Abstract Summary

ICAETA-2024

3rd International Conference on Advanced Engineering, Technology and Applications

University of Catania, Italy

May 24-25, 2024

Program Summary

All timing follows Central European Summer Time: UTC/GMT +1

Day-1
Friday, May 24, 2024

	Google Meet Link-1	Google Meet Link-2
08:50 - 09:00	Conference Opening	
09:00 - 09:40	**Keynote**: Dr. Minhaz F. Zibran	
09:40 - 10:20	**Keynote**: Dr. Daniel Balsalobre- Lorente	
10:20 - 11:00	**Keynote**: Dr. Alessandro Ortis	
11:00 - 11:15	**Break**	
11:15 - 13:15	Technical Session – 1	Technical Session – 2
13:15 - 13:30	**Break**	
13:30 - 14:10	**Keynote**: Dr. Ezgi Demir	
14:10 - 14:50	**Keynote:** Dr. Tala Talaei Khoei	
14:50 - 15:00	**Break**	
15:00 - 17:00	Technical Session – 3	Technical Session – 4

DAY-2
Saturday, May 25, 2024

	Google Meet Link-1	Google Meet Link-2
09:00 - 09:40	**Keynote**: Dr. Valerio Giuffrida	
09:40 - 10:20	**Keynote**: Dr. Luca Guarnera	
10:20 - 11:00	**Keynote:** Miss Pinar Ersoy	
11:00 - 11:15	**Break**	
11:15 - 13:15	In-Person Technical Session – 5	Technical Session – 6
13:15 - 13:30	**Break**	
13:30 - 14:10	**Keynote**: Dr. J. Roberto Sánchez-Reina	
14:10 - 14:50	**Keynote**: Dr. Alexandros-Apostolos A. Boulogeorgos	
14:50 - 15:30	**Keynote**: Dr. Mustafa Takaoğlu	
15:30 - 15:40	**Break**	
15:40 - 17:40	Technical Session – 7	Technical Session – 8

Program Details

DAY-1: Friday, May 24, 2024

Technical Session - 1 Time: 11:15 - 13:15
Session Chair: Massimo Spata

Day-1 May 24

Paper ID	Authors / Title
90	**Gündüz, Ali; Orman, Zeynep** Enhancing Hyperspectral Image Classification with Bayesian for CNN-GRU Hyperparameter Optimization **Abstract:** Hyperspectral image classification, which utilizes algorithms to analyze a vast spectrum of wavelengths beyond the visible, is pivotal for tasks like environmental monitoring, precision agriculture, and resource management. This field has seen significant enhancements with the advent of advanced machine learning techniques and increased computational capabilities. In our study, we focus on the hyperparameter optimization of an existing framework that combines Convo-lutional Neural Networks (CNN) and Gated Recurrent Units (GRU). This optimization, particularly through Bayesian optimization, fine-tunes the model to better harness CNNs' spatial feature extraction and GRUs' sequential data analysis capabilities, crucial for understanding complex spatial and temporal dynamics. Our approach demonstrates considerable improvements in accuracy and computational efficiency across various datasets by optimizing the neural network architecture. The employment of Bayesian optimization for hyperparameter tuning has shown to significantly enhance model performance, evidenced by a substantial 3% increase in classification accuracy (from 92% to 95%) compared to previous methodologies reliant on trial and error. This advancement underscores the importance of precise hyperparameter tuning in deep learning applications for hyperspectral image classification, reaffirming the potential of existing models when optimally configured.
93	**Erboy, Mehmet Onur; Karaca, Ali Can** Weighted XGBoost-based Active Learning Framework for Imbalanced Fraud Detection Using Small Number of Samples **Abstract:** Fraud cases occur rarely, and they cost much money when we face them. Fraud situations also have a continuously changing nature. That is because fraud detection is a widely studied problem that needs to be solved with some machine learning techniques. On the other hand, there is not enough labeled data for fraud cases, and we generally need expert opinions to label. Active learning suggests some opportunities to select the right items to label as the most uncertain and distinguishable samples for experts to label, and it is used with machine learning algorithms to enhance fraud detection. In our study, we proposed a method that uses a hybrid active learning strategy of Least Confidence uncertainty sampling and Cluster-based diversity sampling with K-means algorithm to enhance fraud detection success over weighted XGBoost as a machine learning method. Fraud cases are rare, so we focus on a model that could work with a minimal train cluster. We found after some experiments that we could reach the same F1 score rather than using only 1/90 data on the training side compared to traditional Hold-out data splitting as 70% train and 30% test. We compared our approach over the combinations of machine learning of Isolation Forest, Support Vector Machine, Neural Network, and XGBoost combined with uncertainty active learning strategies of Margin Confidence, Ratio Confidence, and Entropy-Based as only uncertainty and hybrid approaches with Cluster-based diversity sampling method. Our proposed approach overcomes all combinations of the mentioned methods and strategies, and F1 scores are nearly the same compared with 90 times more enormous training data. Using fewer data has no disadvantages over model evaluation, and it could result in the same evaluation metrics with less complexity and possibly take less time.
82	**Fargetta, Georgia; Ortis, Alessandro; Anile, Stefano; Battiato, Sebastiano** Evaluation of CNNs for Wildcats Classification in Real World Scenario **Abstract:** Biodiversity is threatened by habitat destruction and fragmentation, in this context, the knowledge and monitoring of patterns of occupancy of species is crucial for the management of areas and planning proper actions. This study focuses on the monitoring of the presence of the European Wildcat (Felis silvestris Schreber) which conservation is threatened by several factors, including hybridization with domestic cats. This paper presents the evaluation state-of-the-art Convolutional Neural Networks (CNNs) for the task of cat classification. The employed dataset includes images of three main classes of cat species (i.e., Domestic, Wild, Hybrid) with three sub-classes each (i.e., ALIVE, DEAD, NECRO) captured in real world scenario using trap cameras or smartphones. The challenges are mostly related to the quality of the dataset, which is strongly biased and imbalanced, due to the nature of this task. Moreover, the images span within a wide range of

	qualities and acquisition settings including low lighting, specific poses, and backgrounds. The experimental results have highlighted that it is a highly complex task, and the data exhibit high specificity.
117	**Salem, Rawya S; Abdulhammed , Razan** Phishing Email Detection: Survey **Abstract:** Phishing emails pose a significant contemporary challenge on the Internet, resulting in financial losses for organizations and causing frustration for users. Phishing is a deceptive tactic that lures individuals into visiting fake websites and tricks them into divulging sensitive personal information, including usernames, passwords, addresses, social security numbers, personal identification numbers, and any other data that may appear legitimate. This ill-gotten information is subsequently exploited to assume the victim's identity, leading to activities such as draining their bank accounts, conducting fraudulent auctions, money laundering, applying for credit cards, obtaining loans in their name, and more. While most current phishing attacks primarily target financial institutions, phishing websites frequently target a wide range of businesses, including online auctions, payment platforms, gambling sites, social networking platforms, and various online merchants.
79	**Davud, Muhammed** Utilizing Transfer Learning for Enhanced Classification of Skin Lesions through Deep Learning Approaches **Abstract:** The early detection of skin diseases holds great importance in saving lives and reducing the burden of costly treatments. However, dermatologists face a challenge in efficiently managing diagnoses due to the growing prevalence of these diseases. In response, significant advancements have been made in medical image processing techniques, specifically through the implementation of computer-aided diagnosis systems utilizing machine learning and deep learning. Despite this progress, the availability of annotated training data remains limited, posing a major obstacle when training complex and effective classification models. This often leads to overfitting, even when augmented datasets are used. This study proposes a strategy to address these challenges in the classification of skin diseases by employing transfer learning and a customized model structure. The objective is to surpass existing methodologies on the widely recognized HAM10000 dataset. The effectiveness of transfer learning is examined using well-established pre-trained convolutional neural network (CNN) structures, such as ResNet50, MobileNetV2, Xception, InceptionV3, VGG16, and DenseNet121, as base models. Experimental results have revealed that DenseNet121 and MobileNetV2 demonstrate exceptional performance compared to the other architectures investigated, including the ones mentioned in existing literature.
119	**Mohammad Salman** A Novel Hybrid Solution for Traveling Salesman Problem **Abstract:** The Traveling Salesman Problem (TSP) is one of the most notorious challenges in the fields of optimization and operation research. In this paper, a novel hybrid solution that incorporates the Genetic Algorithm (GA) with the Hopfield Neural Network (HNN) is proposed to solve the TSP. This solution exploits the evolutionary exploration capabilities of the GA and the pattern recognition abilities of the HNN. The proposed technique provides promising results in terms of optimal solution and time needed to achieve this solution. Results prove the effectiveness of the proposed algorithm in solving complex combinatorial optimization problems.
109	**Al-Asadi, Mustafa; Taiwo Onifade, Stephen** Machine Learning Insights into Nordic CO2 Emission Trends **Abstract:** The paper explores the impact of rapid industrial development on carbon emissions and consequent climate change threats, such as food security risks, extreme weather events, and economic downturns. It emphasizes the significance of CO2 emissions, accounting for 78% of greenhouse gases since 1970. The study focuses on predicting CO2 emissions for Nordic countries from 2018 to 2029, using data analysis, visualization, and machine learning techniques. It employs multiple regression models and finds polynomial regression to be the most effective, with a mean absolute error (MAE) of 18667.84, root mean squared error (RMSE) of 53277.75, R-squared value of 0.995, and explained variance of 0.995. The paper recommends using polynomial regression for accurate CO2 emission predictions and provides insights for country-specific emission reduction strategies.
95	**Shkurti, Tea; Bayılmış, Cüneyt** Strategic Price Optimization: Machine Learning's Role in E-Commerce Dynamics **Abstract:** In the context of intense competition in the digital age, e-commerce companies must be able to adapt their pricing algorithms in real time in order to remain competitive. This research proposes an advanced dynamic pricing model that employs machine learning to effectively vary price levels. Through exploratory data analysis (EDA) on a large dataset, we identify correlations between pricing patterns and consumer responses. To this end, we incorporate Internet of Behaviors (IoB) technology to measure consumer price sensitivity. The study employs feature engineering and several

