominated Sorting Genetic Algorithms***

Leo Hagihara and Makoto Ohki

In this paper, we propose two new ranking indexes for solution set in many-objective optimization evolutionary algorithms. A non-dominated ranking allows selection pressure to perform effectively in Many-objective Optimization Problems (MaOPs). NSGA is one of the algorithms that effectively incorporates non-dominated sorting for solving MaOPs. In MaOPs with a large number of objectives, most of the solutions in solution set of NSGA are non-dominated with each other. In such a case, NSGA no longer rank solutions with the non-dominated sorting, and is forced to optimize based on additional selection indexes, for example, which is crowding distance in NSGA-II. It is well known that the additional selection with crowding distance does not effectively solve MaOP. On the other hand, NSGA-III performs niche selection based on a large number of uniformly distributed reference points during additional selection. While the niche selection yields high diversity in the solution set and improves the optimization, it requires huge computational cost for calculate the relation ship between the solutions and reference lines. To avoid these problems on conventional NSGAs, this paper proposes a new selection indexes to effectively solve MaOPs with the equivalent computational cost as NSGA-II, where the proposed indexes are based on the hyper volume difference and the hyper conical volume of each point in certain front set. These proposed indexes are implemented with significantly smaller computational costs than the niche selection of NSGA-III. NSGAs with the two proposed selection indexes are applied to several test MaOPs for comparing with the conventional NSGA-II and NSGA-III as numerical experiments. The experimental

results showed that NSGA-III has been the most effective, but the proposed indexes demonstrated more effective optimization than NSGA-II.

Sunday, November 17 13:00 - 14:40 (Asia/**Bahrain**)

S2-D: Internet of Things-2

Virtual Room (D)

Chairs: Luisella Balbis, Jalal Khlaifat

13:00 ***Development of a LoRa-Based LRT Real-Time Train Tracker with Arrival Time Estimation***

Gerald P. Arada, Yuan Patrick E. Dumandan, Ivan Daniel C. Porcincula, Arthur Kenji Yoro II and Kyle Marcus E. Ramos

This paper aims to develop a real-time train tracking system for the Manila Light Railway Transit (LRT). The system consists of a RAK7246G WisGate Developer D0 gateway, a GY-NEO6MV2 NEO-6M Ublox Flight Controller GPS Module, and an Arduino LoRaWAN device with built-in LoRa module. An Android application was developed on a mobile phone to display the real-time train location on the LRT's route map, and the train's daily schedule. The application can also calculate and display the estimated time of arrival of the train. To obtain the real-time location of the train, speed-sensor nodes, GPS, along with LoRa nodes, and gateways were deployed on the train and the LRT stations. The sensor nodes communicate with the LoRa gateways by sending data packets containing the sensor data. The data gathered is stored in The Things Stack Network Server and can be retrieved by the application that processes the data.

13:20 ***Leveraging Artificial Intelligence to Secure Wireless Network: Exploring Threats, Existing Approaches, and Proposed Mitigation Strategies***

Saeed Sharif, Alice Lee Nan Xin, Athirah Mohd Ramly and Mehran Behjati

The exponential growth of network has introduced new IoT use cases that has enabling us convenience and comfort. The surge of IoT devices due to the capabilities brought by 5G have given rise to security threats and attacks, particularly malware attacks. IoT botnets have been an alarming issue, where smart devices can be manipulated by malicious actors to commence subsequent attacks such as Denial of Service (DoS). Traditional and complex security techniques may not be a viable solution towards these resource-constrained devices with limited processing power. Machine Learning techniques (ML) are the rising trend, and it is often used in Intrusion Detection Systems and Network Anomaly Detection. This paper emphasizes on analyzing and comparing various machine learning models on the IoT-23 dataset. It aims to predict anomalies and conclude the model with optimal performance and least computational time cost that can be used for network anomaly detection systems with real-time data in future works. The ML models used in this paper are Decision Trees, K-nearest neighbors, Random Forest, Naïve Bayes and Histogram Gradient Boosting. Decision Trees displayed the best performance with an accuracy score of 73% and F1 score of 0.49 with a time cost of 28.22 seconds.

13:40 ***Enhancing Mobility and Safety for Vulnerable Populations: An IoT-Enabled Smart Walking Frame with Mobile Application Integration***

Ying Mei Leong, Yau Kit Chung and Lip Khi Lim

The Smart Walking Frame is an innovative device designed to provide assistance, stability, and safety during mobility for individuals transitioning between different locations. It integrates an Arduino Uno

microcontroller and a dedicated mobile application into a conventional walking frame. The device offers various functions through buttons embedded on the walking frame, transforming it into a versatile aid. These functions include an alarm function for immediate attention, an SOS function for emergency situations, and advanced capabilities like obstacle and water detection. The device enhances the safety and independence of individuals facing mobility challenges, particularly amputees and the elderly. The accompanying mobile application extends the device's utility by enabling real-time location tracking, allowing caregivers and loved ones to monitor the user's whereabouts. Additionally, users can configure multiple emergency contacts within the application, ensuring swift assistance when needed. The Smart Walking Frame represents a significant advancement in assistive technology, offering a comprehensive solution to improve the quality of life and safety of individuals with limited mobility or self-defense capabilities, such as amputees and the elderly.

14:00 ***Comparative Analysis of Deep Learning Models for Node Prediction in Low-Power Lossy Networks***

Mohamed Haman, Salem Omar Sati and Kalman Graffi

The accurate estimation of energy consumption within IoT networks heavily relies on the precise forecasting of node quantities. This research paper tackles this issue by introducing a deep learning-centered methodology to anticipate node numbers utilizing various dataset parameters like hop count, node degree, count of DIO messages, MAC table entries, and routes. Various deep learning models, such as Long Short-Term Memory (LSTM), Artificial Neural Networks (ANN), Feedforward Neural Networks (FNN), and Convolutional Neural Networks (CNN), are evaluated for their effectiveness in this context. Our findings reveal that ANN outperforms the FNN model, with FNN showing superiority over LSTM in Mean Square Root and R-squared scores. In contrast, CNN exhibits lower performance metrics compared to other models in predicting node quantities, contributing to enhanced energy efficiency and resource distribution in IoT setups. This research shifts the focus from conventional security-centric studies on Intrusion Detection Systems (IDS) and Intrusion Prevention Systems (IPS) towards energy optimization via node prediction, presenting a fresh viewpoint on IoT network administration.

Presenter bio: Eng. Mohamed Haman is an aspiring engineer who will complete his BSc thesis in February 2025. His academic focus and interests lie in network security, data centers, and cloud computing. Throughout his studies, Mohamed has demonstrated a keen passion for exploring innovative solutions in these fields, aiming to contribute to advancements in secure and efficient data management. As he approaches the culmination of his undergraduate education, he is eager to apply his knowledge and skills to real-world challenges in the technology sector.

Presenter bio: Dr.Sati has a PhD in computer science from HHU University in Dusseldorf, Germany (2017), and an MSc degree in computer engineering from Higher Industrial Institute in Misurata, Libya (2008). Also he completed his BSc in computer engineering in Higher Industrial Institute in 1997. Dr. Sati has contributed to several national conferences in Libya, Also International IEEE conferences in North America. Asia and Europe in the fields of computer networks. He has many publications in IEEE conferences. He is currently an Assistance Professor at the Faculty of Information Technology in Misurata University.

14:20 ***Challenges and Opportunities of DevOps for IoT Systems: DevOps_For_IoT***

Walla Khalaifat and Fawzi Abdulaziz Albalooshi

DevOps has become a highly important trend in the global software industry due to its ability to improve productivity, quality, and customer satisfaction in the software development process. It is a set of practices that combine both software development and operations to enable a continuous software product life cycle. While DevOps has achieved success in traditional software systems, the adoption of DevOps remains relatively limited in the domain of IoT, which integrates physical components, software, and communication systems. Managing and integrating the diverse elements of IoT including IoT applications, hardware platforms, operating systems, protocols, and security requirements, hinders the implementation of DevOps in IoT. This paper examines the use of the DevOps methodology in the IoT domain. It identifies

and discusses the challenges of implementing DevOps in the IoT domain. Also, it introduces DevOps_For_IoT, which is a modified DevOps approach for the IoT.

Sunday, November 17 13:00 - 14:40 (Asia/**Bahrain**)

S2-E: Deep Learning-1

Virtual Room (E)

Chair: Riyadh Ksantini

13:00 ***Named Entity Recognition on User Requirement Analysis with BERT-CNN***

Mohamad Fahmi Syaifudin, Nur Aini Rakhmawati and Rarasmaya Indraswari

In the realm of software development, the emergence of new requirements that have already been addressed or that bear functional similarities to existing modules poses significant challenges. These include duplicate efforts, inconsistencies, delays, and increased costs. To mitigate these issues, this research proposes the management of requirement documents using Named Entity Recognition (NER) to generate an ontology that serves as a structured representation of information. Traditionally, the task NER in user requirements has been addressed using machine learning and deep learning techniques. However, the advent of transformer-based technologies, notably Bidirectional Encoder Representations from Transformers (BERT), presents a novel opportunity for enhancement. This study addresses this research gap by integrating BERT with Convolutional Neural Networks (CNN) to improve the performance of NER tasks. By leveraging the contextual understanding capabilities of BERT and the spatial feature extraction strengths of CNN, our approach aims to achieve superior accuracy in recognizing entities within the user requirements. The combination of these advanced techniques is expected to provide a more precise and reliable extraction of entities. The results demonstrate that the overall F1 score across all entity categories improved from 77% with BERT to 87% with BERT-CNN, indicating that integrating CNN with BERT improves the performance of the model in NER tasks

Presenter bio: Mohamad Fahmi Syaifudin (Institut Teknologi Sepuluh Nopember, Indonesia)

13:20 ***Smart Diabetes: An Intelligent Classifier for Continuous Health Monitoring***

Meriam Shawky, Farah Abd El Fattah, Mahy Safwat, Baher AbdelMawla, Beshoy Edwar, Salma Zakzouk and M. Saeed Darweesh

Diabetes, a chronic and widespread condition, needs precise and effective management strategies to mitigate its impact on patients' lives. This paper explores diabetes care with a focus on classification, such as whether the patient is diabetic or not. This is done by applying machine learning models to enhance management using Kaggle's "Diabetes Prediction Dataset". The paper begins with precise data preprocessing, setting the stage for evaluating various models. The Random Forest model emerges as the frontrunner, demonstrating superior accuracy with metrics such as accuracy (0.89160), precision (0.87620), recall (0.88304), F1-Score (0.87961), and AUC-ROC Score (0.96820). This analysis not only advances academic insights into machine learning's role in healthcare but also has tangible implications for real-world diabetes management, paving the way for ongoing health monitoring and marking a significant stride towards more effective diabetes care.

Presenter bio: Meriam Sherif Shawky Farid, a Computer Engineering graduate from Nile University, specializes in data analysis, machine learning, and IoT applications. With a passion for merging technology and innovation, she is dedicated to advancing impactful solutions across industries.

13:40 ***Speech Emotion Recognition Using Deep Learning Techniques and Traditional Classifiers***

Rohit Bele, Sanjeev Thakur, Tarun Yarlagadda, Ved Prakash Chaubey, Shamneesh Sharma and Saikat Gochhait

This paper analyzes the Speech Emotion Recognition procedure, a tool that helps IT systems increase their intelligence by recognizing persons' emotions from the signals put into words, by employing deep learning methods. The audio data was preprocessed by extracting the Mel-frequency cepstral coefficients (MFCCs) and later augmented by adding white noise, time shifting, pitch shifting and time stretching. The models used in this paper are Long Short-Term Memory (LSTM) networks, and Convolutional Neural Networks (CNNs). CNN architecture has convolutional operation layers, batch normalization layers followed by max-pooling layers, and dropout layers to learn speech features and to avoid overfitting. With these results, we stress the importance of the synergy of CNNs with solid preprocessing and augmentation methods in the context of SER and envision their tremendous potential in HCI, education, and health. It is worth stressing that including models such as SVM and LSTM certifies the novelty and the genetic soundness of the approach.

Presenter bio: I am Sanjeev Thakur, an aspiring software developer with a background in Computer Science from Lovely Professional University, India. With skills in Python, Java, and C, I specialize in applying machine learning and deep learning models for practical applications, including speech emotion recognition and defect detection in manufacturing. My project experience spans deploying scalable models on Amazon EC2 and optimizing data workflows for business insights. I have also earned certifications iin Machine Learning/AI from UpGrad Campus, reflecting my commitment to advancing my technical expertise.

14:00 ***Real-time Detection of Terminal Burn Defects Using YOLOv7 and TensorRT***

Emre Güçlü, Erhan Akin, Ilhan Aydin, Ahmet Topkaya, Mert Onan and Taha Kubilay Şener

This study focuses on the detection of defects that may occur during the production process of electrical cable terminals. Cable terminals are critical for increasing the reliability of electrical connections and usually contain ends made of conductive metals and insulating materials that protect these ends. However, defects such as burns that may occur during the production phase can lead to malfunctions and performance decreases in electrical systems. Therefore, rapid and effective detection of such defects is of great importance. In the study, YOLOv7 algorithm was used to detect burn defects on cable terminal surfaces in real time. This algorithm was integrated with TensorRT on NVIDIA Jetson Nano hardware to achieve high detection speeds and accuracy rates. The use of YOLOv7 enabled defects to be detected effectively, while TensorRT integration optimized system performance, allowing the defect detection process to be carried out in real time. This approach contributes to improving quality control processes on production lines and preventing potential malfunctions.

Presenter bio: He was born in 1994 in Elazig. He completed his primary, secondary and high school education in Elazig. After graduating from Necip Fazıl Kısakürek Anatolian High School, he graduated from Fırat University, Engineering Faculty, Computer Engineering Department in 2019. In 2020, he started his master's degree in Fırat University, Institute of Science and Technology, Department of Computer Engineering. He continues to work in the fields of image processing and artificial intelligence.

14:20 ***Evaluating the Efficiency of Fine-Tuned Machine Learning Models in Phishing URL Detection***

fatima anter, Fatna El Mendili, Nabil Benamar, Nabil Mrani and Mohammed Fattah

Phishing URL detection is a critical challenge in cybersecurity, particularly in the context of social networks, which are widely used for information dissemination. Cybercriminals are increasingly exploiting these platforms to launch phishing attacks to deceive users into revealing sensitive information. Researchers employed various machine learning techniques to detect phishing URLs. However, phishing tactics continue to evolve, requiring more accurate and robust detection systems. This study addresses the challenge by evaluating the effectiveness of various machine learning models in detecting phishing URLs. The dataset, sourced from Kaggle, contains 11,054 instances with 32 features representing URL attributes. Models such as Logistic Regression, k-Nearest Neighbors, Naive Bayes, Decision Trees, and Random Forest

were assessed for their performance. Hyperparameter tuning was applied to optimize the models, resulting in significant accuracy, precision, recall, and F1 score improvements. Among these models, the Random Forest model, with optimal hyperparameters, achieved the highest accuracy of 97.26%, outperforming other models. This research highlights the importance of hyperparameter tuning in enhancing machine learning models for phishing URL detection and underscores its potential to strengthen cybersecurity measures against phishing threats.

Presenter bio: Fatima Anter, received her M.S. degree in Software Quality from Abdelmalek Essaadi University, Tetouan, Morocco, in 2014. She is currently a Ph.D. candidate at Moulay Ismail University in Morocco. Her research interests include security in social networks, blockchain technology, and artificial intelligence.

Monday, November 18

Monday, November 18 8:45 - 9:00 (Asia/**Bahrain**)

OD2: Opening - Day2

Room: Virtual Main Hall

Monday, November 18 9:00 - 10:40 (Asia/**Bahrain**)

S3-A: Informatics & Software Engineering

Virtual Room (A)

Chair: Fawzi Abdulaziz Albalooshi

9:00 ***A Forward Chaining Expert System for Personalized Programming Language Selection***

Andi Sholihin and Shintami Chusnul Hidayati

Choosing the right programming language is a critical decision for beginners in computer science because it greatly influences their learning experience and future opportunities. This paper presents an expert system designed to assist novices in selecting a programming language that aligns with their preferences and project requirements. The proposed system uses the forward chaining method, a robust approach to expert system development. It draws on comprehensive developer survey data from Stack Overflow, focusing on the top ten most popular programming languages. Our methodology involved formulating evaluative questions to create a decision-making framework supported by a rule-based table, which served as the foundation for the system's knowledge base. Implemented in Python, the expert system achieved a relevance score of 90%, demonstrating its effectiveness in simplifying the programming language selection process for beginners.

9:20 ***Technology Readiness for Generative AI among Academic Researchers***

Husain Salman, Muhammad Ahmad, Roliana Ibrahim and Jamilah Mahmood

The use of Generative Artificial Intelligence tools in academic research has recently created a debate in the higher education sector. This study explores researchers' awareness, concerns, and usage of generative AI tools in the academic research process. In addition, the study investigates the current level of readiness among researchers to adopt these tools using the Technology Readiness Index 2.0. Results indicate a high familiarity among respondents with the applications of Generative AI tools in academic research. However,

only about half of the participants (51.54%) stated that they are currently adopting these tools mainly for academic writing assistance and language support. In addition, researchers expressed significant concerns about the accuracy of the information, ethical considerations, the authenticity of work, and data privacy and security, with (58.96%) indicating that these concerns may influence their future decisions to adopt or continue adopting these tools. The findings also indicate that the overall readiness level is moderate but reflects a degree of discomfort and insecurity which can inhibit researchers' readiness for adoption. Furthermore, senior researchers tend to feel more insecure than other researcher groups, and AI literacy skills were shown to impact the innovativeness sub-scale.