	regression algorithms to identify the most effective models. The results indicate that both Linear Regression and Random Forest Regression emerge as the top performing models. The Linear Regression model achieved an R-squared of 98.714% and a root mean square error (RMSE) of 7.955, while the Random Forest Regression exhibited a slightly higher R-squared of 98.7626% with an RMSE of 7.998. Other noteworthy models include Ridge Regression, which achieved an R-squared of 98.7135% and an RMSE of 7.960. The deployment of the model is facilitated by the use of a Streamlit interface, which provides the capability to generate robust, data-driven pricing recommendations in real time. This project builds upon existing literature by proposing an operational model for online businesses to make informed decisions based on comprehensive data analysis of user insights. The model demonstrates significant improvements over traditional analysis techniques.

Technical Session - 2 Time: 11:15 - 13:15 **Session Chair: Alessandro Ortis**	**Day-1** **May 24**

Paper ID	Authors / Title
99	**Baniya, Pashupati; Nand, Parma; Bhushan, Bharat; Hameed, Alaa Ali; Jamil, Akhtar** Performance Analysis of Existing SDN Load Balancing Controller Using Mininet **Abstract:** Due to an increase in the load of network, load balancing service, i.e., a ser-vice that gives an equal volume of each task assignment to each of the serv-ers in data centers, it is usually performed by the specialized hardware. Net-works have to adjust due to the load and also as a result of dealing with faults and complexity which are provided in the implementation and config-uration process. Network engineers or administrators must be aware of se-lecting controllers according to the network requirement, which can lead to performance issues, scalability challenges, reliability and fault tolerance and many more problems in the network. To tackle this problem, this research analyses four different controllers in an experiment: In-band, open flow, OVS, and remote controller, which are the key aspects. The paper shows how these controllers, which are detected through a comprehensive evaluation of network performance attributes (e.g., Throughput and Jitter), affect the overall system's performance. This information provides beneficial in-formation for the researchers and practitioners who wish to make informed choices whenever they select suitable controls for specific network needs.
76	**Mostafa, Nour; Shdefat, Ahmed Younes; Al-Arnaout, Zakwan; Salman, Mohammad; ElSayed, Fahmi** Optimizing IoT Resource Allocation using Reinforcement Learning **Abstract:** Efficient resource allocation is critical for ensuring seamless operation and sustainability within the rapidly expanding Internet of Things (IoT) landscape. This paper proposes a novel approach that leverages reinforcement learning (RL) for dynamic and real-time optimization of computational and networking resources in IoT environments. Our method utilizes a state-of-the-art RL algorithm, enabling it to adapt to the inherent fluctuations in demand and operational conditions characteristic of IoT systems. This approach aims to achieve significant improvements in overall system performance and reliability. A custom-designed RL model is integrated within the framework, allowing it to learn optimal allocation strategies through continuous interaction with the environment. This enables effective load balancing and latency minimization without the need for human intervention. The efficacy of our proposed approach is evaluated through extensive simulations encompassing diverse and dynamic IoT scenarios. The results demonstrate significant advancements in resource utilization efficiency and system responsiveness compared to traditional allocation methods. These findings highlight the potential of RL as a robust and flexible solution for managing resources in complex IoT systems, thereby contributing to the progress of smart infrastructure development. This research not only underscores the value of RL in tackling IoT challenges but also paves the way for future investigations into intelligent resource management strategies.
77	**Belouaddane, Lahcen; Ait Said, Mehdi; Hassan First University,, Abderrahim; Benmakhlouf, Amine** Microservice Architecture DevOps Integration Challenges: A Qualitative Study **Abstract:** In recent years, Microservices Architecture (MSA) has emerged as a dominant paradigm in software development, offering agility, scalability, and resilience to modern applications., This paper presents the findings of a qualitative study aimed at exploring the challenges and strategies involved in integrating DevOps practices within Microservice Architecture (MSA). Through in-depth interviews with 20 MSA experts, we identified key challenges in coordinating interdependent services, ensuring scalability and performance, enabling effective service discovery and communication, managing configuration changes and consistency, monitoring, and observability, fostering collaboration and alignment across teams, maintaining data consistency, and addressing security and access control. The experts' insights provided valuable recommendations and strategies to enhance DevOps integration in MSA environments. The

	study contributes to the understanding of MSA and DevOps integration, enabling organizations to improve their software development and operations capabilities.
78	**Özer, Muhammed Miraç** A UAV Configuration Capable of Object Detection, Instant Communication and Real-Time Data Transmission **Abstract:** A UAV design that can detect targets individually or in surveillance flight missions in a swarm formation is presented. For the mission in a swarm operation, the UAV is designed to communicate with the members of the swarm and work together to achieve the common objective. The necessary communication mechanism has been designed to adapt the UAV to the swarm, and it has been equipped with the necessary hardware to perform the task in coordination. To communicate with other UAVs and also to establish an effective communication with the ground control station, the interconnection and bandwidth need of the swarm has been addressed with a proper network architecture. For multi-hop communication, the transmission of packets over the network is executed based on the 802.11s standard, thus ensuring that the images and videos of the detected targets are transmitted to the ground station in real-time, uninterrupted and without latency. With the topology-based communication network, the flight range is greatly expanded by allowing the swarm to transmit data. The results obtained are provided that the communication network connected to the equipment used can support direct point-to-point communication up to 1000 feet. In addition, the UAV swarm, which was developed to detect objects and to coordinate with the herd, was evaluated by being supported by a reliable communication network. The focus is on the ability of UAVs to predict the communication channel strength, and different deep learning optimization algorithms are used for this purpose.
96	**Özer, Muhammed Miraç** Internet of Things-Based Drone Case Study for Atmospheric Data Collection **Abstract:** Although ground-based monitoring, manned aircrafts and satellites are used for atmospheric measurements, rapid and comprehensive data collection is not always possible near pollution sources due to the complexity of the areas to be measured, moving sources or physical obstacles. Therefore, drone solutions equipped with different sensors offer new approaches and research opportunities in air pollution and emissions monitoring, as well as on-site air quality monitoring to study atmospheric trends such as climate change. While the potential of unmanned aerial vehicles for air quality research has been identified, several challenges still need to be addressed, including flight durability, payload capacity, sensor consistency/accuracy and sensitivity. In this study, a rotary-wing drone architecture that utilizes artificial intelligence (AI), computer vision algorithms, as well as 4G-LTE IoT-based monitoring to collect atmospheric data, is presented. Designed as a new scalable platform to accommodate sensors suitable for flight control and communication requirements, the system has the ability to take off, fly and land with full autonomy. In case of possible communication interruption, it can switch to the fail-safe mode set in the ground control station. In addition to being able to make atmospheric measurements, a design has been developed in such a way that wide variety of parameters such as urban planning and development of smart cities, monitoring of industrial emissions, determination of pollution points in the city, redirection and management of traffic can be monitored in real time. The designed drone has a small, lightweight and low-cost multi-sensor system capable of measuring temperature, humidity, pressure, air velocity, noise, amount of UV, light intensity, PM2.5, PM10.
84	**N. Neamah, Osamah; Cayiroglu, Ibrahim; Bayir, Raif** Crack the Code: Leveraging Adaptive Equalization for Enhanced Egg Crack Detection in Classification and Object Detection **Abstract:** . This study investigates the efficacy of employing the Adaptive Histogram Equalization (AHE) strategy on the classification and object detection of egg cracks. Leveraging Convolutional Neural Network (CNN) algorithms for classification tasks and YOLOv8 for object detection, the research aims to enhance accuracy and reliability. Initial testing demonstrates promising re-sults with the CNN model exhibiting an accuracy of 94.12% before AHE in-tegration, which surges to 96.47% post-integration. Object detection with YOLOv8 shows a significant improvement, with a mean Average Precision at 50% Intersection over Union (mAP50) rising from 80.9% to 84.8% when incorporating AHE. These findings highlight the efficacy of AHE in enhanc-ing both classification and detection processes for egg cracks.
80	**Benmessaoud, Lylia; Tair, Khadidja; Boukhedouma, Saida** Dynamic resource allocation for sustainable smart agriculture based on IoT **Abstract:** Smart agriculture uses new technologies like IoT-enabled sensors and drones, with data analytics methods, to optimize farming practices. Sustainable agriculture plays a significant role in preserving nature and improving the effectiveness of farming. It aims for environmental, economic, and social balance, specifically based on rational and optimal resource allocation. In this article, we present a dynamic resource allocation approach for an effective and efficient fertigation (fertilization and irrigation) system, which is automated using a multi-agent paradigm. Concretely, we propose an algorithm for natural resource (water and nutrients) allocation that operates using real-time data collected

	from sensors, and an algorithm for physical resource (sensors and actuators) placement, aiming to optimize the use of resources in the system. We performed a set of sensors' data simulations and demonstrated a significant optimization of natural resources, comparing our algorithm with a naive algorithm. In our approach, we prioritize the preservation of sustainability in smart agriculture, by respecting its factors: environmental sustainability, economic profitability and social equity.
100	**Hmood, Omar H; Askar, Mshary** A Comprehensive Review of Non-Linear Effects and Four-Wave Mixing in Optical Fiber Communication Systems **Abstract:** Four-wave Mixing (FWM) is a significant nonlinear peculiarity that happens in Frequency Division Multiplexing (WDM) frameworks, where three frequencies consolidate to shape a fourth. This study gives a total outline of FWM and other nonlinear peculiarities in optical fiber correspondence frameworks. The presentation depicts the basic ideas of FWM and their ramifications for framework execution. Moreover, the exploration examines nonlinear optics (NLO) and its value in seeing light conduct in nonlinear media, with an emphasis on long stretch correspondence frameworks. The hypothesis of FWM is examined, with an emphasis on third-request nonlinearity and the issues it presents in multichannel frameworks. The concentrate additionally looks at frequency change utilizing fiber FWM, underlining the need of frequency converters in future photonic networks. A writing survey is embraced to synopses late exploration endeavors on numerous components of optical fiber innovation, like FWM relief strategies and creative applications. In general, this study gives helpful data about the significance, issues, and potential purposes of FWM and nonlinear impacts in optical fiber correspondence

Technical Session - 3 Time: 15:00 - 17:00 **Session Chair: Francesco Guarnera**	**Day-1** **May 24**

Paper ID	Authors / Title
70	**Özer, Muhammed Miraç** Transforming a Customized Drone into an Advanced Forensic Investigation Platform **Abstract:** This study deals with the process of transforming a specially designed dro-ne into an advanced forensic investigation platform. First, the details and features of the drone system design are analyzed. This design process is particularly notable for its lightweight structure, high maneuverability and long flight time. These features make the drone an ideal platform for forensic investigation operations. The system design also includes the integration of various sensors. These sensors include high-resolution cameras, imaging devices and air quality measurement sensors. In particular, the use of cameras provides detailed visual data during the forensic investigation process and optimizes evidence collection. Thermal imaging devices, on the other hand, work effectively at night and in harsh weather conditions, increasing the success of forensic investigation operations. In addition, air quality measurement sensors are used to detect explosives, harmful gases and other potentially hazardous substances. These sensors contribute to reliable results by automating the collection and analysis of air samples. In conclusion, this study presents a significant advancement in the field of forensic investigation, focusing on the system design and integration of sen-sors to enhance the usability of a specially designed drone in forensic investigation operations.
101	**Agrawal, Atul; Mohi Ud Din Khanday, Akib; Mohammed Alazawi, Esraa; Bhushan, Bharat; Baniya, Pashupati; Jamil, Akhtar** Improving Breast Cancer Detection Accuracy through Random Forest Machine Learning Algorithm **Abstract:** Breast cancer continues to be a significant global health issue that greatly affects the well-being of people worldwide. Detecting breast cancer early is vital for improving the outcomes of patients. One promising method for breast cancer detection is the use of the Random Forest machine learning algorithm. In a recent research paper, we investigated how Random Forest can be used to predict breast cancer by employing explainable AI techniques. We analyzed the specific features that the algorithm relies on to classify breast cancer and highlighted the advantages of Random Forest compared to other machine learning algorithms in diagnosing breast cancer. Our model offers a well-thought-out, efficient, and easily understandable approach to predicting breast cancer using explainable machine learning techniques.
103	**Khanday, Akib M; Baniya, Pashupati; Bhushan, Bharat; Alazawi, Esraa Mohammed ; Jamil, Akhtar; Agrawal, Atul** A Multifaceted Approach for Identifying Propaganda on Social Networks **Abstract:** Online Social media facilitate human interaction, information sharing, and opinion expression in digital era .Misinformation, disinformation and propaganda propagate quickly through social media platforms and impacts public opinion, political debate, and societal views. Understanding the mechanics of propaganda dissemination and its repercussions on society is critical for reducing its negative implications. Recognizing propaganda will allow individuals to

	safeguard their values and resist attempts to manipulate them. In this paper we propose a hybrid feature selection technique to classify the propaganda and non propaganda tweets. Data is prepared based on the annotation scheme and features are selected by fused various state of art feature selection techniques. Various machine and ensemble learning classifiers are trained and tested based on the features selected. The results showed that the there is an increase in the performance of all the classifiers trained on the proposed hybrid selection criteria. In future Deep learning techniques may be incorporated to improve the efficiency.
118	**Jaiswal, Vanshika ; Gupta, Sanyam; Gupta, Shilpa; Kumar, Deepika; Jamil, Akhtar** Enhancing the heart disease classification using Multi-level Perceptron and Principal Component Analysis **Abstract:** The ability to detect cardiac disease early is vital to saving lives. Heart attacks are one of the leading reasons for high death rates worldwide due to the high cost of identifying cardiac disorders, which is crucial to the healthcare industry, as well as the shortage of human and logistical resources. In order to find the best machine learning algorithm for early-stage heart disease prediction, a model is presented in this study. In order to train and evaluate the model based on the data for efficient decision-making, machine learning techniques are utilized.The goal of this research is to combine Principal Component Analysis and Multilevel Perceptron to propose an updated diagnosis and classification model based on machine learning (ML) for predicting heart failure and heart disease detection.Using cutting-edge techniques and foundational classifiers like Support Vector machines, Random forests, and K-Nearest Neighbors, an empirical evaluation of the suggested methodology was carried out, with accuracy, precision, recall, and F1-score serving as the evaluation criteria. The proposed method has shown the maximum accuracy, 95.1%.This innovative approach not only streamlines the diagnostic process but also offers personalized medical assistance, facilitating early detection and intervention in heart disease, thereby optimizing healthcare delivery and improving patient outcomes.
113	**Abdulaziz, Rahma M; ahmad, mohand lokman** Revolutionizing Stroke Rehabilitation: Integrating Technology and Automation for Enhanced Patient Outcomes **Abstract:** Stroke is a significant worldwide medical problem, frequently bringing about long-term inabilities that require compelling recovery. This exhaustive audit investigates conventional stroke restoration techniques and arising mechanical progressions, underscoring the capability of mechanization in further developing recovery programs. The job of computerized reasoning (man-made intelligence) in stroke recovery is examined, displaying its capacity to customize treatment plans, empower consistent observation, and improve different parts of restoration. Also, mechanical help for actual recovery is analyzed, featuring the crucial role of innovation in upgrading patient results. Be that as it may, the advancement of mechanized stroke recovery frameworks faces huge difficulties, including information accessibility, appraisal normalization, cost concerns, wellbeing issues, organic ramifications, and variation in patient inclinations. Addressing these difficulties is vital to the fruitful execution and boundless reception of robotized stroke restoration arrangements. This audit gives significant bits of knowledge into the developing scene of stroke restoration, underscoring the capability of mechanization and innovation to change patient consideration and results in this basic field. Watchwords: stroke restoration, man-made brainpower (simulated intelligence), evaluation normalization, patient security.
114	**Islam, Md Aminul** Bank Loan Applicant (Credit Score) Assessment through ML: A Comparative Approach **Abstract:** Abstract—The assessment of credit risk and the appraisal of credit portfolios are of utmost importance to financial institutions that offer loans to businesses and people. A non-performing loan refers to a category of loans where the borrower has exhibited delinquency by failing to make the required payments within the designated timeframe. This research examines various machine learning techniques to address a specific problem. The authors present a comparative analysis of commonly utilized NPL models using a dataset from a public dataset of Kaggle. The utilization of class weights addresses the issue of class imbalance. The investigation used a dataset of 4269 samples and 13 columns. Various performance metrics were considered, including Precision, Recall, F1 Score, Imbalance Accuracy (IAM), and Specificity. We assessed the performance of the algorithms and conducted a comparative analysis of the data produced. Based on the performance measures, it can be observed that random forest and random forest classifiers have 98% accuracy in delivering the most favorable results for the given dataset. Keywords— Bank Loan, Prediction, Machine Learning, Performance
116	**Yousif, Aya Emad ; Younus, Mohammed Hazim; Abdulaziz, Azhar** MIMO Channel Coding: Survey **Abstract:** Multiple-Input Multiple-Output (MIMO) technology has revolutionized wireless communication systems by significantly improving capacity, reliability, and spectral efficiency. However, the reliable transmission of data in MIMO systems remains a challenging task due to increased complexity and susceptibility to various impairments. This survey explores the fundamental principles and recent advancements in MIMO channel coding techniques, aiming to address