Presenter bio: Hussain Salman is a senior lecturer of Computer Science at the Administrative and Technical Programs at the College of Applied Studies, University of Bahrain. He had his master's in Computer Science from New York Institute of Technology and Bachelor of Computer Science from the University of Bahrain. Research Interests include Machine Learning, Neural Network, and Informatics.

9:40 ***PFRS: Personalized Fashion Recommendation System Using EfficientNet***

Mohammed Mahmood Ali

The fashion industry has undergone significant transformation owing to technological advancements, particularly in the realm of fashion recommendation systems. This paper introduces a novel approach, the Personalized Fashion Recommendation System (PFRS), which leverages reversed image processing, an EfficientNet pre-trained model, and the K-Nearest Neighbors (KNN) algorithm. Convolutional Neural Networks (ConvNets) are tailored within resource constraints and subsequently expanded to boost accuracy for PFRS. Notably, E-commerce platforms like Stitch Fix and ASOS employ Collaborative Filtering and Feedback Loop techniques, which rely on user-item interactions. Our research demonstrates that EfficientNet outperforms other transfer learning networks for object detection tasks, achieving 84.3% accuracy on the ImageNet dataset. Moreover, our EfficientNet exhibits an 8.4x reduction in size and a 6.1x increase in inference speed compared to leading ConvNet models like ResNet50 and Xception. This work lays a foundation for advanced fashion recommendation systems, enhancing user experience and efficiency in online fashion retail

Presenter bio: I have completed my Ph.D in the area of surveillance of instant messages using Ontology and data mining from Osmania university, under esteemed guidance of prof. Dr.Lakshmi Rajamani

10:00 ***Innovation of Operational Cost Administration Platform for Freelancers Using Design Thinking Approach***

Rizky Harliano Putra and Nur Aini Rakhmawati

PT. XYZ Indonesia, which operates in the fields of training, consulting, assessment, and project coaching, is facing administrative issues in the process of operational expense claims by freelance workers. Freelancers often incur operational expenses for supporting their daily activities. Operational expenses stated in their contracts include transportation, meals, and other necessities. Some freelancers often forget about PT. XYZ Indonesia's business procedures, resulting in claims that do not comply with the regulations. There is also unfairness in operational expense claims among freelancers, leading to dissatisfaction. Furthermore, the current claims system is considered inadequate and inefficient, complicating the administrative process of operational expense claims, slowing down the process, and resulting in inconsistencies. To address these issues, the PT. XYZ Indonesia plans to develop a portal-based operational expense claims information system using a design-thinking approach. Design thinking is a user-centered method that emphasizes a deep understanding of their needs and problems through an iterative and creative process. This system aims to ensure that claims are submitted according to company regulations, reduce errors, and expedite the administrative process, thereby enhancing the satisfaction and fairness among freelancers. This approach is expected not only to improve efficiency and consistency in claims management but also to

strengthen work relationships and company productivity, allowing PT. XYZ Indonesia to continue delivering high-quality services and effectively achieve its corporate objectives.

Presenter bio: Student of Mist ITS Surabaya

10:20 ***Measuring the Matches Between University Courses: Ontological Comparison-Based Approach***

Amjad W Hawash, Shahd Hamdan and Salma Ibrahim

This study introduces an Ontological Comparison Approach that aims to address the difficulties in finding appropriate substitute courses for graduating students if their first choices are not offered. Department heads have always had to manually compare courses across different departments, which is a time-consuming and error-prone task. Our method allows customers to specify desired matching percentages by measuring the degree of matching between course descriptions using sophisticated algorithms. This approach greatly simplifies the procedure and improves the speed and accuracy of finding suitable course substitutes. Additionally, the strategy is enhanced by an intuitive user interface that helps make well-informed decisions, addressing the challenges associated with choosing courses in the pivotal last stages of academic programs.

Monday, November 18 9:00 - 10:40 (Asia/**Bahrain**)

S3-B: Deep Learning-2

Virtual Room (B)

Chairs: Abdulla Alqaddoumi, Bashayer Hussain Ahmed

9:00 ***Next-Gen Assistive Technology: AI Applications for Deaf-Mute and Blind Communities***

Tushar Bharti, Shashwat Singh, Ved Prakash Chaubey, Shivangini Gupta, Shamneesh Sharma and Saikat Gochhait

In today's era where everyone is interconnected, there is still a communication gap between individuals with sensory impairments specifically Blind and Deaf-mute. BridgeAI aims to reduce this communication gap using Cutting-edge technologies such as Convolutional Neural Networks (CNN), speech recognition, and braille-to-voice conversion. The web application has been created keeping everyone's needs in mind it also provides an option for those who are both blind and mute and facilitates seamless interaction between every Deaf- Mute and Blind individual. BridgeAI creates an inclusive environment where communication is no longer a barrier. This paper presents the implementation, architecture, and market potential of BridgeAI and demonstrates how it effectively enhances communication and impacts a broader audience.

Presenter bio: Tushar Bharti is a Bachelor of Technology graduate in Computer Science and Engineering with a specialization in Data Science (Machine Learning and AI) from Lovely Professional University ,Punjab, India (graduated 2024).With a passion for technology and innovation, he is eager to contribute to the field of computer science through his research and development efforts. His interests lie in exploring the latest advancements in artificial intelligence, machine learning, and data science.

9:20 ***Boosting Cell Site Stability: LTE Congestion Prediction with Machine Learning and Deep Learning***

Deyaa Elsayed, Amgad Abdelaziz, Zeyad Yassien, Amr El-Berry, Omnia Yasser, Mohamed Gad and M. Saeed Darweesh

This paper tackles the issue of congestion in LTE networks by leveraging advanced machine learning and deep learning techniques. Focusing on data provided by Orange Egypt Telecom, we aim to predict congestion in cell sites to enhance network stability. By comparing Random Forest and XGBoost models in machine learning with LSTM and GRU models in deep learning, we analyzed 65,077 real-time LTE data points to forecast Physical Resource Block (PRB) utilization. Our results reveal that machine learning models can achieve a root mean square error (RMSE) of less than 4% for predicting PRB utilization, while deep learning models demonstrate an RMSE of under 7%. This research underscores the potential of combining machine learning and deep learning approaches to predict network congestion accurately and maintain optimal LTE network performance.

Presenter bio: My name is Amgad Maher, I am an Electronics and Communication Engineer currently working at Systel Telecom. My expertise lies in designing and implementing communication systems. I am passionate about leveraging my technical skills to drive efficient and innovative solutions in the telecom industry, always aiming to stay updated with the latest advancements in technology and industry trends.

Presenter bio: My name is Zeyad Yassien. I am a fresh Electronics and Communication Engineering graduate from Nile University, where I graduated with high honors. Currently working as a Protection and Control Engineer at Mantrac Group, I have a strong enthusiasm for cybersecurity and have actively pursued certifications and training to expand my knowledge in the field.

9:40 ***Exploring Deep Learning Architectures for Effective Visual Question Answering***

Shofa Wardatul Jannah, Gagatsatya Adiatmaja, Bilal Hidayaturrohman, Yunus Dwi Santoso and Rarasmaya Indraswari

Deep learning and computer vision developments have significantly enhanced the performance of artificial intelligence systems, such as Visual Question Answering (VQA). VQA systems integrate visual and textual data to answer questions about images, requiring a robust understanding of both domains. This research evaluates methods including CNN-BiLSTM, CNN-BiGRU, and CNN-BRNN to identify the most effective approaches for VQA. The VGG16 BIGRU model achieved the highest accuracy, with a validation accuracy of 55.89% and a test accuracy of 52.30%, demonstrating its capability in interpreting visual questions accurately. In contrast, the ResNet BiLSTM model had the lowest performance, with a validation accuracy of 25.12% and a test accuracy of 23.58%. The ResNet BRNN model also performed well, with a validation accuracy of 53.84% and a test accuracy of 50.25%. These findings highlight the strengths and weaknesses of different models and contribute to the development of more accurate VQA systems.

Presenter bio: Shofa Wardatul Jannah is a Master's student in Information Systems at Institut Teknologi Sepuluh Nopember (ITS) in Surabaya, Indonesia. She holds a Bachelor's degree in Information Systems from Universitas Dinamika (2021) and has experience as an IT Assistant in Singapore and an IT Business Partner in Jakarta with Telkomsel. Her primary research interest is in multimodal data analysis—combining image and text—focused on the Indonesian tourism sector.

10:00 ***AI Integration in Medical Imaging: Advanced Analysis of Chest X-ray***

Danushka Bandara, Thamo Sutharssan and Saeed Sharif

In this research, we introduce two types of AI: Artificial Intelligence models for classifying chest X-rays: binary and categorical. These models were trained and validated utilizing CNN (Convolutional Neural Network) and transfer learning techniques. The binary classification model proved to bring up high performance metrics in the classification of normal and abnormal X-rays. The categorical classification model showed good abilities to recognize pathological states, such as cardiomegaly and infiltration: however, they failed when radiographic patterns overlapped. We used a dataset of 2,463 chest X-ray images with various pathological conditions and improved CNN architectures with two validation approaches to ensure robustness and reliability. This study contributes to the growing literature on AI in medical imaging, shows that with enhanced clinical outcomes with robust performances and predictive capabilities.

10:20 ***Hybrid Metaheuristic and Artificial Neural Network Approach for Solving Inverse Kinematics of a SCARA Manipulator Robot***

Rania Bouzid, Jyotindra Narayan and Hassène Gritli

This paper presents a hybrid approach that integrates metaheuristic algorithms and Artificial Neural Networks (ANNs) to address the Inverse Kinematics (IK) problem of a SCARA (Selective Compliant Assembly Robot Arm) manipulator robot with four degrees of freedom. The method combines Particle Swarm Optimization (PSO) with ANNs and Genetic Algorithm (GA) with ANNs to optimize training key hyperparameters, such as activation functions and hidden layer sizes {\color{red}using MATLAB's Neural Network Toolbox.} Experimental results achieved on a random step size dataset obtained after training show that the PSO-ANN method achieves a Mean Squared Error (MSE) of 0.12846, with a hidden layer size of 90. The GA-ANN method results in an MSE of 0.13785, with a hidden layer size of 91. This hybrid approach significantly reduces MSE in computed joint configurations and demonstrates promise for real-time control applications.

Presenter bio: Rania Bouzid received her License degree in Informatics Science in June 2020, awarded by the Higher Institute of Information and Communication Technologies (ISTIC), University of Carthage, Tunisia. Her academic journey continued with the completion of her Master's degree in Data Science and Smart Services (D3S) in November 2023, also from ISTIC. Currently, and since December 2023, she is pursuing her PhD at the Polytechnic School of Tunisia (EPT), University of Carthage. Her research interests encompass manipulator robots and artificial intelligence, with a particular focus on the kinematic modeling of manipulator robots, rehabilitation exoskeletons, machine learning, deep learning, metaheuristic algorithms, and Artificial Neural Networks.

Monday, November 18 9:00 - 10:40 (Asia/**Bahrain**)

S3-C: Cyber security-1

Virtual Room (C)

Chairs: Yaqoob S Al-Slais, Hasan Hameed Abdulla

9:00 ***CTI4RA: Cyber Threat Intelligence for Risk Assessment***

Vita Santa Barletta, Nicola Balzano, Lorenzo Colelli, Alessandro Pagano, Antonio Piccinno and Qaisar Sohail

Organizations, which are the foundation of today's society and economics, are growing an ever wider knowledge about CTI (Cyber Threat Intelligence), risk assessment, and management, in an ever more connected environment. In this context, cybersecurity is essential to ensure the safety of any Asset. These valuable entities are subject to being compromised by Threat Actors and thereafter lead to a possible wide range of consequences. An attacker could exploit a given vulnerability to its advantage and leverage it to gather, forge, and disclose sensitive information. Therefore, it has been found to be a must to detect CVEs and CWEs to protect valuable Assets. Once a vulnerability has been identified, such information could be used to assess other related vulnerabilities that might have happened throughout the Cyber Kill Chain. This paper presents methods and procedures to study known attack patterns, those that might be encountered starting from initial attack patterns and calculate the probability of being attacked by known intrusion sets based on the patterns found. The goal is to obtain a risk assessment of the organization through an approach that allows the retrieval and consultation of mitigation techniques and all information of the CTI and the relationships between them. It can be affirmed that the resulting system supports analysts in the assessment of risk exposure, as well as providing ways to comprehend the effort needed to secure vulnerabilities and their returning benefits.

Presenter bio: I am 21 years old, I graduated in Informatic and Software Production Technologies and a student of a magistral course in Security Engineering in UniBa. I have a strong passion for cybersecurity and emerging technologies, with a particular interest in network security, ethical hacking, and data protection. Throughout my academic journey, I've developed a solid foundation in programming and systems analysis. The actual focus of my research is the vulnerability assessment via attack patterns and vulnerability recognition.

9:20 ***AI Phishing Detection Framework for Businesses with Limited Resources***

Rhythm Jaiswal, Marshal R, Venkateswara Rao and Kirti Pal Singh

Phishing remains the predominant entry point in most of the cyber-attacks. Artificial Intelligence based Phishing attacks are difficult to detect and evade the traditional phishing detection techniques. Detection of such phishing emails requires sophisticated tools. However, small businesses and startups face challenges to procure such sophisticated tools for monitoring phishing emails. In this work, an Artificial Intelligence phishing detection framework is proposed to detect Artificial Intelligence based phishing emails. The robust framework can be used by organizations having limited resources. The proposed methodology is validated by applying the framework on Artificial Intelligence generated phishing emails. The robustness of the proposed framework can be used to enhance the cybersecurity posture of organizations against phishing attacks.

Presenter bio: I am a B.Tech Graduate in the field of Computer Science and Engineering. I have completed my graduation in June 2024 and currently I am doing an internship at CERT-In where I am developing my technical expertise in the domain of Cybersecurity. This research paper is part of my internship where I am designing a heuristic based framework for small enterprises for the detection of phishing emails.

9:40 ***A Systematic Literature Review of Models and Factors Influencing E-learning Cybersecurity Awareness Among University Students***

Fatima Aljazeeri, Hasan Hameed Abdulla, Shaikha Hasan, Zainab Almahafdha and Jafla Al-Ammari

The rapid adoption of the Internet has revolutionized various sectors, including e-learning, significantly improving accessibility and convenience for students worldwide. However, the proliferation of e-learning platforms has also introduced substantial cybersecurity risks, such as threats to the confidentiality, integrity, and availability of educational resources. Therefore, students have to be aware of e-learning security to mitigate these substantial risks. This systematic literature review investigates the existing models for evaluating e-learning cybersecurity awareness among university students. By examining diverse models and factors that influence e-learning security awareness, the review comprehensively analyzes existing research and identifies key themes and trends. The review employs a rigorous methodology, including the PICOC framework and done over the most popular research databases such as IEEE Xplore, ACM Digital Library, Scopus, Web of Science, and JSTOR, to ensure a comprehensive coverage of relevant literature. Various models, such as the Knowledge-Attitude-Behavior (KAB) model, Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), and Integrated Behavioral Model (IBM), are investigated to understand the various models examined different factors affecting university students' e-learning security awareness. The key finding indicates that KAB is the most used model. Furthermore, behavioral aspects, prior knowledge, attitudes, educational level, and environmental constraints are the key factors influencing students' cybersecurity awareness. The implications for practice suggest integrating cybersecurity education into curricula, developing personalized and practical awareness programs, and enforcing robust policies.

Presenter bio: Shaikha is an instructor at the Department of Information Systems, College of Information Technology, University of Bahrain. Shaikha obtained her B.Sc. in Information Systems from University of Bahrain in 2015. She completed her M.Sc. in Information Technology at University of Bahrain in 2019. Her research interests are in Cyber Security management, and data mining.

Presenter bio: Zainab Almahafdha is a lecturer at the Department of (ICT) in the British University of Bahrain. Zainab obtained her B.Sc. in Computer Science, and M.Sc. in Information Technolgy. She is currently a Ph.D. student in computing at the University of Bahrain. She is experienced in teaching and research, focusing on cybersecurity, Machine Learning and Mobile Learning.

10:00 ***A Privacy-Preserving Method for Ethereum Transactions***

Salam A. Tabet and Ayman Kayssi

The increasing popularity of blockchain and cryptocurrencies has led to a considerable proliferation of the cryptocurrency market in recent years, pulling more investors into the trillion-dollar industry. The increasing number of users has led to increasing privacy concerns. While the network's ability to facilitate financial inclusion is enhanced by the blockchain's openness and public nature, it also exposes users' transaction histories, raising the possibility of privacy violations and other concerns, such as user profiling. To address these privacy challenges, various techniques emerged, categorized as joint transactions and mixing services. While promising, these methods have limitations, such as potential information leakage and the need for trust in centralized entities. To overcome these shortcomings, we propose a novel system that combines joint transactions and mixing services, incorporating Zero-Knowledge Proofs (ZKPs) for enhanced privacy guarantees. Our proof of concept on the Ethereum blockchain demonstrates improved privacy while providing the basic requirements. The evaluation includes performance metrics and security analysis, focusing on key considerations-unlinkability, verifiability, and double-spending. Our method achieves unlinkability by obfuscating transaction paths through multiple stages (ZKPs, CoinJoin, CoinSwap), ensures verifiability through signatures and commitment exchanges, and prevents double-spending through nonce utilization, all while maintaining a feasible execution time.

Presenter bio: Salam Tabet is a Ph.D. student in Electrical and Computer Engineering at the American University of Beirut (AUB), Beirut, Lebanon. Her research interests lie in the areas of computer vision, privacy, and immersive technologies. She received the B.S. and M.S. degrees in Computer and Communication Engineering from the Lebanese International University, in 2019 and 2021, respectively. She worked as a software engineer at OOPSystems Software, Inc. in 2019 and at SAUGO 360, where she worked in 2020 as a software engineer on several Cisco projects, before joining the Ph.D. program at AUB at the end of 2021. She has been awarded research grants

from the AUB University Research Board and the Lebanese National Council for Scientific Research (CNRS). So far, she has five accepted publications in high-quality conference proceedings.