	these challenges and enhance the performance of MIMO systems. In this comprehensive survey, we begin by providing an overview of MIMO systems, including antenna configurations, spatial multiplexing, and diversity schemes. We highlight the key challenges associated with MIMO channel coding, such as channel estimation, decoding complexity, and trade-offs between error correction capability and data rate. The survey extensively covers various MIMO channel coding schemes, including space-time block codes (STBC), spatially coupled LDPC codes, turbo codes, and polar codes. For each scheme, we discuss their advantages and limitations, along with a performance analysis in different MIMO scenarios. Furthermore, we delve into advancements in iterative decoding algorithms and joint source-channel coding schemes. These developments enable the exploitation of the full potential of MIMO systems, leading to enhanced reliability and spectral efficiency. In conclusion, this survey serves as a comprehensive resource for researchers and practitioners in the field of wireless communication. It provides insights into the evolving landscape of MIMO channel coding techniques and their applications, contributing to the continued advancement of wireless communication systems.
89	**Tareq, Wadhah Zeyad** Using Different Deep Learning Models for Robot Navigation in Maze **Abstract:** One of the autonomous navigation tasks in a robot or self-driving car is reaching a specified location based on a series of decisions. In recent years, different path-planning algorithms have been developed for navigation and avoiding obstacles. However, all these algorithms depend strongly on the data that comes from the environment through different sensors. When the environment becomes more complex, the amount of data required to process increases, and thus the algorithms become more complex. This work implements an autonomous navigation system using only one input resource. The input resource is a video camera, and the aim is to enable a mobile robot to solve a maze. Different deep learning algorithms have been used to classify the environment state into three categories. Each category represents an action or move step for the robot. Experiments show that the approaches used work efficiently and can solve the maze. So, it can used in some areas where robots need to solve tasks.
63	**Ocak, Ayla*; Niğdeli, Sinan Melih; Bekdaş, Gebrail** Investigation of the Effect of Maximum Height for Tuned Liquid Damper Optimization **Abstract:** Liquid dampers are damping devices that provide structural control by moving a spring and a container with a liquid mass under dynamic loads by sloshing the liquid. For the control of structures under external loads, tuned liquid dampers take advantage of the dimensions of the tank and the sloshing of the liquid. The tank geometry is optimized to increase the control efficiency of the damping tank. Within the scope of the study, in the design optimization of a tuned liquid damper (TLD) containing water, the change of the optimum diameter according to the maximum design limit change given for the tank height was examined. For this purpose, a cylindrical TLD device was placed on a single degree of freedom structure under seismic excitation and the tank geometry was optimized for different height limits. Jaya Algorithm, a nature-inspired metaheuristic algorithm with a simple one-step structure, is used in the optimization process. As a result of the investigations, it is observed that in TLD optimization, tank height increase does not significantly improve TLD performance.

Technical Session - 4 Time: 15:00 - 17:00
Session Chair: Muhammed Davud

Day-1
May 24

Paper ID	Authors / Title
104	**khan, Andleeb; Yadav, Saundarya; Nand, Parma; Mohi Ud Din Khanday, Akib ; Bhushan, Bharat; Jamil, Akhtar; Hameed, Alaa Ali** An Explainable Predictive Model for Diabetes Detection Using Shapley Additive Explanations Approach **Abstract:** The chronic and incurable disease of diabetes that is not only marked with increasing prevalence but is also linked to other life-threatening diseases like cardiovascular diseases, tissue injuries and retinopathy. With this the early detection and diagnosis of the disease becomes essential. This paper proposes an explainable predictive model for diabetes detection using Shapley additive explanations approach which will not just predict the dis-ease but also highlight the most contributing features contributing to our result. Through the utilization of Pima Indians Diabetes database (PIDD), diabetes has been predicted by using three machine learning classifiers namely Random Forest, XGBoost and Support Vector Machine. The performance evaluation highlighted that Random Forest gave the best results with an accuracy of 82%. The results were then interpreted using Shapley Additive Explanations (SHAP) which further explained that the most contributing features throughout the study in each model were 'Glucose', 'BMI' and 'Age' among others. This explanation is meant to aid the medical community in their diagnosis and effective recommendations to the patients.

112	**Abdulrazzaq, Mohammed Majid; Saad, Ehab; ibrahim, abdullahi.; Abdulrazzaq, Mohammed Majid** House Price Prediction Using Artificial Neural Network with Adagrad Optimizer **Abstract:** Abstract The real estate market is a dynamic and complex ecosystem influenced by a myriad of factors, making accurate price predictions a formidable challenge. Understanding the intricate relationships between variables such as location, property characteristics, economic indicators, and market trends is essential for making informed investment decisions, In this paper, a comprehensive exploration of machine learning and artificial neural networks (ANNs) has been undertaken, laying the groundwork for understanding how these powerful computational tools can be harnessed to solve complex problems across various domains. The study began by delving into the fundamentals of machine learning, categorizing it into its primary types, and discussing its applications in clustering, dimensionality reduction, and learning association rules. These sections highlighted the versatility and breadth of machine learning techniques in uncovering patterns and simplifying the complexities inherent in vast datasets. Further, a transition was made into a focused discussion on linear regression, including its simplest form and the more sophisticated gradient boosting method.Top of Form This progression underscored the evolution of machine learning from basic predictive modeling to more advanced, iterative improvement techniques capable of handling nonlinear relationships with exceptional accuracy and efficiency.
51	**García Márquez, Fausto Pedro; Al-taie, Ali; Zakur, Yahya A; Alsadoon, Abeer H; Flaih, Laith; Zakoor, Yousif** Exploring the Potential of the Machine Learning Techniques in the Water Quality Assessment: A Review of Applications and Performance **Abstract:** In this review, the application of machine learning (ML) algorithms in water environment research is proficiently explored. The quick increase in data size related to the water environment has necessitated the use of ML for data analysis, classification, and forecasting. Unlike classical models, machine learning models excel in solving complex problems. They have been successfully applied to various aspects of water management and treatment systems, such as construction, simulation, evaluation, water pollution surveillance, controlling, water quality amelioration, and watershed environmental security management. The survey specifically focuses on the evaluation of water quality in diverse water environments, including surface water, drinking water, groundwater, sewage, and seawater. Moreover, potential future implementations of machine learning in water environments are proposed. ML facilitates the detection and prediction of water contamination events, as well as the provision of decision support systems for water resource management. Real-time monitoring of water quality, anomaly detection, and prediction of potential contamination events are among the specific applications of machine learning high-lighted. The review covers the advantages and disadvantages of generally used ML algorithms, with a particular emphasis on new ML techniques that surpass classical methods.
58	**Kuş, Zeki; Kiraz, Berna; Aydin, Musa; Kiraz, Alper** BioNAS: Neural Architecture Search for Multi-Modal Biomedical Image Classification **Abstract:** Neural Architecture Search (NAS) for biomedical image classification has the potential to design highly efficient and accurate networks automatically for tasks from different modalities. This paper presents BioNAS, a new NAS approach designed for multi-modal biomedical image classification. Unlike other methods, BioNAS dynamically adjusts the number of stacks, modules, and feature maps in the network to improve both performance and complexity. The proposed approach utilizes an opposition-based differential evolution optimization technique to identify the optimal network structure. We have compared our methods on two public multi-class classification datasets with different data modalities: DermaMNIST and OrganCMNIST. BioNAS outperforms hand-designed networks, automatic machine learning frameworks, and most NAS studies in terms of accuracy (ACC) and area under the curve (AUC) on the OrganCMNIST and DermaMNIST datasets. The proposed networks significantly outperform all other methods on the DermaMNIST dataset, achieving accuracy improvements of up to 4.4 points and AUC improvements of up to 2.6 points, and also surpass other studies by up to 5.4 points in accuracy and 0.6 points in AUC on OrganCMNIST. Moreover, the proposed networks have fewer parameters than hand-designed architectures like ResNet-18 and ResNet-50. The results indicate that BioNAS has the potential to be an effective alternative to hand-designed networks and automatic frameworks, offering a competitive solution in the classification of biomedical images.
66	**Nizam-Ozogur, Hatice; Orman, Zeynep** A Comparative Study of Preprocessing Techniques for Stroke Prediction using XGBoost Classifier **Abstract:** Stroke is a condition characterized by the cessation of blood flow to a region of the brain or bleeding within the brain. Early diagnosis and treatment not only reduce the risks of permanent damage and mortality but also enhance the likelihood of recovery. Hence, timely diagnostic interventions are essential for formulating effective treatment strategies and preventing potential complications. Machine learning models are frequently used in the literature as powerful tools in stroke diagnosis. In this study, a comparative analysis of the effectiveness of methodologies used successfully in the literature with the Extreme Gradient Boosting (XGBoost) machine learning method was conducted to overcome the challenges caused by missing values and imbalanced datasets in stroke prediction. In the experiments, the Cerebral Stroke

	Prediction (CSP) dataset was employed to evaluate the performance of these methodologies using model evaluation metrics. The study findings emphasize the effectiveness of SMOTEENN in addressing class imbalance and missing data challenges across various imputation methods. This underlines the importance of employing suitable sampling and imputation strategies to improve the performance of stroke prediction models.
67	**K. S., Srinath** Mental Illness Detection in Social Media Data using Sub-emotions Model and Ensemble-Based Hybrid Technique **Abstract:** Depression is a psychological expression consisting of low mood, loneliness, sadness, anger and emptiness that disrupt relationships, jobs and the health of an individual's daily life. In severe cases, it leads to suicide attempts. With the rise of social media usage for sharing thoughts and interpersonal com-munications, these platforms have become powerful tools for self-expression. Several studies have demonstrated the detection of early signs of depression using social media data, leveraging various Machine Learning (ML) algo-rithms and Natural Language Processing (NLP) techniques. One promising approach we built in our previous work is the Bag of Sub-Emotions (BoSE) method, which extracts sub-emotions from textual data, allowing fine-grained detail of the emotions expressed. Additionally, ML algorithms play a vital role in detecting depression content and categorizing it into normal or depressed. The goal of this paper is to find depression in social media posts by using the BoSE model with machine learning algorithms. We begin with employing the BoSE model developed in our previous work for sub-emotion generation. This sub-emotional dataset is selected to train Support Vector Machine (SVM), Random Forests (RF), Decision Trees (DT), Multinomial Naive Bayes (MNB), Logistic Regression (LR), AdaBoost with SVM, XGBoost and Convolutional Neural Network (CNN) models. The perfor-mance of these models is evaluated and found that the CNN model provides better accuracy compared with other models.
68	**Rahman, Md Habibur** Optimal Control Problem and Its Application in COVID-19 Transmission Dynamics **Abstract:** Optimal control techniques are among the most significant technical concepts that can be applied to medical concerns. Establishing a control law for a particular system mathematical model under specified restrictions to meet a specific optimality criterion is known as optimal control. To evaluate the effect of vaccination on the spread of infectious disease and try to decrease the infected group, an optimal control strategy known as Pontryagin's principle applied in this project. This work develops and thoroughly analyzes a nonlinear deterministic mathematical model that assesses two crucial COVID-19 therapeutic interventions: immunizing susceptible individuals and treating infected individuals under quarantine. A relevant set of conditions is met by proving the existence, uniqueness, positivity, and invariant region of solutions, among other essential aspects of the model system. The model shows two equilibrium points: one that is disease-free and the other that, under some circumstances, is endemic. The fundamental reproduction number R0 is obtained using the next-generation matrix technique, and the model's dynamic behavior is thoroughly examined. When the corresponding primary reproduction number is less than unity, the analytical study shows that the disease-free equilibrium solution is locally and globally asymptotically stable, indicating that COVID-19 has died out in the population. Additionally, anytime the corresponding primary reproduction number surpasses a unity, the endemic equilibrium point is globally asymptotically stable, suggesting that COVID-19 becomes established in the population. The primary reproduction number is subjected to a sensitivity analysis to determine the most critical factors that influence the spread of infection and its control. These are factors that intervention efforts should focus on.
74	**Fadli, Marwa; Alhamli, Bashayer; Aldosari, Aljawhara; Alajmi, Nourah; Alkhayat, Zahraa; Potams, Albert; Salman, Mohammad** Q-State versus FFT and WT for Stress Detection **Abstract:** Mental stress is a critical issue that could be defined as mental tension due to any challenging circumstances. In this paper, we are focusing on developing a stress detection model using a dry EEG headset. Our methodology uses three signal-processing techniques—Fast Fourier Trans-form (FFT), Q-state, and Wavelet Transform (WT)—to ensure a full diagnostic assessment. These techniques are applied to EEG data from 17 people who were both calm and stressed. The analysis focuses on EEG channels FP1, FP2, F3, and F4, which have shown significant varia-tions between calm and stress states. Utilizing Support Vector Machine (SVM) and Random Forest (RF) machine learning algorithms, we achieved notable diagnostic accuracy. Our findings indicate that while both SVM and RF perform well under controlled conditions, the FFT and SVM combination offers a better balance between accuracy and generalization to unseen data. Keywords: Stress detection, Electroencephalography (EEG), Fast Fourier Trans-form (FFT), Q-state, Wavelet Transform (WT), Support Vector Machine (SVM), Random Forest (RF).

83	**Panchal, Vidhi ; Vyas, Vaidehi ; Jamil, Akhtar; Ahmed, Saad Bin** Classification of Alzheimer's Disease Stages using Vision Transformers **Abstract:** Alzheimer's disease, a neuro degenerative disorder, poses significant challenges in early diagnosis and treatment. Non-invasive imaging techniques such as brain Magnetic Resonance Imaging (MRI) offer promise but require advanced analysis methods to detect subtle structural changes indicative of AD. In recent years, deep learning techniques, particularly Vision Transformers (ViTs), have emerged as powerful tools for medical image analysis. ViTs leverage self-attention mechanisms to capture long-range dependencies in data, making them well suited for analyzing brain MRI scans. This paper presents a classification of Alzheimer's disease using the ViT base model along with PDF report generation containing images and descriptive captions to simplify the understanding.