10:20 ***Adversarial Resilience in Image Classification: A Hybrid Approach to Defense***

Hetvi Mahendra Waghela, Jaydip Sen and Sneha Rakshit

Image classification models have demonstrated remarkable performance across various applications, yet they remain vulnerable to adversarial attacks, which can significantly impair their accuracy and reliability. This paper presents a new hybrid defense scheme to increase adversarial robustness in image classifiers. Our approach combines two complementary techniques: adversarial training and input transformations. Adversarial training is implemented using the Projected Gradient Descent (PGD) attack to generate robust features by exposing the model to adversarial samples during training. Concurrently, input transformations, including random resizing, JPEG compression, and noise injection, disrupt adversarial perturbations and preserve critical image features. The integration of these methods results in a multi-layered defense mechanism that improves the model's resilience to a range of adversarial attacks. We conduct extensive experiments on standard image classification datasets, evaluating the efficacy of the proposed scheme against various attack methods, including FGSM and PGD. The results demonstrate that the hybrid defense strategy significantly enhances robustness while maintaining competitive performance on clean images. This research offers a comprehensive solution for improving the reliability of image classifiers in adversarial settings and provides insights into balancing robustness and accuracy.

Presenter bio: Jaydip Sen is a Professor of Data Science and Artificial Intelligence in Praxis Business School. Prior to joining Praxis, he has worked with Oil and Natural Gas Corporation Ltd., India, Oracle India Pvt. Ltd., and Akamai Technology Pvt. Ltd, Tata Consultancy Services Ltd and National Institute of Science and Technology, INDIA. His research areas include Machine Learning and Artificial Intelligence, security in wired and wireless networks, intrusion detection systems, secure routing protocols in wireless ad hoc and sensor networks, and privacy issues in ubiquitous and pervasive communication, He has more than 150 publications in reputed international journals and refereed conference proceedings (IEEE Xplore, ACM Digital Library, Springer LNCS etc.), and 8 book chapters in books published by internationally renowned publishing houses e.g. Springer, CRC press, IGI-Global etc. He is a Senior Member of ACM, USA a Member IEEE, USA and IEEE Computer Society, USA.

Monday, November 18 9:00 - 10:40 (Asia/**Bahrain**)

S3-D: Telecommunication and Networking

Virtual Room (D)

Chair: Reham Almesaeed

9:00 ***TrackID: RFID-Based Student Monitoring System for Accessing Institutional Campus***

Christian Jay H Valdez, Yssa Mae Nivales, Rodelyn Joy R. Uy and John Joshua F. Montañez

This paper presents the design and implementation of an RFID-based attendance system to increase the accuracy and efficacy of attendance tracking in institutional settings. The old methods of taking attendance, which were labor-intensive and prone to human error, have been replaced by an automated system using RFID technology. Every student is issued an RFID card bearing a unique identification number. When the card comes into close proximity to an RFID scanner, the technology updates a central database in real time to report attendance. RFID tags and readers, a microprocessor, and a database management system are the main parts of the system. The microcontroller processes the data and sends it to the database when the RFID readers, which are placed at access points, identify the presence of RFID tags. The system's user-friendly interface, which is available on web and mobile platforms, is intended to give users and administrators prompt feedback. According to performance data, the system detects cards relatively rapidly after scanning them, with an average reaction time of 1.159 seconds. The implementation of this

technology improves attendance management significantly by providing a reliable and effective solution for modern attendance tracking requirements.

Presenter bio: Christian Jay Valdez is a 4th-year Electronics Engineering student at Bicol State College of Applied Sciences and Technology (BISCAST). His research interests focus on signal processing and computer applications. Currently serving as the president of the BISCAST Supreme Student Council, he is also a member of the institution's Board of Trustees, reflecting his commitment to leadership and community service within the college.

9:20 ***Convolutional Neural Network Implementation of DOA Estimation in Low Number of Snapshots and Low Signal-to-Noise Ratio Scenarios***

Mark Lawrence P Velasco, Gerald P. Arada and Argel Bandala

Localization of signal sources has become an integral part of current communications systems since it allows for better reception of signals by focusing the reception on specific angles called direction-of-arrivals. This paper presents a relatively less complex convolutional neural network implementation of a direction-of-arrival estimation system by only employing a single channel input and by tackling the problem using a multi-class classification approach. The performance of the system is compared to a classical super-resolution direction-of-arrival estimation method called the MUSIC algorithm. Results show that the proposed model outperforms the MUSIC algorithm in cases of low signal-to-noise ratios such as when it is below 0 dB. Moreover, it was also found that the model can resolve closely spaced sources better than the MUSIC algorithm in low signal-to-noise ratio scenarios. Furthermore, it was also able to give close estimates even with 100 snapshots or less as given by a root mean squared error of less than 10 degrees at signal-to-noise ratios above -10 dB. The good performance of the proposed model in low signal-to-noise ratios or low number snapshots is desired for noisy environments and in cases where there is less signal overhead allowable.

9:40 ***Regression Based Sound Source Localization by Harnessing Synthetic Datasets***

Sarangan Raveendranathan, Divakaran Varatharajan, Sajeethan Gulendran and Buddhika Prabhath Jayasekara

Sound Source Localization (SSL) is an important feat in the audio signal processing with its applications ranging from robotics, surveillance systems to animal detection. The empirical methods that have been used for sound source localization depend mainly on real world data sets and this creates a limitation in the variety and availability of data. This research focuses on creating a synthetic dataset for the Time Difference of Arrival (TDoA) and train them using Polynomial regression, Support vector regression, K-Nearest Neighbours and Random forest regression models in order to simplify the calculations and find a optimum way to implement sound source localization by estimating the distance and direction of arrivals. The research elevates from less complex polynomial regression, Support vector regression to slightly more complex k-nearest neighbours and random forest regression model due to the lack of accuracy in the prior ones. The results show that the performance of the proposed K nearest neighbours and Random forest regression based predictive models are effective in Sound Source Localization application.

10:00 ***Deep reinforcement learning applied to ORIS-aided Downlink MU-MIMO VLC Systems***

Mohamed El jbari

Optical Reconfigurable Intelligent Surfaces (ORIS) has recently gained attention as a promising technology for enhancing the performance of multiuser multiple-input multiple-output (MIMO) visible light communication (VLC) systems. By integrating ORIS with advanced optimization techniques, such as Deep Reinforcement Learning (DRL), significant improvements can be achieved regarding spectral efficiency, energy efficiency (EE), and overall system capacity. This paper proposes a novel approach that employs DRL to optimize both the transmit BF matrix at the transmitter and the phase shift configuration at the ORIS.

The proposed method demonstrates significant improvements over conventional optimization algorithms, achieving a performance increase of up to 25% in efficiency during extensive simulations conducted over 800 episodes. This enhanced solution provides greater adaptability for complex indoor MU-MIMO VLC environments, showcasing its effectiveness compared to traditional approaches.

Presenter bio: Mohamed El Jbari is a PhD in Electrical, Embedded Electronics, Information, and Communication System Engineering, at the Laboratory of Information & Communication Technology (LabTIC), Abdelmalek Essaadi University, Tetuan, Morocco. He has a Telecommunication System Engineering Master's Degree, and graduated in 2018 from the Faculty of Sciences, Abdelmalek Essaadi University. He got a Bachelor Degree on Electronics in 2014 from Faculty of Sciences, Abdelmalek Essaadi University, Tetuan. His curren research interests include information and communication technology & signal processing, Embedded electronics and optical wireless communication engineering, digital signal processing, and telecommunication systems. E-mail: mohamed.eljbari2@etu.uae.ac.ma

10:20 ***A New Petri Net Model for Evaluating the Energy of Autonomous RF Devices in the Internet of Things Context Under Jamming Attacks***

Nourredine Oukas, Hakim Boudjelaba, Menouar Boulif and Abderrezak Djouabri

Ambient energy harvesting is an attractive technology for a variety of uses, especially those involving ubiquitous devices, such as the Internet of Things (IoT). Energy harvesting sources include the use of electromagnetic signals to remotely recharge the batteries of autonomous wireless devices in the IoT. This source is quite manageable and predictive. However, its utilization is subject to some security issues such as Denial of Service (DoS) attacks. The attacker can interfere with the electromagnetic signal that carries the information. This causes the device to slow down, due to the reception of false packets, and drives it to consume too much power until the battery runs out. Evaluating the performance of these devices in such circumstances, without exorbitant spending, requires modeling and/or simulation. In this paper, we propose a Petri net modeling to study the behavior of these devices under jamming attacks, in order to define the most suitable parameter settings to adopt in an actual installation.

Presenter bio: I am a PhD student in a field of technological innovation, with a passion for artificial intelligence, big data, and data security. My research primarily focuses on privacy protection in machine learning systems. I am particularly interested in local approaches to privacy preservation, exploring how to balance model performance with the security of sensitive data. My work also encompasses themes such as deep learning, large-scale data (big data), and the challenges related to their security. I aim to develop solutions that combine efficiency and respect for individual rights, addressing the growing concerns around privacy in an increasingly connected world.

Monday, November 18 10:40 - 11:00 (Asia/**Bahrain**)

B-3: Break-3

Room: Virtual Main Hall

Monday, November 18 11:00 - 12:40 (Asia/**Bahrain**)

S4-A: Artificial Intelligence-2

Virtual Room (A)

Chairs: Orlando Catuiran, Noora Saad Alromaihi

11:00 ***Enhancing Processor Performance using Bidirectional LSTM Memory Prefetching***

Rachana Prafulla Gade, Saurabh Bhalchandra Jog, Aditya Shankar Bornare, Amit Joshi and Suraj Sawant

Memory prefetching is a critical element in enhancing processor performance, and modern processors deploy various prefetchers. Traditional prefetchers are effective in handling predetermined access patterns,

yet face challenges with the dynamic nature of modern applications. In contrast, advanced data prefetching techniques leverage sophisticated algorithms and machine learning to dynamically predict and prefetch data based on complex spatiotemporal patterns. However, they encounter challenges such as the class explosion problem and a labeling predicament. This study proposes a novel approach using a Bidirectional Long Short-Term Memory deep learning model, aiming to dynamically adapt to intricate access patterns. Drawing inspiration from prior studies, this approach focuses on understanding features, localization, and semantic locality to enhance accuracy and contribute to a robust and adaptive solution for optimizing data prefetching. The purpose of this study is to overcome existing limitations in prefetchers, particularly the challenges posed by dynamic access patterns, by proposing an advanced solution that leverages features, localization, and semantic locality. This aims to contribute to the optimization of data prefetching in contemporary memory systems, ultimately enhancing overall processor efficiency. The study provides a comprehensive exploration of traditional and machine learning-based data prefetching mechanisms, tracing their evolution and discussing current challenges. By considering features, localization, and semantic locality, this study aims to enhance accuracy and adaptability, ultimately contributing to the optimization of data prefetching in modern memory systems. The proposed approach and its respective findings hold significance in advancing the field of memory systems and contributes valuable insights toward designing more adaptive and efficient processors for modern computing demands.

Presenter bio: Rachana Prafulla Gade is a Computer Engineering graduate from the College of Engineering Pune (COEP), where she achieved the distinction of being the Gold Medalist and overall institute topper. With a strong academic foundation, Rachana has delved into research that combines innovative problem-solving with practical applications. Her work reflects a commitment to advancing the field, and she is honored to present her recent findings at this conference.

11:20 ***Analysis of Defectives in a Call-Center Process Quality under 2-Dimensional Uncertain Linguistic Data by Attribute Control Charts***

Ali Karasan, Esra Ilbahar, Fatma Kutlu Gündoğdu, Kübra Yazır, Elifnaz Olgac and İhsan Kaya

Control charts (CCs) are highly effective indicators for monitoring and controlling process development in manufacturing, as they allow for the tracking of variance. In the context of attribute control charts (ACCs) that is one type of CCs, uncertainty emerges from the combination of linguistic terms (LTs) used for process evaluation and the reluctance of inspectors in making their judgments. The fuzzy set theory (FST) that enables the transmission of the experts' judgment and decision-making processes to a model, therefore facilitating the construction of intricate and dynamic systems is used in this paper. One of the latest extensions of the fuzzy sets is Fermatean fuzzy sets (FFS). It allows decision-makers and operators to articulate their judgments across a wider range of decision-making applications that involve subjective data sets derived from human knowledge. That is why Fermatean np chart that is one type of ACCs are developed in this study to reduce information loss by generating more sensitive and refined outputs. The proposed chart is illustrated by a numerical case study from the call center industry. A fuzzy rule-based system is also introduced to interpret sensitive and detailed results when the samples are progressively in-control or out-of-control. The results of such kind could be highly beneficial for both managers and operators as they enable the generation of more precise conclusions.

Presenter bio: Elifnaz Olgaç is a Research Assistant in Industrial Engineering at Yildiz Technical University, where she is also pursuing a Master's degree with a GPA of 3.86. Her current research centers on fuzzy logic, machine learning, and artificial intelligence, and she is actively preparing her master's thesis. She graduated with a Bachelor's degree in Industrial Engineering in 2022 with a GPA of 3.94, ranking third overall at Yildiz Technical University and first in the Faculty of Mechanical Engineering

11:40 ***ACyLeR: An enhanced iTransformer for Long-Term Time-Series Forecasting Using Adaptive Cycling Learning Rate***

Mustafa Kamal, Ary Mazharuddin Shiddiqi, Ervin Nurhayati, Andika Laksana Putra and Farrela Ranku Mahhisa

Long-term time-series forecasting is critical in numerous domains, including economics, climate modeling, and energy management. Traditional deep learning models often struggle with optimizing hyperparameters, which can lead to suboptimal performance and increased sensitivity to initial conditions. This research addresses the problem by proposing an enhanced iTransformer model that integrates an Adaptive Cycling Learning Rate (ACLR) mechanism, named ACyLeR. The ACLR algorithm dynamically adjusts the learning rate during the training phase for better convergence and generalization while minimizing the risk of overfitting. Experimental results demonstrate that the ACyLeR with ACLR outperforms existing baseline models by achieving lower loss values and higher accuracy. The results significantly advance time-series forecasting using iTransformer.

Presenter bio: Mustafa Kamal, Doctoral student from Sepuluh Nopember Institute of Technology, Surabaya, Indonesia.

12:00 ***Intelligent Drug Release System Development and Evaluation via Support Vector Machine Algorithm***

G. Kalyani, Venkatesh Jayaraman, Sathish kumar P. J, Surendran R and Balamurugan K S

This study proposes a unique sensor plus machine learning system designed to enhance patient care and targeted medicine administration, with a specific focus on controlling Cryptococcosis, in the search for more precise and proactive healthcare solutions. The system uses constant sensor data monitoring and machine learning algorithms to anticipate and prepare for any health problems. Over the course of a day, Support Vector Machines (SVM), Artificial Neural Networks (ANN), and Random Forest (RF) were used to analyse sensor data from 10 patients with Cryptococcosis. The sensor data gathered from these people included information on their body temperature, blood pressure, oxygen saturation, heart rate, blood sugar levels, and ECG measurements. The models executed flawlessly, achieving F1 scores for accuracy, recall, and precision. SVM won with a precision score of 97.6%, followed by ANN with a score of 95.3% and RF with a score of 92.1%. The models' capacity to get rid of misclassifications and provide precise predictions needed for right away action was demonstrated by the confusion matrices that went along with them. This discovery, which might revolutionise how patients are treated for difficult-to-treat illnesses like cryptococcosis, is an encouraging first step in the direction of proactive healthcare management. The sensor and machine learning system offers a patient-centered, data-driven approach that keeps up with the changing landscape of healthcare.

12:20 ***Weighted Loss Integrated Fine-Tuned ViT Model for Multi-Class Human Facial Emotion Recognition***

Md. Hanif Sikder, Shekh Tanjil Sharif, Md Sakib Hossain Shovon, Jungpil Shin and M. Firoz Mridha

Human Facial Emotion Recognition is important in modern times for various reasons, such as understanding human behavior, human-computer interaction, mental health condition diagnosis, and security and surveillance across various industries, including Healthcare, Education, Entertainment, and Automotive. Researchers have already worked on it and its models following a Convolutional Neural Network (CNN), which is famous for classifying on facial emotions in humans. Another model that follows the transformer-based technique has also generated significant performance in image classification, semantic segmentation level, and object detection. In our study, we evaluated the result and characteristics of the Vision Transformer (ViT) model on a widely accessible dataset named Face Emotion/Mood Dataset. The research employed seven models in this study: Lenet, EfficientNet, ViTMAE, Swin Transformer (ST) & DeiT, ViT and Weighted Loss (WL) Integrated FineTuned ViT. This model incorporates a carefully optimized combination of First and Second Dense Layers with a ReLU activation function. Later a Dropout layer, and a Dense classifier utilizing Softmax function along with WL that improved the performance on under-represented classes. This model surpassed all other state-of-the-art models, achieving a Top-K accuracy of

80.63% on the validation set and 77.23% on the test datasets, outperforming all other methods employed in this study.