Program Details
DAY-2: Saturday, May 25, 2024

Technical Session - 5 Time: 11:15 - 13:15 Session Chair: Wadhah Zeyad Tareq	Day-2 May 25

Paper ID	Authors / Title
71	**Shdefat, Ahmed Younes; Mostafa, Nour; Salman, Mohammad; ElSayed, Fahmi** Breaking New Ground in HAR with Enhanced Weighted k-NN Algorithm **Abstract:** In recent times, the rise in demand for IoT-based Human Activity Recognition (HAR) applications across diverse sectors such as health monitoring, elderly care, gait analysis, security, and Industry 5.0, has been noteworthy. A critical challenge encountered in these developments is the accuracy of reference models, prompting this research to focus on enhancing model precision through advanced machine learning (ML) methodologies. The study meticulously analyzed a dis-tinct machine learning strategy, represented in the k-Nearest Neighbor (k-NN) approach. Data was meticulously gathered from 102 individuals, aged between 18 and 43, and segmented into training and testing datasets. These datasets were instrumental in the supervised learning phase, utilizing refined ML techniques. This rigorous process enabled the accurate identification of twelve daily activities, ranging from sedentary behaviors like sitting and laying to dynamic movements such as walking, jogging, and cycling. The findings revealed that Weighted k-Nearest Neighbor (Wk-NN) approach outperformed with a remarkable accuracy of 98.6%. This study conclusively demonstrates that the enhanced ML approaches significantly boost the accuracy of daily activity classification, with enhanced Wk-NN approach leading slightly in performance metrics. Keywords: HAR, Pervasive, Machine learning classifier, k-NN.
69	**M. Vaighan, Leila ; Jabbarbabouei, Zeinab ; Uyguroğlu, Fuat; Toygar, Önsen** Exploring Deep Learning Architectures for Multiple Apple Leaf Disease Classification **Abstract:** This paper delves into the selection and adaptation of deep learning architectures for classifying diseases in apple trees, with a particular focus on three widely recognized CNN models: VGG16, ResNet152V2, and DenseNet121. By harnessing the established performance and adaptability of these networks, we utilize transfer learning to initiate training with pre-trained models. This approach allows us to capitalize on learned feature representations and mitigate the need for extensive datasets. Our experimental results, conducted on both the PlantVillage and Turkey Plant datasets, showcase the efficacy of ResNet and DenseNet architectures, potentially attributed to their superior feature extraction capabilities. We outline the preprocessing steps, which include employing data augmentation techniques to augment diversity and enrich the training data. Importantly, our study demonstrates improved classification accuracy, highlighting the significance of architectural selection and customization in optimizing deep learning models for specific tasks and providing valuable insights for practitioners aiming to deploy efficient and effective classification systems.
97	**Abdullah, Fasih; Razi, Muhammad; Aleem, Muhammad; Jamil, Akhtar; Hameed, Alaa Ali** A Comparative Analysis of Cloud Load Balancing Algorithms Using CloudSim Simulations **Abstract:** Cloud computing provides a set of services that allows its users to lease digital infrastructure as software. This abstraction allows users to focus on development without managing low-level aspects and associated challenges. The infrastructure comprises heterogeneous VMs with varying performance parameters such as MIPS and bandwidth. Thus, user cloud jobs must be executed with great care and consideration of load balancing. If scheduling is not done efficiently, the latency that users experience increases, resulting in lower customer satisfaction and decreased revenue. Since

	scheduling problems are NP-Hard, there is a need for continuous research into improving existing algorithms. Ideally, the scheduling of cloud jobs should be fair and well-balanced, with minimal waiting time and minimal overhead. This study focuses on the comparison of nine such state-of-the-art, batch-based, non-preemptive scheduling schemes. All algorithms have been implemented in Java with the help of the CloudSim simulator and tested across seven performance metrics. We provide an in-depth performance analysis of Random Selection, Round Robin, Minimum Completion Time, Suffrage, Min-Min, Max-Min, Weighted Mean Time-Min, Resource Aware Load Balancing Algorithm, and QoS Guided Weighted Mean Time Min Heuristic across asymptotic time and space complexity, make-span, throughput, average resource utilization rate (ARUR), load balancing level, and batch scheduling time. Comparison of the mechanisms and their performance shall aid future work in comparing and contrasting the concepts deployed in existing schemes. It was observed that Suffrage and QWMTM performed the best across most of the performance metrics.
59	**Özer, Çağdaş; Orman, Zeynep** Transformers Architecture Oriented Intrusion Detection Systems: A Systematic Review **Abstract:** In recent years, the field of intrusion detection systems (IDS) has witnessed a paradigm shift with the emergence of deep learning techniques. Among these, Transformers has emerged as a promising architecture that exhibits remarkable capabilities in various natural language processing and computer vision tasks. In this paper, a comprehensive review was conducted to systematically evaluate the publications on Intrusion Detection Systems with Transformers Architecture. 697 papers were found using the systematic review (mapping) method to evaluate publications related to this article, which has been found to be increasingly used in Intrusion Detection Systems. The aim of our study is to identify how the Transformers architecture is used in combination with other algorithms and optimization methods, what criteria are taken into account in these choices, and the most searched topics in Transformers architecture and intrusion detection. Scientific papers published in the last 10 years were searched in Wiley, Science Direct, IEEE Explorer, ACM Digital Library and Scopus databases.
102	**Lulaj, Enkeleda** Unleashing Student Triumph: Unraveling the Dynamic Link between State Funding, Academic Excellence, and Financial Prosperity in the Digital Era **Abstract:** This research intended to investigate and reveal the links through direct and indirect effects between factors such as state funding (SF), academic excellence (AE), and financial prosperity (FP) in the digital era. The data were collected from 963 Kosovar students and their processing was done through exploratory factorial and confirmatory factorial analyses using SPSS and AMOS programs. The results revealed links through direct and indirect effects between the factors (SF, AE, and FP) in the digital age. SF exhibits direct positive effects on AE (r=0.81), AE significantly effects FP (r=0.88), and SF also indirectly effects FP (r=0.11). Notably, SF significantly effects students' income, expenditures, and financial prosperity. Increased SF leads to better educational resources for students, affecting their capacity to afford tuition fees and related expenses (FP). Conversely, inadequate state funding detrimentally affects students' academic outcomes and hampers the implementation of beneficial educational initiatives, thus exerting a negative influence on academic excellence (AE). It is recommended the need for government policies and strategies that increase state funding for education to improve academic excellence with new programs and qualified staff, and the financial prosperity of students. Future studies should focus on other countries and variables to better understand their impact and develop other effective policies for promoting education in the digital age.
87	**Çelik, Esra; Dal, Deniz** Analysis of Assembly Code Similarities of Different C++ Compilers **Abstract:** A compiler is an important system software responsible for converting high-level programming code into low-level machine code. This process involves a one-to-many relationship in which a single high-level code can produce multiple machine code variations that all share the same functionality. Compilers are able to optimize code to improve runtime performance or reduce memory requirements, depending on specific performance criteria. Today, there are a variety of compilers, each tailored to produce optimized output to meet different requirements and target platforms. MSVC++, CLANG/LLVM, and GCC g++ can be given as examples for well-known C++ compilers. The focus of our study represents a significant contribution to the literature, as it examines for the first time the similarities within assembly code outputs produced by the latest versions of MSVC++, CLANG/LLVM, and GCC g++. This investigation was facilitated by the use of the tool named Measure Of Software Similarity, also known as MOSS in short. The study was conducted in two phases: First, we assembled a set of 24 different C++ benchmarks that included well-defined control structures, data elements, and functions. Then, in the second phase, we generated three different assembly code representations for each benchmark using the corresponding compilers. The result of our analysis showed that across all benchmarks, the highest degree of code similarity was observed between GCC g++ and CLANG/LLVM, while the lowest similarity was observed between GCC g++ and MSVC++. It was also notable that MSVC++ produced a comparatively larger amount of assembly

	code compared to the other compilers. We anticipate that the research results of this study will help raise awareness of compiler selection and thus improve the quality of code produced for future scientific projects.
62	**Nar, Meryem Tuğba; Durukan, Gürcan; Özcan, Abdullah Himmet; Çakil, Lütfü; Kara, Huseyin; İlhan Omurca, Sevinç** Turkish Document Image Classification **Abstract:** Document image classification has gained extensive attention due to the rising number and types of scanned documents. Multi-modal architectures, processing image and text simultaneously, leverage the strengths of each modality. This study explores an efficient neural architecture for classifying scanned documents in a private company. The effectiveness of CNN-based deep learning and OCR algorithms in extracting textual and visual features is investigated. Different feature fusion methods are applied in the next stage to combine these extracted features. A multi-modal document image classifier is developed for companies managing a large number of scanned documents, delivering superior performance even with fewer and faint documents.
65	**Islam, Md Aminul ; Hasan, Mehedi; Nur, Abdullah Hafez** Assessing Cybersecurity Threats: The Application of NLP in Advanced Threat Intelligence Systems **Abstract:** Abstract—Cybersecurity involves safeguarding critical infrastructure and sensitive data from attackers. Various sectors, including government organizations, banks, hospitals, and other industries, are progressively allocating resources to enhance their cybersecurity infrastructure to protect their operations and the vast number of consumers who rely on them for their data. In a more interconnected world, businesses are seeing concern levels of cyber threat activity, which raises questions about their ability to defend against widespread attacks. Threat intelligence systems utilize Natural Language Processing to analyze words and technical data in multiple languages to identify trends and patterns. Machines are becoming more accurate at analyzing data from many sources in various languages using NLP. The study seeks to create a system that focuses on detecting software vulnerabilities by treating source code as texts and applying powerful deep-learning NLP models. We have created and assessed different deep learning models based on their accuracy, with the top performance achieving 95% accuracy. Additionally, we have endeavored to anticipate the vulnerability class to which a specific piece of source code belongs, and have created a sturdy dashboard utilizing FastAPI and ReactJS. Keywords—Cybersecurity, NLP, deep learning, vulnerability

Technical Session - 6 Time: 11:15 - 13:15 **Session Chair: Enkeleda Lulaj**	**Day-2** **May 25**

Paper ID	Authors / Title
9	**Ahmed, Nazik J. ; Al-Rozbayani, Abdulghafor M.** Numerical Convergence Solutions of the (2+1) Dimensional Fractional Coupled Differential Burger's Equations Using Sumudu Transform with Adomian Decomposition Method **Abstract:** In this article, the aim is to apply a reliable analytical hybrid method of Sumudu transformation with Adomain decomposition method to examine Burger equations with time-coupled fractions in the two-dimensional formula that arise in polydispersity precipitation in shallow water waves New approximate solutions are shown where the reliability of this method is given through several examples with the results presented graphically. When we compare the results obtained from the maple code, we saw the approximate solution (Sumudu transformation with Adomain decomposition method) which gives omit results very near to the exact solution, this means that the SAD method is an efficient one
85	**Sisman, Halil Ibrahim; Güney, Emin; Bayılmış, Cüneyt** A Real-Time Tracking System for Bread Production Based on YOLOv8 and DeepSORT **Abstract:** This article presents the application of bread production processes through integrating AI-driven detection and tracking systems. Utilizing the YOLOv8 and DeepSORT algorithms, this study explores developing and implement-ing a real-time system for detecting, counting, and reporting bread units. The methodology includes the preparation of a dataset from an operational bakery and subsequent training of the system on the Jetson Xavier NX em-bedded platform. Our findings show that the system can detect bread with a 96% accuracy rate during the training phase. Implementing this system in a bread production facility has significantly improved efficiency, waste reduc-tion, and workflow optimization. By providing detailed insights into both the technical setup and the operational outcomes, this research underscores the potential of intelligent technologies to transform bread production.

86	**Güney, Emin; Bayılmış, Cüneyt** YOLOv5-Based Driver Behavior Monitoring System for Safer Roads on Jetson Xavier NX **Abstract:** Recent advancements in computer vision and deep learning have led to the widespread adoption of driver assistance systems (ADAS), which play a crucial role in detecting critical situations to ensure driving safety and comfort. However, achieving real-time monitoring of both the driver and the environment remains a significant challenge. This study addresses this gap by developing a real-time ADAS utilizing images from embedded platform cameras. The system employs a driver-oriented approach, analyzing driver conditions, including phone and cigarette use, as well as eye tracking, to detect fatigue and sleep, thus providing timely warnings. Models were trained on GPU using custom datasets, and detection speeds were compared across different embedded platforms and a computer environment. The study culminates in the development of a real-time ADAS prototype boasting a remarkable 95% accuracy rate.
94	**Abdellatif, Abdelrahman; İslamoğlu, Ertuğrul ; Nizam, Ali** Analysis of Code Similarity with Triplet Loss-Based Deep Learning System **Abstract:** Currently, there are several mature plagiarism detection tools based on static code features available for code similarity detection. In addition, innovative solutions can be developed using deep learning methods considering the semantic structure of the code. This research proposes a deep learning system based on triplet loss for detecting code similarity. Our training approach involves generating embed-dings for pairs of code snippets to increase the accuracy of detection. Our system relies on a tokenization and embedding mechanism based on Code BERT, specif-ically tailored for Java code snippets. The model learns to embed similar code snippets close together while ensuring that dissimilar code snippets are placed far apart. After the learning phase, we employed transfer learning with a classifier to evaluate the model's effectiveness by monitoring the reduction in loss values. We evaluated the potential improvement of the proposed system by comparing mod-els with and without the integration of triplet-loss. The results suggest that the model has the potential to identify code similarities better and distinguish between snippets from different programming languages with high accuracy. This ap-proach can imply an enhancement in code similarity, code clone detection, and source code analysis.
35	**Mohammed, Hadi Salman; Algamal, Zakariya Yahya; Alheety, Mustafa I. N.** Performance of the difference-based two parameters estimator in semiparametric regression models **Abstract:** Semiparametric models are by design more flexible than standard linear regression models since they combine both parametric and nonparametric components. these models are extensions of linear regression models to include a nonparametric function of some explanatory variables. In the semiparametric regression model researchers often encounter the problem of multicollinearity. Researchers are often used biased estimators to overcome this problem. In this paper, the difference-based two parameters estimator is proposed. Our Monte Carlo simulation results are used to show the effectiveness of the proposed estimator over other used estimators, in terms of mean squared error
6	**Al-Saffar, Suzan Muhsen; Qasim, Omar Saber** Feature Selection Based on Binary Tree Growth Algorithm Using Opposition-Based Learning **Abstract:** Data science and data mining were among the industries affected by the high data dimensionality and quick growth of data volume. High memory costs, poor precision performance, and high computational costs are the main problems these fields face. How much computational power and memory are needed for machine learning is significantly influenced by the size of the used datasets. In order to overcome these challenges, feature selection can be used to choose the optimal subset of characteristics and reduce the dimensionality of the data. Feature selection is an essential preprocessing phase in many intelligent and expert systems, including those that detect intrusions and forecast diseases. The key enhancement was included in the original Tree Growth Algorithm (TGA) to overcome its shortcomings and adapt it to the feature selection challenge. The initialization phase of BTGA now makes use of Opposition Based Learning to broaden the population variability in the search space (OBL). To confirm and validate the effectiveness of the presented technique, OBL-BTGA was applied to three datasets from the UCI repository. The suggested algorithm OBL-BTGA accomplishes better classification accuracy and requires fewer particular features than the original algorithm BTGA
40	**Mohammed, Shahad J.; Yakob, Haidar Kadum; Ramizy, Asmiet** Synthesized Pulsed Laser ZnO as Anti Diabetic Foot Ulcer Pathogenic Bacteria **Abstract:** The current study aimed to evaluate the inhibitory activity of zinc oxide nanoparticles synthesized by pulsed laser ablation (ZnO NPs) against pathogenic bacteria isolated from patients with diabetic foot ulcer in Baghdad Teaching Hospital, Iraq. Fifty swabs of clinical specimens were collected by using sterilized swabs and cultured on different cultural media. The isolated bacteria were identified based on their cultural, microscopical characteristics, and biochemical tests. The diagnosis was confirmed using Vitek2 System. ZnO NPs were prepared using pulsed laser ablation. Characterization of the biosynthesized ZnoNPs were carried out by using field emission scanning electron microscopy (FESEM), atomic field microscopy (AFM), UV-visible spectroscopy, and X-ray diffraction (XRD). The results indicate the formation of pure ZnO

	NPs in a spherical shape with an average size ranging from 20 to 90 nm. The efficiency of prepared ZnO NPs against isolated bacteria (52 isolates) was examined by using well diffusion method. The results indicated that prepared ZnO NPs had antibacterial activities and their activity differed according to the bacteria and various laser pulses. The highest diameters of the inhibition zone were (23.7±0.3, 21.3±0.6, 19.3±0.6, 18.8±0.3, 18.8±1.0, 18.7±0.6, 18.5±0.5, 14.8±0.8, 14.7±0.6, 12.7±0.6, 11.7±0.6, and 11.5±0.5) mm against Kocuria kristinae, Proteus vulgari, Sphingomonas paucimobilis, Staphylococcus aureus, Enterococcus faecalis, Proteus penneri , Staphylococcus hominis, Aeromonas hydrophila, Pseudomonas aeruginosa, Escherichia coli, Klebsiella pneumoniae, and Proteus mirabilis, respectively for nanoparticles at a laser pulse of 300
123	**Abdulrazzaq , Mohammed; Al-Yosif, Rasha; Hamodat, Zaid** Design and Implementation of LUO Converter with MPPT Controller Based on Photovoltaic System Growth **Abstract:** The contentious nature of the topic of energy management may be traced back to the negative effects on the sur-rounding environment that are caused by the use of nonrenewable energy supplies. In spite of this, there has been a lot of discussion on whether or not we should continue to rely on fossil fuels to meet the ever-increasing need for en-ergy throughout the world. Both the greenhouse effect and global warming may be traced back to actions taken by humans, most notably the burning of fossil fuels. This is especially true of the greenhouse effect. The interaction of these two fundamental systems may be directly responsible for the recent shifts that have been seen in the climate of the Earth. The capability of the proposed system to evaluate the effects of variations in radiation and temperature was investigated. It has been shown that the fuzzy maximum power point tracking approach can reliably detect the maxi-mum power point with an accuracy that ranges from 96.4 percent to 99.3 percent. This demonstrates how successful the method is as a responsive system that can easily adjust to varying amounts of input in a short amount of time.