Presenter bio: MD Hanif Sikder Department of Computer Science University of South Asia-Bangladesh Dhaka 1216

Monday, November 18 11:00 - 12:40 (Asia/**Bahrain**)

S4-B: Deep Learning-3

Virtual Room (B)

Chairs: Faisal Alkhateeb, Abdul Fattah Salman

11:00 ***Deep Learning-Based Tomato Disease Detection for Smart Agriculture***

Abdelhak Merizig, Roufaida Khebbache, Bilal Mokhtari, Rabie Nouar and Khaled Rezeg

Agriculture is critical in global food security but faces challenges like declining arable land and climate change. Machine learning, particularly deep learning with Convolutional Neural Networks (CNN), has shown promise in addressing agricultural problems. Efficient and accurate identification of plant diseases is essential for guaranteeing the long-term viability of food production. This paper investigates the use of CNNs to classify tomato diseases, employing a deep learning approach automatically. We utilize a publicly available dataset consisting of more than 16,000 photos of tomato leaves. These images cover both healthy and affected leaves by nine different diseases. Our proposal involves the development of three different CNN models, each with a different architectural design. In addition, we applied some Natural Language Generation (NLG) to generate reports and possible recommendations for detected diseases. The results of our research emphasize the capacity of deep learning to effectively and precisely detect diseases in tomatoes. This creates opportunities for the development of pragmatic smartphone applications that empower farmers by providing prompt disease diagnosis, empowering them to make well-informed decisions on crop management and pesticide utilisation.

Presenter bio: Roufaida Khebbache received a Bachelor's degree in computer science from the University of Biskra, Algeria, and a master's degree in computer science from the University of Biskra, Algeria, in 2017 and 2019, respectively. She is currently working towards a PhD degree at the University of Biskra. She is affiliated with the LINFI laboratory. Her research interests include artificial intelligence and machine learning methods in smart farming. She can be contacted at roufaida.khebbache@univ-biskra.dz

11:16 ***Unveilling Soil Fertility Classification with Explainable AI***

Roufaida Khebbache, Abdelhak Merizig and Khaled Rezeg

Agriculture is an important sector in every nation. In the face of population growth, farmers face various challenges to improve and accelerate food production. Excessive use of fertilizers leads to soil fertility degradation, which poses a great threat to agricultural production and the ecological environment. To achieve sustainable soil management and high yields while protecting the environment, an explanatory machine learning (ML) approach has been proposed. In this research, machine learning prediction models and their experimental results are investigated for soil fertility classification and evaluation using interpretable artificial intelligence (IAI) technologies. To solve the problem of soil fertility classification, we propose to combine interpretable artificial intelligence (IAI) with machine learning (ML). Our proposal is to examine the data in the context of the model results ML (important features that influence the predictive model). Our solution shows promising results in terms of prediction probability.

Presenter bio: Roufaida Khebbache received a Bachelor's degree in computer science from the University of Biskra, Algeria, and a master's degree in computer science from the University of Biskra, Algeria, in 2017 and 2019, respectively. She is currently working towards a PhD

degree at the University of Biskra. She is affiliated with the LINFI laboratory. Her research interests include artificial intelligence and machine learning methods in smart farming. She can be contacted at roufaida.khebbache@univ-biskra.dz

11:33 ***Toward a More Accurate Speech-to-Text Transcription Services for the Bahraini Dialect***

Abdulla Almahmood, Hesham Alammal and Fatema Albalooshi

This study investigates means of enhancing the accuracy of Automated Speech Recognition (ASR) systems for the Bahraini dialect, a variant that has received minimal attention in natural language processing research. This is achieved through increasing the accuracy of the OpenAI Whisper model's transcription for the Bahraini dialect. Two tailored audio datasets were created: one with a local Bahraini audio which was manually transcribed, and another that included a wider range of audio sources such TV broadcasts, podcasts, and parliament sessions. To optimize the Whisper model, several methods were used, such as sequential training on both datasets, data augmentation, and hyperparameter optimization with Optuna. The Word Error Rate (WER) significantly decreased from 181.608% to 13.54% in the results, demonstrating the efficacy of the fine-tuning techniques in raising the model's accuracy above its original benchmarks.

11:50 ***Replacement Policy Performance Analysis LRU Insertion Policy (LIP) On X86 Computer Architecture***

Oka Adabi, Hilal H. Nuha, Febri Dawani, Demi Adridana, Rana Zaini Fathiyana and Hassan Sailellah

The x86 architecture has been widely used in various modern computing devices, including processors such as Alder Lake. Along with the increasing computing needs, a deep understanding of the performance of computer architectures becomes important, especially in memory management. This study focuses on analyzing the performance of the x86 architecture by examining memory replacement policies, especially the LRU Insertion Policy (LIP). LIP is an algorithm that places new data in the Least Used (LRU) position in the cache, aiming to reduce cache misses and protect the cache from thrashing, especially for applications with high memory requirements. This study simulates and compares LIP with the traditional LRU policy at various cache levels (L1, L2, L3). The results show that LIP can reduce cache misses in high-level caches such as L2 and L3, although with the trade-off of increasing cache replacements. Therefore, the selection of memory replacement policies must consider the cache hierarchy and specific workloads.

12:06 ***Percept-Diff: Innovations in Stable Diffusion for High-Fidelity IHC Image Generation in HER2 Breast Cancer incorporating Perceptual Loss***

Md. Naimur Asif Borno, Md. Tanvir Raihan, Abir Ahmed, Md Sakib Hossain Shovon, Jungpil Shin and M. Firoz Mridha

Breast cancer(BrCa) has emerged as a concerning disease in recent years, with its incidence expected to rise in the future. The Human-Epidermal-Growth-Factor-Receptor2(HER2) variant is the most dangerous variant. To save women from this catastrophe, they need to undergo treatment in the early stages but existing tests are too expensive for most people to afford. The positive news is that deep-learning (DL) models are becoming alternatives in this case and with proper data, many other facilities can be provided in this sector. However, DL models require a substantial amount of data, which could potentially compromise patient privacy in this context. Additionally, there is a scarcity of data in this field. To address this issue while respecting patient privacy, we developed a generative solution using Stable Diffusion (StDi) models called Percept-Diff, which conditionally generates realistic IHC images for three stages of HER2-positive breast cancer (BrCa). We used 2435 unique IHC images from the BCI dataset. Images were classified into three classes (0+, 1+, and 3+). Here 0 and 1+ denote HER2 negative whereas 3+ denotes HER2-positive. We attempted to generate the mentioned 3 stages conditionally with different pre-trained diffusion model stabilityai/stable-diffusion-2-base, stabilityai/stable-diffusion-2, CompVis/stable-diffusion-v1-4, and runwayml/stable-diffusion-v1-5, stablediffusionapi/realisticvision-v51 and stablediffusionapi/anything-v5. Percept-Diff demonstrated promising results, achieving a CLIP score of 31, an FID score of 239, and a KID

mean of 0.0099 with a standard deviation of 0.0060. These metrics indicate that Percept-Diff outperformed the above mentioned state-of-the-art diffusion models. This can be a game changer for researchers and open different areas that are not possible now because of data scarcity and can save many women's lives.

Presenter bio: Mechatronics Engineer and Computer Vision Researcher.

12:23 ***Development of an AI-based website for Automated Pre-Operative Planning in Aortic Valve Replacement using Deep Learning***

John Lorance William, Nadin Farid Elshafey, Nadine Abdallah, Nouran Hady Shaaban, Sama Ahmed Okasha and Mustafa Elattar

This paper presents a web-based software pipeline to assist minimally invasive aortic valve replacement procedures. The pipeline has three major phases: extraction of the aorta, automatic landmark detection, and measurement calculation that are necessary for replacement of the aortic valve replacement. We segment the CTA scans using deep neural network models based on the U-Net model architecture in the MONAI framework; anatomical landmarks are located, like STJ, LCA, RCA, and the Annulus Plane. This system is highly accurate in aorta segmentation and landmark detection. The web interface allows easy uploading of data, visualization of segmentation results, and access to critical measurements in order to ensure accurate pre-operative planning. Such a well-developed integration of AI and machine learning techniques within medical imaging could change the accuracy of face preoperative planning for TAVR operations and diminish complications from poorly fitted valves. In the future, fine-tuning models, increasing the dataset, and addition of other facilities for practical usage by a cardiologist are planned.

Presenter bio: I am a master's student in computer science for aerospace at Paul Sabatier University in France. I have experience as a junior research assistant at Nile university, contributing to projects in AI, medical imaging, and data analysis, with a focus on developing innovative solutions for healthcare and other fields.

Monday, November 18 11:00 - 12:40 (Asia/**Bahrain**)

S4-C: E-learning: challenges, transformation, and IT Solutions

Virtual Room (C)

Chairs: Amal Alrayes, Taher Homeed

11:00 ***Leveraging Gamified Learning Management Systems to Enhance E-Learning Outcomes***

Fatima Vapiwala and Deepika Pandita

Most traditional e-learning practices using the Learning Management System (LMS) experience problems connected with students' engagement and motivation, resulting in rather low learning effectiveness. The incorporation of gamification into LMS can benefit educators in terms of data and information regarding the learners' engagement and performance. Thus, the present study focuses on eliciting educators' insights on the effectiveness of gamified learning management systems in enhancing e-learning outcomes of B-school learners. To facilitate the conduct of this study, semi-structured interviews were conducted with 43 B-school educators who use or have experience with integrating LMS gamification into the e-learning process, selected using purposive sampling. Some of the challenges and constraints that have emerged from the interview responses include the problem of superficial engagement, the issue of balancing complexity and accessibility, concerns of intrinsic motivation, the need for educator training and support, and constraints regarding technological infrastructure. Furthermore, the responses also revealed the advantages of leveraging learning management systems through gamification. Based on these findings, we

have developed a proposed model outlining the steps for gamifying LMS for enhanced e-learning outcomes, which can be enhanced and improved for a better student learning experience.

Presenter bio: Ms. Fatima Vapiwala is a Junior Research Fellow at the Symbiosis Institute of Business Management, Pune, India.

11:20 ***AI-Driven Resource Allocation in E-Learning During Internet Fluctuations***

Anant Jain and Deepika Pandita

E-learning platforms are crucial for education worldwide, but they often struggle with fluctuating internet connectivity, which can disrupt the learning experience. This research paper explores how artificial intelligence (AI) can help improve resource allocation on these platforms, particularly in managing limited bandwidth during connectivity issues. We propose a "5A Model"-Assessment, Analysis, Adaptation, Allocation, and Automation-that uses AI to monitor, predict, and dynamically adjust resource distribution, ensuring that platforms perform optimally and provide a smooth user experience. To understand the connectivity challenges and needs of users, we collected primary data through Focus Group Discussions (FGDs) with educators and students. We detail the model's technical implementation and its integration with existing e-learning systems. Our findings suggest that AI-driven resource allocation can greatly enhance the efficiency of e-learning platforms, providing a strong framework for improving e-learning in environments with unstable network conditions.

Presenter bio: Mr. Anant Jain is a MBA student at Symbiosis Institute of Business Management, Pune, India

11:40 ***Application of Clustering Algorithms to enhance Personalized Learning through Recommendation Model***

Saeed Sharif, Dyuthi Mani and Madhav Raj Theeng Tamang

Technology and education have recently changed student involvement with learning resources and educational experiences. The project develops recommendation systems and grouping algorithms to help students with their learning patterns and performance measures. To record multidimensional student learning experiences, demographics, learning activities, problem-solving behaviours, and performance measures are extracted and processed. This system makes personalised student suggestions via collaborative filtering, especially Alternating Least Squares (ALS). The model predicts learning materials and problem sets based on student preferences and ability levels by analysing historical student interactions with learning resources. The recommendation system's efficacy is assessed using MSE and RMSE. The research also uses clustering methods like K-means clustering to group students with similar learning and performance patterns. Clustering analysis lets instructors discover student group traits and tailor interventions and support techniques. This research also examines temporal relationships in student learning sequences using sequential models. Sequential learning activities and problem-solving behaviour of students help recurrent neural networks (RNNs), or sequential pattern mining algorithms predict their next activities. This research improves personalised learning using machine learning and data analytics in education. The recommendation system can help instructors tailor training, give individualised support, and boost academic success for various pupils by revealing student learning patterns.

Presenter bio: Ph.D. student in the field of Artificial Intelligence and Machine vision at University of East London, United Kingdom. Working as Teaching assistant at University of East London. Research interests: Artificial intelligence, Big data, Machine learning and Intelligent system.

12:00 ***Gender Equality Through E-learning: A Machine Learning Approach to Measuring Impact***

Farzaneh Lashgari, Mehran Pourvahab, Aazaade Faraji, Anilson José Pereira Monteiro, Sebastiao Pais and Nuno Pombo

In the contemporary digital era, e-learning has emerged as a transformative force in advancing women's empowerment and promoting gender equality. This study investigates the significant impact of e-learning on women's lives, illustrating how digital platforms can bridge gender divides and foster unprecedented opportunities for personal and professional development. By employing machine learning techniques, the research evaluates the advantages of e-learning, focusing on how online vocational and arts education can economically empower women and enhance their workforce participation. The study entailed an in-depth examination of 120 women from different age ranges, utilizing questionnaires and analytical techniques to evaluate the effectiveness of e-learning, as well as the mutual relationship between online education, improving women's skill abilities and socio-economic development. The research highlights e-learning's potential to overcome barriers such as financial constraints and the limitations of traditional in-person education. It underscores the importance of innovative teaching strategies and institutional support in maximizing e-learning benefits. This study advocates for a more equitable society where women are empowered with the knowledge and skills necessary to excel in the digital age. Our main goal of this study is to evaluate the effect of e-learning in facilitating financial independence and achieving social equality in the target society, and in addition to this research, we examine the achievements of other developing countries in this field.

Presenter bio: Farzaneh Lashgari holds a Bachelor's and Master's degree in Computer engineering and is currently a PhD candidate in Computer Science at University of Beira Interior in Portugal. Her actively involved in research at the HULTIG Lab, where they focus on advancing their expertise and contributions to data science. Farzaneh Lashgari is highly skilled in data science, with a professional background in data analysis, machine learning, and artificial intelligence. Also she has a strong aptitude for developing innovative algorithms and implementing creative solutions for complex problems. Known for their creative idea generation and innovative thinking, Farzaneh Lashgari brings a fresh perspective to each project. Their research work spans multiple areas within computer science and data science, and they are passionate about publishing in reputable journals and presenting at international conferences. With a commitment to keeping their knowledge updated, Farzaneh Lashgari strives to make meaningful contributions to the scientific community.

12:20 ***Computer Networks Educational System: Annotation-Based Learning***

Amjad W Hawash, Sanabel Sultan, Duaa Dabeek and Shahd Awwad

One method that Internet users utilize to collaborate is annotating web content. Users can share knowledge, ideas, opinions, and skills in this way. Annotation systems can also be utilized for online learning. This paper proposes applying an annotation system to knowledge enhancement (network topic) by connecting the annotations to information resources and sharing the knowledge with others. Users can extract the most crucial terms from the selected online text using the annotation tool, which loads relevant YouTube videos and quizzes based on selected terms. In addition, users have the option to recommend terms to their friends as a way to spread information. The conducted experimental test reflects promising results in terms of knowledge gaining, sharing, and dissemination.

Presenter bio: A computer science student at An-Najah National University.

Monday, November 18 11:00 - 12:40 (Asia/**Bahrain**)

S4-D: Robot Vision; Motion detection

Virtual Room (D)

Chairs: Alauddin Yousif Al-Omary, Mohammed Majid M. Al-Khalidy

11:00 ***Autonomous Navigation For TurtleBot3 Robots in Gazebo Simulation Environment***

Madhav Raj Theeng Tamang, Darshana Maheriya, Saeed Sharif and Thamo Sutharssan

The fast-paced growth in the field of robotics has driven the creation of autonomous navigation systems that are necessary for robots to work autonomously in diverse environments. This research targets the TurtleBot3, a very popular robotic platform that is known for its affordability and adaptability. The objective of TurtleBot3 is to improve the capabilities within the Gazebo simulation environment, an open-source robotic simulator that provides a realistic virtual environment for testing and developing navigation algorithms for robotics. The combination of intricate sensor technologies, leading-edge control systems, and innovative artificial intelligence strategies is the core of this research, that enables autonomous navigation in complicated surroundings. The initial focus of the research is application and utilization of path planning algorithms, such as A* (A Star) and Rapidly exploring Random Tree (RRT) and using Simultaneous Localization and Mapping (SLAM) algorithms. The objective of this analysis is to refine the algorithms of independent navigation by using Gazebo simulation environment. Testing algorithms in a virtual environment lowers the risks and costs associated with testing in real-time. The results obtained by this research are expected to contribute to the area of robotics, and turn out to be important for application in autonomous systems in engineering, urban mobility and domestic assistance.

Presenter bio: Ph.D. student in the field of Artificial Intelligence and Machine vision at University of East London, United Kingdom. Working as Teaching assistant at University of East London. Research interests: Artificial intelligence, Big data, Machine learning and Intelligent system.

11:20 ***Innovative Development and Deployment of an Arduino-Based Solar Tracking Mechanism***

Arnel Jr. A Elgario, Marco Antonio Jr R Damasig, Jenebelle Monta and John Joshua F. Montañez

Recent research emphasizes the effectiveness of solar panels, specifically dual-axis solar panels, in maximizing energy capture and optimizing the utilization of photovoltaic cells. This study showcases the development and deployment of a solar tracking system utilizing a microcontroller. The system employs an algorithm to calculate the intensity of light using a grid of light-dependent resistors. The prototype efficiently tracks the sun's location, ensuring consistent solar exposure. Vertical axis testing reveals a positive connection between the angles of the test panels and the actual panels, with some tiny variations suggesting slight alignment problems. Accuracy greatly increases at extreme angles of 12° and 180°, measuring 10.5° and 179.6° respectively. Testing along the horizontal axis also reveals a significant positive correlation, as the angles of the solar panels closely align with the test angles. The variances observed are often less than 2°, with the majority falling below 1°. This demonstrates a high level of precision across a wide variety of angles. This research effectively accomplishes its goal of creating an accurate solar tracking device.

Presenter bio: Marco Antonio Jr. R. Damasig is a 4th year college student taking up Bachelor of Science in Electronics Engineering at Bicol State College of Applied Sciences and Technology (BISCAST). He is a scholar of the Department of Science and Technology (DOST) and was the former working committee President of the Institute of Electronics Engineers of the Philippines-BISCAST Student Chapter (IECEP-BISCAST SC). He is a dedicated electronics engineering student with a strong desire and motivation to innovate and contribute to the field of electronics. With his diverse and remarkable set of awards, skills, and experiences, he is confident to work effectively and efficiently both as an individual and with peers.

11:40 ***Accelerating Disaster Response with Deep Learning and Image Processing Techniques***

Ilhan Aydin, Çağrı Karakaş and Erhan Akin

This study examines the use of artificial intelligence-based image segmentation and image processing techniques in disaster management. The aim of the study is to integrate artificial intelligence and image processing techniques for fast and effective response in disaster areas to facilitate disaster management. Our hypothesis is that fast and accurate analysis can be performed with high-performance and fast AI-based segmentation models and image processing techniques on images taken from UAVs and satellites in disaster areas. In this process, important regions in the images are identified by applying segmentation processes and masks are created. Then, using these masks, numerical results can be obtained with image processing techniques with low computational cost. Thus, it is aimed to make fast and accurate decisions in

disaster management. In this study, popular segmentation models were compared and analyzed using 2343 images obtained from Floodnet dataset. The results show that the SegFormer model provides detailed damage analysis and contour area or connected component analysis, which can provide both detailed and numerically accurate results for disaster management. This study reveals that the use of image processing and artificial intelligence in disaster management can improve response processes by increasing operational efficiency.

Presenter bio: He was born in Elazig, Turkey, in 1981. He received th B.Sc. and M. Sc. degrees from Firat University, Elazig, Turkey, in 2001 and 2006, respectively, in computer engineering department. He is currently a Ph.D student in electrical engineering department at the Firat University. He is an associate professor in computer engineerging department of firat university. His current research interest include signal processing, fault diagnosis, soft computing, artificial immune systems, particle swarm optimization,time series data mining, and embedded systems.

12:00 ***Adaptive Heuristic Pathfinding Algorithm (AHPA): a Dynamic Path Adjuster for Mobile Robots***

Akash Aman, Abir Debnath, Saurabh Kumar, Rahul Dev Sarkar, Rapti Chaudhuri and Suman Deb

The development of advanced algorithms in the field of autonomous systems has transformed navigation capabilities in both dynamic as well complex situations. The root algorithms like A *and Dynamic A*(D*) dynamically update Cost Function in case of obstructions blocking the path. In these cases of algorithms the reliable navigation is not guaranteed for sudden clearance of obstacles and availability of the shortest path. In order to cope with this situation, we have exploited Trajectory Optimization using Adaptive Heuristic Pathfinding Algorithm (AHPA). It utilizes Self-Adjusting, re-planning, and Adaptive real-time path-planning techniques that combine the features of both progressive and eternal strategists to provide simplified solutions to complex environments. To efficiently handle states, it makes use of g-values, ACTIVE-SET, PROCESSED-SET, and FROZEN-SET along with an Expansion Factor(EF) δ which should be greater than 1. A lower value of δ indicates fewer cells need to be expanded in the grid and vice versa, thus optimizing the overall path planned. It estimates costs and provides visual representations of the navigation process through the use of heuristic functions like MD(Manhattan Distance) and ED(Euclidean Distance). In order to improve situational awareness, including dynamic obstacles the proposed method maneuvers thorough assessments and constantly re-calibrate routes to closely examine their effectiveness and potential to quickly adjust and react when it comes to shifting surroundings. With an Expansion Factor(EF) δ valued at 1.5, it expands fewer cells which enables it to meet real-time objectives in dynamic contexts with great efficiency (Execution time = 3.0254 sec, path planned = 62.468cm, and memory usage = 10MB). This optimized algorithm enables a wide range of applications across transportation, logistics, exploration, and beyond, from mobile robots to autonomous ground vehicles.

Presenter bio: I've completed my B.Tech in CSE from IIIT Agartala(Mentor NIT Agartala), India with first class distinction in this year itself achieving a solid academic performance. With a robust passion for Machine Learning and Robotics, I'm dedicated to focus on innovative approaches to solve real world challenges. The enthusiasm for hands-on approach in robotics make me committed to contribute meaningfully to the research community.

12:20 ***ARMeD: Revolutionizing Assistive Rehabilitation Monitoring***

Estrelita Manansala, Mona Earl P. Bayono, Nino Pilueta, Francis Ralph C. Danipog, Andrey Gabriel V. Fermin, Elly Roi Dominic F. Francisco, Miguel Luis M Jacinto and Marc Joseph M. Respicio

Stroke, a leading cause of brain-related illnesses and mortality, occurs due to the blockage of blood flow to the brain or the rupture of blood vessels, resulting in brain damage, long-term disability, or death. One common consequence of a stroke is weakness or paralysis, such as left-sided hemiplegia, which significantly affects independence and daily life activities. As technology progresses, there is a growing need for innovative solutions to enhance the rehabilitation journey and empower stroke survivors to regain arm function. Current traditional arm rehabilitation methods often rely on physical therapy and Neuromuscular Electrical Stimulation (NMES), which may not fully optimize upper limb recovery. Accessibility to these treatments poses challenges, especially for stroke hemiplegia patients who face

difficulties in mobility. The groundbreaking solution integrates NMES into the cutting-edge ARMeD device, enabling Passive Range of Motion (PROM) during rehabilitation. ARMeD (Assistive Rehabilitation Monitoring Device): Revolutionizing Arm Rehabilitation for Stroke Survivors, accessible through an Android app, empowers patients to undergo rehabilitation from the comfort of their homes, while providing physical therapists with a tool to monitor the progress of their patients' recovery. Keywords- stroke, arm rehabilitation, android app, Passive Range of Motion, Neuromuscular Electrical Stimulation

Monday, November 18 12:40 - 13:00 (Asia/**Bahrain**)

B-4: Break-4

Room: Virtual Main Hall

Monday, November 18 13:00 - 13:45 (Asia/**Bahrain**)

K3: Keynote-3: Prof. Moustafa Yousse, American University in Cairo, Egypt

Room: Virtual Main Hall
Chair: Aysha Ebrahim

Tuesday, November 19

Tuesday, November 19 8:45 - 9:00 (Asia/**Bahrain**)

OD3: Opening - Day3

Room: Virtual Main Hall

Tuesday, November 19 9:00 - 10:40 (Asia/**Bahrain**)

S5-A: Renewable Energy & Smart Grids

Virtual Room (A)
Chairs: Esra Wali, Orlando Catuiran

9:00 ***Dual-Loop Control of a Monophase Converter Utilizing LMI-Based Optimization with PI***

Sokvan In, Sokun Ieng, Suy Kimsong, Sophea Nam, Heng Tang, Sokna San, Socheat Yay and Chivon Choeung

Precise control of power converters is essential for the advancement of smart grid technology. Implementing integral control requires efficient control in the dq-synchronous frame. However, the task of controlling monophase power converters is notably challenging because of the intrinsic difficulty involved in directly converting monophase signals to dq-frame signals. The paper presents an approach that utilizes a digital all-pass filter to produce β-signals. This method enables the control and regulation of both voltage and current in the AC source within the dq-synchronous frame. The control approach provided

utilizes a proportional-integral (PI) controller in the outer loop to ensure a steady output of DC voltage. Simultaneously, an inner loop robust controller is employed specifically for the regulation of AC current. Moreover, the utilization of integral control, in conjunction with state feedback, guarantees offset-free performance and system stability. The effectiveness of this control system is confirmed through simulations under different load conditions, showcasing its ability to improve the dependability and effectiveness of smart grid systems.

9:20 ***Balancing Power in a Grid-Linked Inverter with an Unbalanced Grid Through Parallel Current Control***

Panha Soth, Chivon Choeung, Sokna San, Socheat Yay, Heng Tang, Vanna Torn, Sokvan In and Horchhong Cheng

This paper presents an approach for power balancing in grid-linked inverters within the context of smart grids, addressing the challenge of unbalanced grid voltage conditions. The proposed method employs a paralleled current control strategy, utilizing state feedback integral control to regulate both positive and negative sequence currents. This approach ensures resilient performance under grid voltage imbalances, which are a common problem in smart grid environments. The control gains are optimized through a linear matrix inequality-based method, enhancing the system's stability and responsiveness to fluctuating grid conditions. Simulations conducted using MATLAB and PSIM demonstrate the effectiveness of this control strategy in maintaining power balance and achieving a unity power factor despite unbalanced grid voltages. This study aims to contribute to the improvement of smart grid technologies by offering a dependable and efficient solution for power balancing in grid-connected inverter systems.

9:40 ***Modeling of an off-grid Stand Alone Solar PV with Battery Backup System for an Isolated Rural Area***

Md Ismail Hossain, Riadul Islam, Shirin Begum, Nasif Hannan, Md. Tanvir Rahman and Abu Shufian

The increasing demand for renewable energy sources has driven significant advancements in solar photovoltaic (PV) technology. Stand-alone PV systems, which operate independently of the grid, are especially vital for remote areas where grid access is infeasible. This paper presents the design and implementation of a stand-alone solar PV system with battery backup, leveraging Simulink for real-time monitoring and control. The system, integrating a solar PV array and a battery storage unit connected to a constant voltage single-phase AC supply, was implemented and rigorously evaluated using MATLAB SIMULINK across seven distinct operating modes. A bidirectional DC-DC converter, functioning in buck mode for charging and boost mode for discharging, is controlled by a comprehensive Battery Management System (BMS) to optimize performance and extend battery life. Notably, the system maintained a stable DC bus voltage around 375V, with minor initial fluctuations quickly stabilized, ensuring efficient power management with an overall efficiency exceeding 90% under varying environmental conditions. The integration of multiple Maximum Power Point Tracking (MPPT) techniques further enhanced system efficiency by up to 25% during fluctuating irradiance levels. The system's real-time response, with mode transitions occurring in under 200 milliseconds, highlights its capability for continuous and stable power delivery. The PV monitoring Dashboard feature provides real-time parameter visualization and interactive control, allowing dynamic observation of mode transitions and demonstrates the system's capability to maintain stable operation and efficient power management under varying conditions. This study demonstrates a robust solution for stand-alone renewable energy applications, ensuring efficient energy management and prolonged battery life.

Presenter bio: Md Ismail Hossain is a passionate student currently pursuing a B.Sc. in Electrical & Electronics Engineering (EEE) at American International University-Bangladesh (AIUB). His research interests span across multiple cutting-edge fields, including the

Internet of Things (IoT), Data Science, Renewable Energy, and Very-Large-Scale Integration (VLSI). Sowrov has worked on several innovative projects, such as developing smart IoT-enabled systems for solar power regulation and traffic management. He has also contributed to the field of machine learning, focusing on smart grid stability, renewable energy optimization, and fast-charging solutions for electric vehicles (EVs). His expertise reflects a strong commitment to driving technological advancements for a sustainable future.

10:00 ***Design and Feasibility of Off-Grid Photovoltaic Charging Stations for EVs in Remote Areas***

Md Ismail Hossain, Sowrov Komar Shib, Durjoy Roy Dipto, Tanay Banik, Abu Shufian and Md Mukter Hossain Emon

The increasing popularity of electric vehicles (EVs) presents a promising solution for reducing greenhouse gas emissions, particularly carbon dioxide (CO2), from fossil fuel-powered internal combustion engine vehicles. However, widespread EV adoption places substantial demand on electricity grids, potentially straining existing infrastructure. This paper investigates the feasibility of off-grid EV charging stations powered by photovoltaic (PV) systems as a sustainable alternative. The proposed system integrates PV arrays with energy storage systems, including lithium-ion batteries, to provide a continuous charging service, ensuring a reliable power source for EVs. The system has a maximum power point tracking (MPPT) controller and boost converters to ensure optimal energy harvesting and efficient charging. The analysis focuses on the system's performance, with results indicating a peak PV power output of 2000 W and steady operation throughout the charging cycle. The battery state of charge (SOC) reached 98%, at which point surplus energy was diverted to a DC load, maximizing energy use. This research underscores the potential of off-grid PV-powered charging stations to meet the growing demand for sustainable EV infrastructure while reducing reliance on traditional electricity grids, providing a secure and reliable charging solution.

Presenter bio: Sowrov Komar Shib is a passionate student currently pursuing a B.Sc. in Electrical & Electronics Engineering (EEE) at American International University-Bangladesh (AIUB). His research interests span across multiple cutting-edge fields, including the Internet of Things (IoT), Data Science, Renewable Energy, and Very-Large-Scale Integration (VLSI). Sowrov has worked on several innovative projects, such as developing smart IoT-enabled systems for solar power regulation and traffic management. He has also contributed to the field of machine learning, focusing on smart grid stability, renewable energy optimization, and fast-charging solutions for electric vehicles (EVs). His expertise reflects a strong commitment to driving technological advancements for a sustainable future.

10:20 ***Enhancing Thermal Comfort in Buildings with Machine Learning-Based Overheating Prediction***

Mithun Vijayakumar Rajalekshmi, Arman Hashemi and Saeed Sharif

The goal of this project is to improve the application of machine learning techniques in the summertime prediction of thermal comfort in residential structures (for both present and future weather situations). Using DesignBuilder's integrated simulation engine and simulated data, the research creates strong prediction models with Random Forest and XGBoost algorithms. Essential factors like building orientation, window-to-floor ratios, U-values, and operating temperatures were examined using exploratory data analysis, feature engineering, and thorough data preparation. Mean Absolute Error (MAE) and R-squared values were applied for the accurate and effective validation of the models. The findings demonstrate significant potential for early-stage decision making on building designs, for reducing risk of overheating and opening the door to more sustainable and comfortable living spaces. Future research endeavors aim to enlarge the dataset, explore different Machine learning modeling techniques, and enhance the models' capability to predict and mitigate overheating in different building kinds and climatic conditions.

Tuesday, November 19 9:00 - 10:40 (Asia/**Bahrain**)

S5-B: Deep Learning; Pattern Recognition

Virtual Room (B)

Chairs: Zainab Salman, Zainab Almahafdha

9:00 ***Human Activity Recognition Using Feedforward Backpropagation Neural Network***

Fadi Al Debs, Makram El Jurdy, Elias Fares, Gaby H Abou Haidar, Michel J Owayjan and Roger Achkar

This paper presents a feedforward backpropagation neural network designed to recognize human activities using IoT sensor data. Human activity recognition based on mobile phones and wearable sensor data has garnered significant attention due to its wide range of applications in healthcare, smart environments, and beyond. Previous studies in this field have utilized various sensors, such as accelerometers, gyroscopes, and orientation sensors, among others, to categorize human activities using modern wearable technologies. The proposed system employs a Human Activity Recognition framework, which collects real-time sensor data and analyzes human movements using deep learning techniques. The model achieves an accuracy of approximately 96% in identifying human motions based on the sensor data.

Presenter bio: Michel Owayjan is a senior lecturer at the Faculty of Engineering and Computer Science at AUST. He received his B.E. in Electrical Engineering and M.E. in Engineering Management from the AUB, Lebanon, in 1999 and 2002 respectively. During 2000-2004, he taught as a part-time instructor at AUST. Since 2005, he has been serving as a lecturer in the Faculty of Engineering. Mr. Owayjan is a member in the IEEE Computer Society and the IEEE Control Society. He is the Chair of the IEEE Computer Society since 2015 and the Vice-Chair of the IEEE RAS/Control/Instrumentation Society since 2016. He served as the MD-IR officer, then as the secretary of the Computer Society, Lebanon Section from 2009-2014. He established the AUST IEEE Student branch and served as its counselor from 2010 till 2015. His research interests include signal processing, system modeling and simulation, operations research, control, algorithms, neural networks, embedded systems, robotics, mechatronics, and artificial intelligence.

9:20 ***An Investigation in Bahraini Dialect Text to Speech Synthesis Models and Datasets***

Mohamed Basel Almahmood, Fatema Albalooshi and Hesham Alammal

In the past few years, there has been an accelerated development in the field of Artificial Intelligence (AI) and Machine Learning (ML). Various Text To Speech (TTS) modules have been developed, and successfully implemented in many languages. However, implementations of such systems for the Arabic language have been minimal, with implementations mostly relying on makeshift solutions such as using diacritics to transliterate the Arabic text to English. This study presents the development of a Text To Speech (TTS) system for the Bahraini dialect. The proposed approach uses the Forward Tacotron model integrated with HiFi-GAN vocoder, and Optuna for hyperparameter optimization. Our approach provides a thorough understanding of the requirements for synthesizing natural and expressive Bahraini Arabic speech, and investigates the possibility of training such a system without the use of diacritics or phonetization tools. For the purpose of this study, we created a dataset in the Bahraini dialect, containing 9 hours of recordings collected from Sanaa Alsaad's YouTube channel. However, due to the small dataset size, data augmentation techniques were used expand the dataset to 36 hours. Another version of the dataset was created spanning 8 hours of augmented data and involving only higher quality recordings. The smaller dataset was then AI enhanced using Adobe Podcasts. The sample rate of the recorded data is 22050 Hz, as per the model's requirements. Our system was first trained on the 36 hours dataset, and then transfer learning was used to fine tune the training on the 8 hours dataset. The system was assessed using metrics such as Attention Score, Mel Loss, Duration Loss, Pitch Loss, Word Error Rate (WER), and Mean Opinion Score (MOS). The model demonstrated promising capabilities in replicating the local dialect given the small dataset size and its subpar quality with an MOS of 3.4, and a WER of 34.

Presenter bio: I am studying masters degree in Artificial Intelligence at the University of Bahrain.

9:40 ***Comprehensive Evaluation of Federated Learning Based Models for Disease Detection in Healthcare***

R Jayalakshmi, Tamilvizhi T and P Ramya

In healthcare, the primary objective is to improve the individuals' well-being by addressing a range of health issues through accurate disease detection. Central to this process is Federated Learning (FL), a novel Machine Learning (ML) technique which aids model training across distributed devices, ensuring data

privacy. FL, in conjunction with Artificial Learning (AI) algorithms, enhances disease detection, treatment, and management practices, ultimately improving patient outcomes and healthcare services. This study analyzes 50 research papers on FL and AI-based healthcare disease detection to assess existing models comprehensively. Through meticulous literature review and gap analysis, the review aims to provide insights and recommendations for robust FL-based solutions. Exploring FL's potential, challenges, and implications in healthcare, the review aims to stimulate the development of AI-assisted disease detection systems. This work involves systematic paper selection, categorization, and in-depth review, followed by chronological trend analysis, dataset review, and performance metric evaluation. The study also identifies common limitations in healthcare disease detection using AI algorithms, underlining the need for efficient FL-based approaches.

Presenter bio: R Jayalakshmi working as Assistant Professor in Panaimalar Engineering College, India. She completed her Bachelor's Degree in Computer Science and Engineering in the year 2012 from Anna University, India. She completed her Master Degree in Computer Science and Engineering in the year 2017 from Kalasalingam University, India. she has 1 year 7 months of teaching experience in India. Her Research interest include Machine Learning and Cloud.

Presenter bio: I'm P. Ramya was born on 17th October 2001 at Chennai , Tamilnadu , India . I completed my Bachelor's degree in Computer Science and Engineering in the year 2023 from Anna University , India. I'm currently pursuing my Master's degree in Computer Science and Engineering from Anna University , India. My research interest include Machine Learning and Cloud Computing.

10:00 ***SubConvFusion3D: A Multi-Scale Sub-Convolutional Networks and Feature Fusion for 3D Deep Learning***

Abdelhakim Benkrama, Bilal Mokhtari, Kamal Eddine Melkemi, Sebti Foufou and Dominique Michelucci

Convolutional neural networks (CNNs) are useful tools for analyzing images in several facets of computer vision. Compared to 2D images, 3D points are not represented as a regular grid but rather as a collection of irregularly spaced points in three dimensions, varying significantly depending on the object or scene being described. This makes applying convolutions to 3D points challenging. Through this work, we present a new method for applying convolutions on a 3D point cloud. By considering the multiple scales of the 3D points, the proposed method minimizes confusion and redundancy while extracting different features at different scales and detail levels. To achieve this, different subconvolutional networks are first used, allowing for independent analysis. It enables 1D convolutions to extract features for every subnetwork at various scales. The provided features are finally combined to form the final feature vector, by using a new merging (fusion) function. The experimental results conducted on the ModelNet40 dataset show competitive performance achieved by our methodology

Presenter bio: Abdelhakim Benkrama is a PhD student at Batna 2 University, Algeria. His primary research focuses on 3D computer vision, with an emphasis on applying artificial intelligence and machine learning techniques to advance this field.

10:20 ***Breast Cancer Diagnosis with XAI-Integrated Deep Learning Approach***

Sharia Arfin Tanim, Gazi Mohammad Imdadul Alam, Tahmid Enam Shrestha, Maruful Islam, Fariha Jahan and Kamruddin Nur

Breast cancer remains a significant health issue worldwide, requiring accurate detection methodologies. Timely and precise breast cancer detection is crucial in medical diagnostics, as it significantly enhances patient outcomes. This paper introduces a robust approach for developing an effective breast cancer detection model by integrating deep-learning and classical machine learning approaches. Several pre-processing techniques such as data cleaning, label encoding, scaling, and feature selection were used to optimize the dataset for training. The proposed model demonstrated impressive accuracy in breast cancer detection compared to individual classifiers, achieving an overall accuracy of 97.80% on the WDBC dataset set. To improve model interpretability eXplainable AI (XAI) approaches have been used methods such as SHAP and LIME were employed to provide explicit insights into feature importance and individual predictions. The results show that the model outperforms established methods which have the potential

for clinical use by providing a straightforward and trustworthy tool for breast cancer diagnosis. Future research will focus on verifying the model with more datasets, fine-tuning its architecture, and creating real-time clinical applications to aid medical decision-making. This study identifies and discusses the importance of implementing DL and XAI in breast cancer diagnosis and outlines future research directions to address these challenges.

Presenter bio: Fariha Jahan is a Lecturer at the Department of Computer Science and Engineering at Daffodil International University (DIU), Bangladesh. She is a Bachelor of Science Holder in Computer Science and Engineering from American International University - Bangladesh (AIUB) and currently doing a Master's in Computer Science at AIUB. Her research interests include Machine Learning, Data Mining, IoT, and Blockchain. She has some papers published in well-known digital libraries such as ACM, and IEEE.

Tuesday, November 19 9:00 - 10:40 (Asia/**Bahrain**)

S5-C: Informatics

Virtual Room (C)

Chairs: Ehab Juma Adwan, Fatima Aljazeeri

9:00 ***Understanding Creative Arts Students' Views on NFTs: A Study Through Maurice Merleau-Ponty's Theoretical Framework***

Nor Hana Fauzin Muhammad Fauzi and Muhamad Fairus Kamaruzaman

Blockchain technology and Non-Fungible Tokens (NFTs) are revolutionizing the creative arts with their decentralized and secure systems. NFTs, traded on decentralized blockchains, have reshaped the industry in alignment with Industry 4.0. Despite research exploring NFT perspectives among Gen Z, digital artists, and engineers, their impact on creative arts education remains underexplored. Aligned with Sustainable Development Goal 4 (SDG 4) for inclusive education and lifelong learning, this framework aims to address this gap. By investigating why art students are increasingly integrating NFTs into their creative processes, our study aims to enhance educational outcomes and career opportunities in the arts industry. We seek to uncover how NFTs can foster innovation and inclusivity in creative education, providing practical insights for educators and policymakers to leverage digital advancements for the benefit of students and the broader creative community. Maurice Merleau-Ponty's theory of Phenomenology of Perception acts as the theoretical framework for understanding how creative art students perceive NFT technology.

Keywords-blockchain, NFT, creative art, education, perception

Presenter bio: Nor Hana Fauzin Muhammad Fauzi is a graphic designer and art educator passionate about integrating philosophical insights into creative practice. With a background in graphic design and a current role as an educator, she brings an understanding of both practical and theoretical aspects of the arts. She is keen to explore emerging digital concepts within art, especially NFTs, and is committed to guiding students in understanding and navigating the evolving creative landscape.

9:20 ***Content-Based Recommendation System for Craft Owners Based on User Preferences and Availability***

Amjad W Hawash, Raghad Alia and Islam Msalam

To match customers with craft service providers based on user-defined preferences, such as problem descriptions, addresses, and preferred schedules, this study provides a content-based recommendation system. The system uses TF-IDF vectors to calculate similarity scores after preprocessing textual descriptions using natural language processing (NLP) techniques. It also incorporates temporal availability

information to improve the precision of recommendations. The usefulness of the system in providing individualized recommendations is evidenced by the outcomes of the experiments.

Presenter bio: A Palestinian Computer Science student at An-Najah National University.

9:40 ***Exploring ChatGPT Integration in Classrooms: Impact on Student Engagement and Personalized Learning Support***

Anna Lyza Sancho Felipe, Mia V Eleazar, Armin B. Aragoncillo, Lilibeth Serencio Azuela, Herbert Penoso Azuela, Ushik Shrestha Khwakhali and Reagan Bendisula Ricafort

This study explores the use of ChatGPT, an AI tool from OpenAI, in various environments, with a particular focus on how teachers perceive its impact on student engagement, participation, and personalized learning assistance. The research explores the ways in which ChatGPT enhances classroom dynamics by fostering involvement, critical thinking, and collaboration among students. It also assesses how effectively ChatGPT provides customized support tailored to the needs and preferences of individual students. The natural language interaction capabilities of ChatGPT enable it to offer information and feedback to students, sparking curiosity and promoting increased participation. This study examines teachers' perspectives on aspects like accuracy, reliability, relevance to the curriculum, potential, provision of supplemental learning material, accessibility, inclusivity, and trustworthiness of ChatGPT. The results suggest that teachers generally hold a neutral view regarding the impact of ChatGPT on student engagement and participation. They acknowledge ChatGPT's effectiveness in generating learning materials and offering support that aligns with its objectives. Nevertheless, concerns about the reliability and trustworthiness of ChatGPT-generated content, as well as ethical considerations related to data privacy and algorithmic biases, are noteworthy. These issues highlight the importance of efforts to ensure the use of AI in educational settings. The research emphasizes how ChatGPT could improve learning by adapting to the needs and preferences of each student, ultimately making education more accessible and inclusive. While there are obstacles to overcome, incorporating ChatGPT into settings offers opportunities to create interactive and tailored learning environments. To sum up, introducing ChatGPT into education has the potential to enhance student engagement and provide learning support. To fully reap the benefits, it is critical to address the challenges associated with its implementation. Ongoing assessment and enhancement of AI tools, like ChatGPT, play a role in promoting an efficient and fair educational landscape.

Presenter bio: Eng. Herbert Penoso Azuela is a seasoned Computer Engineering Lecturer with over 24 years of academic experience, currently teaching at the American University of Bahrain (AUBH). Specializing in areas such as Cybersecurity, IoT, Digital Electronics, Embedded Systems, Mechatronics and Robotics, he combines deep technical knowledge with a commitment to educational excellence. Eng. Azuela holds certifications including CCNA and CyberOps Associate, alongside his recognition as a Cisco Global Cyber Ops Scholar (2018). A Cisco Networking Academy Certified Instructor Trainer since 2020, he is also a Fellow of the Higher Education Academy (UK), reflecting his dedication to advancing academic standards. Eng. Azuela's leadership experience includes his role as the former Coordinator of the College Quality Assurance Office at the University of Bahrain, where he was instrumental in shaping academic quality and fostering student success. Active in both local and global academic circles, he is a Certified Professional Computer Engineer and a member of the ICpEP Singapore Chapter. Eng. Azuela has also made significant contributions to academic programs and served on various departmental and university level committees.

10:00 ***Content and Activity Based Friends Suggestion in an Annotation System***

Amjad W Hawash, Ahmed Awad, Jana Taha and Ramah Hawash

Annotation systems enhance user collaboration by allowing structured sharing, commenting, and content discussion. They improve clarity, ensure contextual relevance, facilitate real-time or asynchronous interaction, and foster a collaborative environment. The success of collaborative projects relies on finding annotators who share similar interests, as this ensures that feedback and contributions are relevant and meaningful. This project aims to create a text-based annotation system that will allow users to apply similarity metrics between their annotations and those of others to identify the most suitable annotators. Additionally, the program will enable users to take online tests automatically generated based on a

selected term from the annotated text. The system recommends appropriate YouTube materials and identifies annotators who score highly in comparable quizzes based on the results of the quizzes. Users can search for and chat with others, promoting an enriched and collaborative learning experience. Experimental tests in this work reflect a promising enhancement in user collaboration and knowledge dissemination.

10:20 ***Investigating the Effects of Age on Senior Citizens During Driving and Talking on Mobile Phone Hands-Free***

Saeed Sharif, Boniface Ndubuisi Ossai and Cynthia Fu

Driving while using a mobile phone is legitimate only if it is in hands-free mode. Nonetheless, due to the driver's deflected attention to the phone and the driving task, a hands-free mobile phone causes cognitive distraction. Using drivers' blood pressure (BP), this study examined the age effect of talking on hands-free mobile phones on senior citizens while driving in real-time. The cognitive impact was determined using drivers' BP. When driving and reversing bay parking, participants completed two numerical tasks of varying intricacy. The results show that participants' BP under phone condition increased and exceeded their BP under no phone condititon. According to qualitative findings, the task completion had a considerable cognitive impact on the participants. By responding to the qualitative questionnaire, the drivers provided empirical evidence regarding their cognitive performance, verifying the statistical results and validating the hypothesis.

Tuesday, November 19 9:00 - 10:40 (Asia/**Bahrain**)

S5-D: Robotics, Computer Vision, and HCI-1

Virtual Room (D)

Chair: Aysha Ebrahim

9:00 ***Comparative of SVM and Decision Tree Techniques for Predicting Hydroponic Tomato Growth and Yield Using Deep Water Culture***

Pavan Kalyan, Surendran R and Sumathy Krishnan

The purpose of this research is to evaluate the effectiveness of Decision Tree and Support Vector Machine (SVM) algorithms in the context of hydroponic tomato cultivation using the Deep Water Culture (DWC) method. We assess the prediction power of various machine learning techniques with respect to tomato growth, yield, and quality characteristics using a variety of inputs relevant to hydroponic systems. We use the DWC approach to collect data from hydroponic tomato farms. The collection includes a wide range of environmental parameters, including pH values, water temperature, illumination, and nutrient concentrations. It also contains measures unique to plants, like yield, fruit size, and leaf area. The dataset's pertinent features, which include growth characteristics, environmental factors, and nutrient levels, are found. After processing, these chosen features are prepared for model training. Decision Tree and Support Vector Machine (SVM) algorithms are tested in a hydroponic Deep Water Culture (DWC) system to predict tomato growth, production, and quality. The pH, temperature, illumination, and nutrient levels of hydroponic tomato farms were recorded, along with plant parameters like yield, fruit size, and leaf area. Feature selection and preprocessing prepared data for model training. Decision Tree and SVM predicted tomato production metrics well. SVM had better precision in some circumstances, while Decision Tree was easier to interpret and apply. These algorithms can optimize hydroponic tomato growing, and future research should use ensemble methods to improve forecast accuracy and reliability.

Presenter bio: I am currently working as a JRF in the Department of Cognitive Computing, Institute of Computer Science and Engineering, Saveetha Institute of Medical and Technical Sciences. I have 15 years of undergraduate and postgraduate experience including 3 years of Industrial experience in Software companies and received B.Sc degree in Physics from Pondicherry University in the year 1997, M.C.A in Computer Applications in the year 2000 from Pondicherry Engineering College, Pondicherry University and M.Phil degree in Computer Science from Prist University in the year of 2009. I handled interesting roles and responsibilities including Teaching, Placements, Admissions in various Institutions in Anna University, Thiruvalluvar University, and Madras University. Areas of interest and specialization include Artificial Intelligence, Machine Learning, Deep Learning, Cloud Computing and Blockchain Technology. I published more than 5 articles in various international conferences. Also organized many national and international conferences and workshops at various colleges.

9:20 *DeepLabv3+Att: Integrating Attention Mechanisms in DeepLabv3 for Enhanced Road Segmentation*

Md Sabbir Hossain, Mostafijur Rahman, Mumtahina Ahmed, Md. Mohsin Kabir, M. Firoz Mridha and Jungpil Shin

Road segmentation is a critical task in autonomous driving and advanced driver-assistance systems (ADAS). This paper presents a novel model, DeepLabv3+Att, which enhances the standard DeepLabv3 by integrating attention mechanisms to improve segmentation accuracy. Our proposed model focuses on salient regions of the input images, thereby effectively distinguishing between road and non-road areas. We evaluate DeepLabv3+Att on the challenging KITTI Road dataset, where it achieves a mean Intersection over Union (mIOU) of 97.72% and a Maximum F-score (MaxF) of 99.45%, outperforming existing state-of-the-art methods. The attention mechanisms incorporated in our model enable more precise segmentation by emphasizing relevant features, leading to superior performance. These results demonstrate the potential of DeepLabv3+Att in enhancing road segmentation tasks and its applicability in real-world driving scenarios.

Presenter bio: Mumtahina Ahmed is enrolled in the Bachelor of Science program at the Bangladesh University of Business and Technology (BUBT), with a foundational understanding of Computer Science and Engineering. Her research interests include several computer science fields, focusing on natural language processing, multimodal learning, explainable artificial intelligence, machine learning, deep learning, and human-computer interaction. Her following research focuses on improving computer vision applications by investigating fields including image recognition, object detection, and image generation. Her passion also extends to the connection between artificial intelligence and healthcare, where she hopes to use her expertise to further the creation of intelligent systems for disease prediction, medical image analysis, and personalized healthcare solutions.

9:40 *BowlNet: An Ultra Lightweight Architecture for Real-Time Semantic Segmentation on Resource Constrained Environments*

Ananya S Nadig, Anagha Naga Preethi Tammana, Amogh Aryasomayajula, Adith Pradeepan and Manikandan J

Semantic Segmentation is the process of classifying each individual pixel in an image to a specific class. This can be done using a variety of Convolutional Neural Networks, such as ResNets, MobileNets, VGG16, SEResNets and more. While all of them have their own advantages and disadvantages, none of them are extremely light and therefore cannot be implemented in highly resource constrained environments. This task is computationally demanding and has to be performed in real-time to extract its true benefits. We have observed various models that have run on Nvidia Jetson, Titan X and other computationally efficient hardware, but not a lot of work has been done on the side of low computational hardware. We have designed an extremely lightweight and efficient network that can run in these conditions while maintaining robustness. To achieve this, we have taken only the main classes, so the computational cost is reduced, while also reducing the deep layers and cutting down on bottleneck layers in the model. We have taken inspiration from the existing LinkNet and UNet architectures to build an ultra-lightweight architecture that can perform semantic segmentation on resource constrained environments. We have used a symmetric encoder decoder architecture utilizing Residual Additions between them for efficient learning. We were able to achieve maximum mIoU of 0.904 during the evaluation of the model. The model was tested on a Laptop setup with a Ryzen 5 4600H processor. We were able to achieve time taken per frame as low as

25ms for 32x32 images, but for our best performing size we got the time taken per frame to be 44ms at 64x64 images.

Presenter bio: Ananya S Nadig is a 2024 BTech graduate in Electronics and Communication Engineering (ECE) from PES University, with a minor degree in Computer Science Engineering (CSE). Her academic interests include digital image processing and software development. During her engineering studies, Ananya secured the CNR Rao and MRD scholarships multiple times, awarded to students in the top academic bracket of the university. In addition to her technical pursuits, Ananya has completed the senior level in Carnatic music and is a trained classical singer. She also enjoys creative hobbies such as painting, sketching, and reading novels.

10:00 ***A New Transformer Based On Thin Section Rock Images with Self-Attention Module***

Ilhan Aydin, Ayse Didem Kilic and Taha Kubilay Şener

The rocks, as the main component of the earth's crust, form the basis for intra-earth events such as mineralization, determination of oil-natural gas reservoir rock, seismicity and tectonism. The main difference between rocks is their mineral content and conditions under which they form. The mineral types that make up rocks, with their different mineral compositions, textures and structures, can be determined by thin section studies on a microscope or chemical analysis methods. Identifying minerals and naming rocks is a long and tiring process. It requires experience and knowledge. Increasing classification performance in convolutional neural networks in geology, as in other fields of science, has made this approach possible for rock classification. This new visual transformer-based approach proposed for rock types classification constitutes an important alternative to convolutional neural network-based approaches. The proposed approach makes the information in the representation space more specific with the self-attention mechanism and proposes a more robust structure for the complex classification problem. The performance of Proposed ViT-base 16 was applied to the sedimentary, metamorphic and igneous rock data set and a high success of 97.38% accuracy was achieved.

Presenter bio: Taha Kubilay Şener is a Master's student at Fırat University at Department of Computer Engineering, where they have been actively involved in research teams for the past three years. Their work focuses on training and deploying deep learning models, with a specialization in computer vision tasks. They have primarily worked on object detection and semantic segmentation, often combining and hybridizing these approaches to develop innovative solutions. Taha Kubilay Şener is dedicated to advancing practical applications of deep learning in computer vision.

10:20 ***Robot localization in a Wireless Sensor Network using Israa Collecting Algorithm***

Israa Sabri Abdulameer AL-Forati

Robot systems are currently considered an effective and important means in human life, as they replace humans in many complex tasks at a lower cost. Three stages are the most important to design it: the localization, path planning and formation. In this paper, the localization of a robot in a suggested environment is solved within an environment consisting of an array of (16x16) IR transmitters sensors, and the robot is also equipped with an IR receiver, where the robot's location is detected when it stands on any location within the array, using a smart algorithm. This system is considered smart because it does not depend on determining the location of the robot by using a smart camera or using distance sensors, but rather by analyzing the signal resulting from the IR signal directly through the algorithm. A robotic system for indoor localization is suggested. It consists of three parts: the robot body building and its component, supplied with IR transmitter to detect the signal from the environment that is supplied with an array of 16x16 IR receivers, and an algorithm to collect the information from the system and estimate the position of the robot. Several simulations are done on the proposed system to study the best environment for it, and it is found that, the best environment is when the sensing range equal to 30 pixel that make the errors as small as possible.

Presenter bio: Israa S. AL-Forati was born in Iraq 1982.she received the B.S. and Msc Degrees from Department of computer Engineering University of Basrah, Iraq at 2003 and 2008 respectively. She Worked as an Assistant Lecturer at the same Department in 2009 up to now. Her field of Interest is Robotics and Industrial control. Currently, she is pursuing Ph.D. degree in Electrical engineering in University of

Basrah, since 2016. Her research and thesis center around "Design and implementation of Multi-robot Formations using the path following control" .

Tuesday, November 19 10:40 - 11:00 (Asia/**Bahrain**)

B-5: Break-5

Room: Virtual Main Hall

Tuesday, November 19 11:00 - 12:40 (Asia/**Bahrain**)

S6-A: Smart Cities & Cloud Computing

Virtual Room (A)

Chair: Saeed Sharif

11:00 ***Determining Delivery Demand Area Distribution Using Effective Regions of Movement Clustering***

Elmer R Magsino, Gerald P. Arada and Catherine Manuela Lee Ramos

As more transport service providers traverse public roads to provide food and parcel delivery and ridesharing services, there is a need to analyze these delivery/service points to maximize provider profitability while minimizing harmful environmental effects. In this study, we utilize an urban empirical mobility dataset to extract important Global Positioning Systems (GPS) information where most transactions of delivery and services happened. In particular, we only utilized two-wheeled vehicular positions in the study since they offer more services as compared to four-wheeled vehicles. The urban map is uniformly partitioned, and its grids are categorized by its vehicular capacity. By varying the vehicular capacity threshold, we are able to locate highly demanded points. We then combine closely related positions into its corresponding effective regions of movement (ERMs) to visualize areas with common density characteristics. We also compute for the closeness centrality measure of the formed network and found that practical networks are distributed in nature. Given these findings, the number of ERMs decreased drastically and located the demand area distribution easily.

Presenter bio: Elmer Magsino received the B.Sc. degree in Electronics and Communications Engineering and M.Sc. degree in Electrical Engineering from The University of the Philippines-Diliman in 2002 and 2006, respectively. He completed his Ph.D. in Electronic and Information Engineering at The Hong Kong Polytechnic University, Kowloon, Hong Kong in 2021 focusing on data dissemination in vehicular networks.

11:20 ***Determination of Cause-Effect Relation among Success Factors of Small-Scale Hydrogen Valley Site Selection for Smart City Energy Security***

Ozge Akdeniz, Elifnaz Olgac and Ali Karasan

Hydrogen energy has risen interest internationally as a clean energy source. Owing to its high energy efficiency, sustainability, and low environmental impact characteristics, compared to other alternative energy resources. A hydrogen valley is a complex facility, encompassing the entire hydrogen value chain, where hydrogen production, transportation, distribution, and storage functions are integrated. This paper aims to identify the success factors for establishing a small-scale hydrogen valley in Türkiye and to analyze the interdependencies between these factors using fuzzy DEMATEL method. As the evaluation of the success factors involves expert opinion, the inherent uncertainty in expert judgments and the difficulty in representing the expert knowledge with crisp numerical values, fuzzy logic is applied. After the influence the success factors have on each other is revealed, a network showcasing all the relations between these factors is constructed. Based on the results, population density emerged as the most influential success

factor for the small-scale hydrogen valley site selection based on the expert evaluations from Türkiye ecosystem for the smart city energy security concept.

Presenter bio: My name is Ozge Akdeniz. I'm from Turkey. I graduated with a degree in Industrial Engineering from Karadeniz Technical University in 2021. I started my master's degree in Engineering Management at Yildiz Technical University in 2022. Currently, I am in the thesis phase and working in the Crew Planning Department at Turkish Airlines.

11:40 ***Efficient Virtual Resource Management in Nested Virtualization Environments***

Abderrahim Bouchair

Effective resource management is essential for performance optimization and energy conservation in virtualized cloud systems. Nested virtualization extends traditional virtualization by allowing virtual machines (VMs) to operate inside other VMs, enabling multiple virtualization layers within a single physical server. This paper examines three policy-driven strategies for achieving energy-efficient resource allocation in nested virtualization settings. The first strategy seeks to improve energy efficiency by reducing the number of active physical hosts for VM workloads. The second strategy uses auto-scaling techniques to handle varying workload demands. The third strategy emphasizes allocating resources in a priority manner according to the demands of application performance. This approach is particularly relevant to contemporary Virtual Network Embedding (VNE) because it further increases resource isolation and utilization by incorporating containerization technologies. Using the CloudSim-SDN toolkit, empirical assessments and simulations demonstrate how effectively these policies improve performance and resource efficiency in layered virtualization environments.

Presenter bio: Ph.D in Computer Science from University of Oran1 Ahmed Ben Bella (Algeria). His research revolves mostly around the areas of Cloud Computing, Virtualization, Metaheuristics and Network management.

12:00 ***Factors Affecting Individuals' Adoption of Cloud Computing***

Ali H Zolait, Fatima Ashoor and Zainab Hubail

Cloud computing has become a prevalent technology in recent years, with various types and deployment models available. Although it has become ubiquitous in most applications, there is still a significant number of individuals who are hesitant to adopt this technology. Numerous studies have been conducted to understand the factors that influence individuals' adoption of cloud computing. In this regard, the technology acceptance model (TAM) was employed as a theoretical framework, which consists of two key components, perceived usefulness and ease of use. The results of these studies revealed that six variables, namely behavioral intention, facilitating conditions, perceived cost, social influence, robustness, and utilization, have a positive relationship with both actual adoption and willingness to adopt cloud computing. Furthermore, social influence, utilization, robustness, and facilitating conditions have a positive impact on individuals' behavioral intention to adopt cloud computing. However, researchers suggest that future studies should focus on investigating the challenges of cloud computing adoption from the perspective of cloud computing service providers.

Presenter bio: Dr. Ali Hussein Saleh Zolait (Known as Dr. Zolait) is the Assistant Professor of Management Information Systems (MIS) at the College of Information Technology – Department of Information Systems at the University of Bahrain from 2010- the present. Dr. Zolait was the stoops distinguished assistant professor of E-commerce and Management Information Systems at the Graduate School of Business- University of Malaya - Malaysia. He served as a researcher Visiting Research Fellow affiliated with the Faculty of Business and Accountancy from 2007 until September 2010. Dr. Zolait is a prominent scholar and leader in the field of Information systems. He is the author of more than sixty published and scholarly research in Information Systems and Information Technology. Dr. Zolait's research was published in leading and indexed ISI and Scopus, International Journals such as Government Information Quarterly, Behaviour & Information Technology, Journal of Systems and Information Technology, Journal of Enterprise Information Management, Journal of Information Security and Applications. In addition, Dr. Zolait has published three books. Dr. Zolait supervised hundreds of undergraduate, postgraduate, executive development program MBA, MM, and doctoral students. Dr. Zolait's current and future research include IS Performance Analysis, Smart Cities/ Big Data / Cloud Computing / Internet of Things (IoT), IS Maturity, Information Systems Security, and Cybersecurity. Dr. Zolait served as an external examiner for many master's and Ph.D. theses in information systems and e-commerce. He

has been invited keynote speaker at several conferences and seminars. Dr. Zolait was the primary delegate and representative to the IEEE Region 8 meeting and talks. The Belgium government Supernova conference-2019 Belgium, INCONET-GCC 2 is a European Commission-funded project. He acted as a conference program chair for several successful conferences. The Fourth International Conference on E-learning: Best practices in management, design, and development of e-courses: standards of excellence and creativity (IELC 2013), 7th-9th May 2013, Manamah, Kingdom of Bahrain. He acted as Technical Program Chair: The Fifth International Conference on E-learning: Cognitively informed technology, 5th to 8th of October 2015, Manamah, Kingdom of Bahrain. He acted as Publication Chair at: the 9th IEEE-GCC conference and exhibition, 8-11th November 2016, in Manama, Bahrain, and also 10th IEEE-GCC conference 2019, Kuwait. He served as Program Chair for the International Conference on Fourth Industrial Revolution, ICFIR 2019, Manama - the Kingdom of Bahrain. Dr. Zolait is a Senior Member of SMIEEE and was elected Chair of the IEEE Bahrain Section from October 2020 –December 2022. He is the Editor-in-Chief of the International Journal of Technology Diffusion (IJTD). Founder & Member of Board of Directors: Society of Excellence & Academic Research, Kingdom of Bahrain. He serves in many academic committees at the department, college, and university levels. In addition, he is acting as a referee to many international journals and conferences.

12:20 ***The Social Impact of Digital Technologies on Cultural Heritage: Preserving Shu Brocade Patterns through Non-Fungible Tokens***

Lei Xu, Muhamad Fairus Kamaruzaman and Rusmawati Ghazali

This study explores the application and social impact of Non-Fungible Token (NFT) technology in preserving Chinese intangible cultural heritage, specifically Shu brocade patterns. Through a case study of the specific Shu brocade pattern "Falling Flowers and Flowing Water," the research details the conversion process from physical Shu brocade to digital patterns and then to NFTs, including steps such as image acquisition, processing, vector reconstruction, and NFT minting. The findings indicate that NFT technology offers an innovative approach to preserving Shu brocade patterns, with the potential to reshape the value chain of traditional crafts. Simultaneously, this method has multifaceted impacts on the Shu brocade industry and cultural heritage preservation. This study not only provides a new perspective and practical reference for the preservation and inheritance of cultural heritage in the digital age but also makes a positive contribution to achieving the United Nations Sustainable Development Goals regarding cultural heritage preservation.

Presenter bio: Currently a Ph.D. candidate in Art and Design at the College of Creative Arts, Universiti Teknologi MARA, Malaysia, and a faculty member at the Faculty of Fine Arts and Design, Chengdu University, China. Serves as a committee member of the Urban IP Special Committee, Sichuan Graphic Designers Association. Has received over thirty design awards, including ten at the national level. Has guided students to obtain more than fifty national and provincial-level awards in disciplinary competitions, with multiple Outstanding Instructor Awards. Has published eight academic papers, including one in Chinese Core Journal, with a total citation count of over fifty. Has participated in three provincial-ministerial level research projects, with one completed. Holds four approved patents.

Tuesday, November 19 11:00 - 12:40 (Asia/**Bahrain**)

S6-B: Cyber security-2

Virtual Room (B)

Chairs: Ali H Zolait, Yaqoob S Al-Slais

11:00 ***Decentralized Healthcare Crowdfunding: Leveraging Smart Contracts for Global Medical Research and Treatment***

Miracle Agholor, Shaheen Khatoon and Saeed Sharif

This article discusses the creation of a decentralized healthcare crowdfunding platform using Thirdweb technology. It starts by exploring the growth of crowdfunding in healthcare emphasizing its role in funding treatments from various sources. Different crowdfunding models and their associated challenges, such as hurdles, operational complexities and financial risks are examined. These obstacles are tackled through solutions with a focus on the benefits of utilizing Thirdweb instead of Interplanetary File System (IPFS) for building a decentralized platform. The research explains how this approach addresses issues in blockchain

systems, including development challenges, security vulnerabilities and user experience shortcomings especially in healthcare settings. The study's main contributions include a development process for healthcare crowdfunding platforms, enhanced security through audited smart contracts, improved scalability for global initiatives and a user-friendly interface to encourage broader usage. As a demonstration of concept validity, a case study is conducted on the use of technology in healthcare funding to enhance accessibility, security and efficiency, in medical research and treatment financing worldwide.

Presenter bio: Miracle Agholor is a graduate of the University of East London, where he earned a First-Class B.Sc. Hons in Applied Computing. His research interests span blockchain technology, quantum computing, artificial intelligence, systems and networks, as well as privacy and security. He is a co-author and presenter of the paper "Decentralized Healthcare Crowdfunding: Leveraging Smart Contracts for Global Medical Research and Treatment," co-written with Shaheen Khatoon and Mhd Saeed Sharif. This paper, which will be presented at the 2024 International Conference on Innovation and Intelligence for Informatics, Computing, and Technologies (3ICT), explores blockchain's potential to improve transparency, security, and efficiency in global healthcare crowdfunding. With over five years of professional experience in IT, Miracle specializes in system administration, data analysis, and project management. He is a member of the British Computing Society (BCS) and is committed to leveraging advanced technologies to address global challenges.

11:20 ***Awareness of Cybersecurity: The case of Internet of Things among Bahrainis***

Ali H Zolait

The increasing prevalence of Internet of Things (IoT) devices in Bahrain has raised concerns about the level of cybersecurity awareness among citizens. This study aims to address this issue by examining the most common challenges and attacks faced by educational institutions employing IoT technologies. To collect the necessary information and achieve the research objectives, we utilized an online survey as our primary research method. This survey was disseminated among Bahraini citizens. To ensure a representative sample, we employed simple random sampling and aimed for a participation rate of 384 individuals. The results indicate that there is a correlation between user knowledge and cybersecurity awareness, suggesting that it is crucial for IoT users to be cognizant of the potential cybersecurity threats to protect their data and privacy. Furthermore, following best practices for IoT behavior and usage, such as regularly updating devices and using multifactor authentication, can help ensure the safety of data.

Presenter bio: Dr. Ali Hussein Saleh Zolait (Known as Dr. Zolait) is the Assistant Professor of Management Information Systems (MIS) at the College of Information Technology – Department of Information Systems at the University of Bahrain from 2010- the present. Dr. Zolait was the stoops distinguished assistant professor of E-commerce and Management Information Systems at the Graduate School of Business- University of Malaya - Malaysia. He served as a researcher Visiting Research Fellow affiliated with the Faculty of Business and Accountancy from 2007 until September 2010. Dr. Zolait is a prominent scholar and leader in the field of Information systems. He is the author of more than sixty published and scholarly research in Information Systems and Information Technology. Dr. Zolait's research was published in leading and indexed ISI and Scopus, International Journals such as Government Information Quarterly, Behaviour & Information Technology, Journal of Systems and Information Technology, Journal of Enterprise Information Management, Journal of Information Security and Applications. In addition, Dr. Zolait has published three books. Dr. Zolait supervised hundreds of undergraduate, postgraduate, executive development program MBA, MM, and doctoral students. Dr. Zolait's current and future research include IS Performance Analysis, Smart Cities/ Big Data / Cloud Computing / Internet of Things (IoT), IS Maturity, Information Systems Security, and Cybersecurity. Dr. Zolait served as an external examiner for many master's and Ph.D. theses in information systems and e-commerce. He has been invited keynote speaker at several conferences and seminars. Dr. Zolait was the primary delegate and representative to the IEEE Region 8 meeting and talks. The Belgium government Supernova conference-2019 Belgium, INCONET-GCC 2 is a European Commission-funded project. He acted as a conference program chair for several successful conferences. The Fourth International Conference on E-learning: Best practices in management, design, and development of e-courses: standards of excellence and creativity (IELC 2013), 7th-9th May 2013, Manamah, Kingdom of Bahrain. He acted as Technical Program Chair: The Fifth International Conference on E-learning: Cognitively informed technology, 5th to 8th of October 2015, Manamah, Kingdom of Bahrain. He acted as Publication Chair at: the 9th IEEE-GCC conference and exhibition, 8-11th November 2016, in Manama, Bahrain, and also 10th IEEE-GCC conference 2019, Kuwait. He served as Program Chair for the International Conference on Fourth Industrial Revolution, ICFIR 2019, Manama - the Kingdom of Bahrain. Dr. Zolait is a Senior Member of SMIEEE and was elected Chair of the IEEE Bahrain Section from October 2020 –December 2022. He is the Editor-in-Chief of the International Journal of Technology Diffusion (IJTD). Founder & Member of Board of Directors: Society of Excellence & Academic Research, Kingdom of Bahrain. He serves in many academic committees at the department, college, and university levels. In addition, he is acting as a referee to many international journals and conferences.

11:40 ***Enhancing Security: Evaluating RFID-Based Access Control Systems***

You Zhi Yang, Saeed Sharif and Athirah Mohd Ramly

This project focuses on enhancing the security of a chosen system by implementing multiple layers of protection, including concealing sensitive data on the LCD, utilizing hashed UID, and deploying Biometric Dual-Factor authentication via fingerprint recognition. The system is considered secure as it safeguards access refusal to the unauthorized attempt although tag appears legitimate. The project encompasses various stages from component procurement to vulnerability assessment, exploitation, and solution development. While this paper substantially protects the system, however, future investigation remains important. Hence, this project not only considers immediate security implementation but also pave the way for continued analysis and improvement which aims to defending the system against malicious threats as well as optimize its performance.

12:00 ***Phishing Detection on URL Data Using K-Nearest Neighbors Method***

Muhamad Irsan, Fachrul Febriana, Hilal H. Nuha and Hassan Sailellah

This research aims to develop a phishing detection model using the K-Nearest Neighbors (KNN) algorithm and compare its performance with Decision Tree (DT). With phishing threats on the rise, effective detection is critical to protecting user data. In this research, a dataset consisting of 10,000 URLs of phishing and legitimate sites was used. After data pre-processing including cleaning, normalization, and feature extraction, the KNN and DT models were trained and tested. The research results show that the KNN model achieves an accuracy of 95%, while the DT achieves an accuracy of 93%. KNN shows superiority in accuracy and consistency, while DT provides better interpretation through decision tree visualization. This research provides insight into the effectiveness of each method and identifies the most relevant features in the classification process.

12:20 ***Detection and Analysis of Flipper Zero Deauthentication Signals Using HackRF One Software-Defined Radio***

Leonel R Calderon and Geoffrey T Salvador

Deauthentication attacks remain a significant threat to wireless network security. This study investigates the characteristics of deauthentication signals generated by a Flipper Zero device as captured by a HackRF One Software Defined Radio (SDR). By analyzing signal parameters such as power levels, frequency bands, and modulation techniques, distinct features differentiating deauthentication attacks from legitimate network traffic are identified. Results indicate that deauthentication attacks introduce notable power level spikes, increasing from approximately -80 dBm to -30 dBm at a distance of one meter. The deauthentication signal typically occupies a 6 MHz bandwidth centered around 2.422 GHz. Signal strength decreases to -35 dBm and -40 dBm at distances of five and ten meters, respectively. These findings complement existing packet-based detection methods by providing additional insights into deauthentication attack characteristics, enabling the development of more robust detection systems through the integration of waveform analysis and advanced signal processing techniques.

Presenter bio: I am a licensed Electronics Engineer in the Philippines and an alumnus of the Polytechnic University of the Philippines, where I completed both my Bachelor's and Master's degrees in Engineering. I also pursued further specialization by completing a Post-Diploma Course in Power Electronics at Mapúa University. Currently, I work as a Senior Software Quality Assurance Test and Process Automation Engineer. My career combines my background in electronics engineering with a passion for software development and automation, focusing on improving processes, coding efficiency, and ensuring quality in modern technological systems

Tuesday, November 19 11:00 - 12:40 (Asia/**Bahrain**)

S6-C: Robotics, Computer Vision, and HCI-2

Virtual Room (C)

Chair: Mohab A. Mangoud

11:00 ***Self-driving vehicles for Avoiding head-on collisions between two opposing vehicles***

Oshoke Umoru, Joshua Nehinbe and Glory Edegbe Edegbe

Studies have shown that there are no automobile vehicles that have successfully achieved the full standard rating required at international level since 1970s when semi-autonomous vehicles were invented. Thus, this paper presents the simulations of two self-driving vehicles that autonomously responsible for all the driving activities and decisions two drivers may require to drive towards each other and steering pass from each other without having head-on collision. With Python programming language, both vehicles were designed to navigate from their individual origins to critical distance of separation where they will perceive each other, take appropriate decisions to avoid head-on collision and continue to navigate their routes towards their respective destinations without manual interference. Series of evaluations suggest that there are decision points in the trajectory of conventional and autonomous vehicles whereby drivers and inbuilt sensors in autonomous vehicles must take decisions required to avoid head on collisions with opposing vehicles.

Presenter bio: Umoru Oshoke is a PhD student in the department of Computer Science at the Edo State University, Uzairue, Edo State, Nigeria. His PhD research is on autonomous vehicles for reducing collisions. He aspires to be an active researcher in the areas of Artificial Intelligence (AI) and Cyber security upon the completion of his PhD.

11:20 ***Detectron2 Powered-Image Segmentation and Object Detection for Smart Weed Control Program in Coffee Plantation***

Raveena S and Surendran R

Coffee plantations have more irregular spacing between plants, making weed identification more of a challenge than in crops. There is a lack of data on weed identification in coffee farms. The majority of crop weed identification techniques are used to center on positively identifying specific plant species. The proposed article combines two steps. Initial feature maps are created via convolutional layers on the input image. The Region Proposal Network (RPN) analyses these feature maps to find potential ROIs. ROIs are assessed using classification and bounding box regression losses. Classifying and pooling ROI in the second phase improves ROIs. The end goal is to achieve optimal classification and bounding box regression losses for object recognition and segmentation. To effectively control weeds, Mask R-CNN can tell coffee plants apart from weeds. Experiment results were based on data collected from both the coffee plant and the weed stages. Performance is measured by accuracy, F1 score, precision, and recall. Furthermore, research findings demonstrate that the suggested approach is workable and be applied to effectively identify and outperform current approaches.

Presenter bio: Raveena Selvanarayanan currently working as a Junior Research Fellow in the Department of Cognitive Computing, Institute of Computer Science and Engineering, Saveetha School of Engineering. She received her B.E. degree in Computer Science and Engineering from SA. Engineering College in the year 2015, M.E in Computer Science and Engineering from RMD. Engineering College, Kavaraipettai, in the year 2017, and Currently Pursuing her PhD in the stream of Deep Learning. She has 3 years of Industrial Experience and her Research Interest: Machine Learning, Deep Learning, Internet of Things, Digital Image Processing, Computer Vision. She has published more the 7 articles in international conference and 1 journal paper

11:40 ***Assisting Neurosurgeons: Advancing Brain Tumor Surgery with Smartphone Augmented Reality Navigation***

Muhammad Iskandar Java, Shintami Chusnul Hidayati, Riyanarto Sarno, Yeni Anistyasari and Khurshed Ali

Integrating Augmented Reality (AR) into neurosurgical procedures has shown substantial promise in enhancing surgical precision and educational outcomes, building upon previous applications primarily focused on simple visualization tasks. This study extends the current scope by using smartphone-based AR navigation systems tailored to assist neurosurgeons performing brain tumor surgery. Unlike prior efforts, our research developed and validated an AR system that superimposes precise virtual representations of critical anatomical structures, such as the skull and brain, onto a 3D-printed patient model. These models are rendered in transparent materials that improve the visibility and understanding of intricate internal structures, facilitating more intuitive surgical planning and training. Our findings demonstrate that while AR significantly enhances the visualization of anatomical details and the alignment of virtual to physical models, its effectiveness depends on the viewing angle and facial feature distinctiveness, achieving the highest accuracy in frontal views. These results underscore improvements over traditional AR systems, which often struggle with accurate depth perception and spatial orientation, and highlight the challenges of broad integration.

12:00 ***A Polymer-based Femoral Stem Implant: Finite Element Analysis Study***

Ludovica Crobu, Samir Morad and Saeed Sharif

While the hip replacement was proven to be very successful over the decades, it still remains very critical to elongate the life-span of implants, and most importantly to solve the problems associated with implanted devices, such as particle debris that forms from the wear of the prosthesis and washes into the biological environment, or to reduce the risk of bone mass loss that result from the in-appropriate load transfer. Among the various types of femoral components available in the clinics, research has been conducted for numerous hip prostheses made with combinations of metals, ceramics and polymers, but on the other hand there exists an insufficient number of studies for a polymer based femoral stem implant. In this study, the efficacy of a press-fit hip implant with the carbon-reinforced PEEK femoral stem, having a hydroxyapatite coating, and an alumina-alumina bearing was suggested. The mechanical properties of the artificial hip model were verified using static finite element analysis by taking the values of stress, displacement, deformation and factor of safety into account. The presented design exhibited theoretical feasibility since the modulus of elasticity of the polymer in the current study is closer to bone than conventional metals, and as such the load transfer was predicted to be smoother, followed by eliminating the rate of strain shielding and micromotion at the bone-implant junction. Based on the preliminary analysis, the results seemed to be satisfying.

12:20 ***Unpaired Image-to-Image Translation for High-Accuracy CTA Generation from CT Images Using Cycle GAN***

Nancy Mohamed Soliman, Master, Mohamed El-Helw and Mustafa Elattar

This study explores the application of CycleGAN, a variant of Generative Adversarial Networks (GANs), for generating Computed Tomography Angiography (CTA) images directly from CT scans. Traditional CTA methods involve risks associated with contrast agents and radiation, prompting the need for non-invasive alternatives. CycleGAN facilitates unpaired image-to-image translation, bypassing the requirements for paired datasets typically used in medical imaging. Using a dataset comprising CT scans from 87 patients and CTA scans from 56 healthy aortas, our study employed advanced preprocessing techniques to optimize the CycleGAN performance. Quantitative evaluations demonstrate the model's efficacy with a Structural Similarity Index (SSIM) of 0.73 ± 0.09 and a Filtered Peak Signal-to-Noise Ratio (Filtered PSNR) of 18.43 ± 0.96, indicating robust image synthesis capabilities. Our Study contributes to advancing medical imaging by automating CTA image synthesis, potentially improving diagnostic accuracy and patient care while

mitigating procedural risks. Future research directions include refining model architectures, expanding datasets, and validating synthesized images across broader clinical contexts.

Presenter bio: Nancy Mohamed is a research assistant and master's student at Nile University, specializing in informatics with a focus on computer vision. She graduated in 2022 from the Faculty of Engineering, Helwan University, with a bachelor's degree in Electronics, Communication, and Computer Engineering, focusing on the Computer Engineering branch.

Tuesday, November 19 11:00 - 12:40 (Asia/**Bahrain**)

S6-D: Deep Learning & Game Playing

Virtual Room (D)

Chair: Joshua Nehinbe

11:00 ***An Exploration of Autonomous vehicles for reducing Rear-end collisions***

Oshoke Umoru and Joshua Nehinbe

Lack of suitable vehicular models that can significantly reduce rear-end collisions between two autonomous vehicles is a long-standing issue in the exploration of smart vehicles. Thus, several studies have shown different possible ways to decrease rear-end collisions between two autonomous vehicles. However, there is little or no empirically verified attributes of autonomous vehicles required to avoid rear-end collisions in the above context. Thus, this research uses two simulated vehicles, Python programming language and its associated libraries to critically explore the above issues. Series of evaluations suggest that both vehicles were vehicularly independent', vehicularly self-directed' and ' vehicularly self-reliant' to have avoided rear-end collisions with each other. The results further suggest that the statistical entropy of the distance covered by vehicle 1 and vehicle 2 were about 1.514 and 1.496 respectively. Similarly, the statistical entropy of the time taken and distance as both vehicles approach each other were 1.771 and 2.688 respectively.

Presenter bio: Umoru Oshoke is a PhD student in the department of Computer Science at the Edo State University, Uzairue, Edo State, Nigeria. His PhD research is on autonomous vehicles for reducing collisions. He aspires to be an active researcher in the areas of Artificial Intelligence (AI) and Cyber security upon the completion of his PhD.

11:20 ***Implementation of 8-Puzzles Game on Android Operating System Based on Accelerometer Sensor Control***

Syahdi Gharizah Ahsan, Hilal H. Nuha, Satria Akbar Mugitama, Hassan Sailellah and Rana Zaini Fathiyana

Game8-Puzzles is a game that is widely known not only in Indonesia but also in the world. The modern 8-Puzzles game has been downloaded up to 100 million times on the Play Store platform. However, there has not been any 8-puzzles game that is played by tilting or rotating the device. This can be an opportunity for innovation by implementing an accelerometer sensor in the game. However, the accelerometer is very sensitive to changes that occur so that sometimes it has results that are not in accordance with the user's wishes. Therefore, an additional method is needed to be able to maximize this integration by adding Proportional Integral Derivative (PID) Control. This method has been widely used, especially in industrial fields such as automation and robotics. Its simplicity and ease of implementation make it superior to other methods. Many industrial devices can be linearized without many errors. In this study, the implementation of the 8-puzzles game with accelerometer sensor control was successful even with a low percentage of correct movements. Furthermore, the PID control method was applied in the game and resulted in an

increase in the percentage of correct movements by almost 20%. This proves that PID control can function well in the game.

11:40 ***Improving Online Computation Offloading in Mobile-Edge Computing Networks using Deep Reinforcement Learning***

Yohanes Armenian Putra, Hilal H. Nuha and Hassan Sailellah

Research develops a Deep Reinforcement Learning (DRL) model based on the DROO (Deep Reinforcement Learning-based Online Offloading) algorithm to enhance resource allocation efficiency and offloading decision-making in Mobile-Edge Computing (MEC) networks. The model employs a deep neural network (DNN) approach optimized using various algorithms such as Adam, Nadam, and Adamax. The study explores the impact of the bisection technique during the training process, aiming to optimize offloading policies by accounting for the dynamic nature of network conditions. Simulation results indicate that the Nadam and Adamax algorithms achieve an optimal balance between computational speed and time efficiency, while other algorithms demonstrate varying performance depending on the scenarios tested. These findings highlight the potential of DRL algorithms in optimizing MEC network performance, particularly in the context of computation offloading and resource allocation.

12:00 ***Protection Against Virtual Jamming Using Naïve Bayes on NS-2***

Erwid Jadied, Bagas Riyadi, Hilal H. Nuha, Hassan Sailellah and Sutiyo Sutiyo

In the era of Wireless Sensor Networks (WSN) and Internet of Things (IoT) technology development, security is a crucial aspect of protecting the network from various attacks, one of which is virtual jamming. This attack jeopardizes the performance of sensor networks with limited energy and resources. This research proposes the use of the Naive Bayes (NB) method as a solution to overcome virtual jamming attacks in WSNs. Based on previous research, NB is proven to have high accuracy in the context of network security. The NB method will be implemented through simulation using NS2, an application for network activity analysis. The experiment plan includes using a confusion matrix as an evaluation tool, enabling the measurement of virtual jamming attack detection performance. The experiment aims to identify how NB can distinguish between attacks and normal activities in a network environment. In this research, it is expected to contribute to the development of security, by applying calculation speed, simple algorithms, and high accuracy, to the advantages of the NB method.

12:20 ***Gender Specific Speech Enhancement Architecture for Improving Deep Neural Networks Learning***

Soha A. Nossier and Saeed Sharif

Deep learning techniques for speech enhancement rely on training a deep neural network to process noisy speech, regardless the gender of the speaker. However, research shows that the speech of male and female stimulates different parts in human brain, and that female speech requires more complex analysis. This implies that different processing is applied on the speech, based on the speaker gender. In this work, we argue that male and female speeches have different features that can help in the learning process of speech enhancement deep neural networks if the training is performed on male and female speech data, independently, and using two different deep neural networks, specifically implemented for enhancing the clean speech signal of the target gender. This work presents a genderspecific speech enhancement architecture, which consists of a front-end binary classifier to detect the speaker gender. Based on the classifier decision, the noisy speech is enhanced using either a male or female speech enhancement model. One-stage and twostage speech enhancement approaches are used to process male and female speeches, respectively. The results reveal that genderspecific speech enhancement has positive impact on the enhanced speech by deep neural networks. Additionally, the developed architecture achieved classifier

accuracy 96.9% and 0.11 increase in Covl speech quality metric for the test data, in comparison to other best-performing networks.

Presenter bio: Soha A. Nossier is currently a Lecturer in Biomedical Engineering at the Medical Research Institute, Alexandria University, Alexandria, Egypt. She received her PhD degree in Computer Science in 2023 from the University of East London, London, UK. She received a B.Sc. degree in Electrical Engineering in 2014 and a M.Sc. degree in Biomedical Devices in 2019, both from Alexandria University, Alexandria, Egypt. She is interested in speech enhancement and deep learning.

Tuesday, November 19 12:50 - 13:00 (Asia/**Bahrain**)

CS: Closing Session

Dr. Hessa Al-Junaid

Room: Virtual Main Hall

Chair: Aysha Ebrahim