Technical Session - 7 Time: 15:40 - 17:40 **Session Chair: Faezeh Soleimani**	**Day-2** **May 25**

Paper ID	Authors / Title
38	**Ahmed, Zainab K.; Rzaij, Jamal M.** Synthesis and Characterization of Silver Nanoparticles-Coated Molybdenum Oxide Thin Films **Abstract:** A thin film of molybdenum oxide was deposited using the vacuum evaporation technique. The developed molybdenum oxide layer was coated with silver nanoparticles via a cost-effective and eco-friendly method (Cold Atmospheric Plasma). The structural, morphological, and optical characteristics of Ag NPs-coated molybdenum oxide have been described and evaluated. The X-ray diffraction results indicated that molybdenum oxide, silver oxide, and molybdenum nanoparticles crystallized in the mixed crystalline phase. Morphological investigation revealed that the nanostructured silver oxide layer considerably impacted the MoO3 grain size distribution, reducing it from 52 nm to 12 nm. The optical characteristics of molybdenum oxide film revealed that the transmittance reached 50%, but reduced to 30% when coated with silver nanoparticles. The deposited films also demonstrated an absorption coefficient of more than 104, indicating that the electronic transitions were of the direct type. The energy gaps of the uncoated and silver oxide-coated molybdenum oxide films have been estimated to be 3.66 and 3.62 eV, respectively
37	**Al-Rashid, Saeed Naif Turki; Hijab, Sarah Ahmed** The effect of the particle size on the optical properties of Nano TiO2 Coatings **Abstract:** This paper refers to TiO2 coatings, which is an important material in optical coating applications . Some of the optical properties are determined for Nano TiO2 coatings such as refractive index, the energy gap and the reflectivity. The results confirm the effect of particle size on optical properties, particulary when the radius becomes equal to or smaller than the exciton Bohr radius, as the refractive index decreases and the energy gap increases with decreasing particle size, and TiO2 tends to be permeable to electromagnetic radiation (transparent) when its particle size is small whereas, as the grain size of TiO2 increases, it tends to be reflective of electromagnetic radiation until it almost stabilizes at a value (R = 20%) for a grain size of (40 nm)
42	**Mohammed, Shahd Khaled; Al-Rawi, Bilal K.** Modeling the Structural and Vibrational Properties of SiP Diamondoids and Nanocrystals Via DFT **Abstract:** This work aims to comprehensively study the properties in their applied form. The Ab-initio method is used along with density functional theory (DFT) to determine the electronic structure and physical properties of silicon phosphide (SiP) crystals. Silicon phosphide (SiP) crystals have been studied within the framework of the density functional theory using the

	diamond structure that starts from (diahamantane, tetramantane, hexamantane, octamantane) based on the electronic structure of the simulation of (SiP) nanocrystals. The properties including energy gap, the density of states, tetrahedral angles, dihedral angles, and bond length were compared. The results indicate that the energy gap decreases as a function of the total number of (Si atoms, P) and that the increase in the size of nanocrystals leads to a decrease in the cohesion energy. As for tetrahedral angles, and diagonal angles, they are closer to the ideal value of 109.430
32	**AbdAlrazaq, AbdAllah Salah; Batah, Second Feras Sh. M.** Estimation to the Survival Function for Weibull Pareto Distribution by crisp and Ranking algorithm **Abstract:** The authors discuss maximum likelihood estimation (MLE) and the Cramer-von-Mises estimation (CVME) to estimate the three parameters which follow the Weibull pareto distribution in this paper. The nonlinear membership function for Gaussian functions is used to obtain the fuzzy number for all these parameters estimators. To create a crisp number, we select estimate parameters with lowest Mean Squared Error (MSE) and we found that CVME has less (MSE) for the parameters .If a fuzzy number is converted to a crisp number, the crisp algorithm approach can be used, according to this investigation. After that, the researchers found the estimation density function, survival function and hazard function
31	**Abdullah, Mustafa Mohammed ; Alheety, Mustafa I.** Modified New Biased Estimator In Linear Regression Model Under Heteroscedastics or Correlated Errors **Abstract:** In this paper, we present a new bias estimator to improve the efficiency of the estimator in a linear regression model that contains errors in heteroscedastics or correlated errors with a multiple linear relationship problem. The properties of the new estimator, variance matrix, and mean squared error (MSE), in comparison with other estimators, were calculated using the mean squared error criterion as a measure of fit. The new estimator appears to have better properties than the other estimators because its mean squared error is smaller than the others. Simulations, examples, and graphics are used to illustrate the results
28	**Ahmed, Abdulrhaman A Jassim; Batah, Feras Sh. M.** On Estimating Reliability Stress – strength Model in Case the Weibull Pareto Distribution **Abstract:** In this paper we used the Weibull Pareto Distribution to establish mathematical formula of R1 which is Single and R2 is Series for the stress-strength model's reliability. The stress-strength model is used to determine the reliability of a model with a single and Series component that has strength x and is stressed by y . Maximum likelihood Estimator ,The Percentile Estimator , The Least Squares Estimator Method , The Shrinkage weight Estimator Method. Some of the four estimation methods were employed for R1 and R2 . The reliability of these estimations was investigated via using a simulation approach that allowes for additional item for different-sized stress and strength samples. The simulation analysis shows that the suggested shrinkage estimation approach works well and has made significant progress in the field of stress - strength reliability
20	**Raslan, Amina; Entesar, Ahmed** Hybridization of the Analytic Banach's Contraction Method Using the Particle Swarm Optimization Algorithm for Fractional System Solving Drinfeld-Sokolov-Wilson **Abstract:** In this manuscript, the fractal equations, which are one of the complex problems facing most researchers in the Drinfeld-Sokolov-Wilson system, were addressed and solved using the analytical method (Banach's contraction) and then using the smart method (particle swarm optimization) , by choosing the best values for the parameters in the system, using the smart algorithm and improving the results for the system. The resultsobtained from the hybrid method (BCM - PSO), proved the efficiency of this method by finding Maximum Absolute Error (MAE) and Mean Square Error (MSE) compared with the exact solution. The tables for several different values of (α) show that the hybrid method is better than the analytical method
19	**Mahmoud, Mohammed Sabah ; Al-Rozbayani, Abdulghafor M. ; Qasim, Omar Saber** Numerical Solution of Fuzzy Linear Systems Using Homotopy Perturbation Method **Abstract:** In this research, we provide a numerical method for the Homotopy Perturbation Method to solve the Fuzzy Linear System (FLS) (HPM). The n n linear system was solved by HPM and then converted into a fuzzy linear system of 2n*2n using the fundamentals of mathematical logic and fuzzy sets. This fuzzy solution of HPM is denoted as FHPM. By resolving a few examples of the fuzzy linear system, it is possible to compare the consistency and effectiveness of the FHPM to the hypothetical HPM
11	**Al-Thanoon, Niam Abdulmunim; Algamal, Zakariya Yahya ; Qasim, Omar Saber** Improving Meta-heuristic Algorithms for Feature Selection in Multiclass Classification **Abstract:** Due to the prevalence of multiclass classification challenges in numerous applications, classification is an important component, which plays a vital role in resolving data issues. An important area of application and study now

	centers on choosing the right type of essential features from the entire feature set. The selection of features has been reinforced by a number of binary meta-heuristic techniques. Initial sets must be supplied for these algorithms in order to get the desired results and initialization appropriate values are crucial to this process. Situations are started randomly by using a uniform distribution function to initialize the population in the first stage, which has an impact on the classification results and values since it introduces variance into the production of values. As an initial set of methods for binary meta-algorithms, some parametric and non-parametric techniques, such as the Kruskal-Wallis test and one-way ANOVA, have been proposed to avoid the issue of randomness in population generation and to take into account the relationship between the features and the category variable. By using them on ten high-dimensional datasets, the importance of the proposed approaches' performance was assessed. When compared to industry standard methodologies, the majority of the results tested and statistical measurements showed that the approaches suggested are with better performance in terms of the accuracy of classification performance, the number of the features selected and runtime

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Paper ID	Authors / Title
4	**AL_Hayani, Mahmoud H.Eiada ; Alheety, Mustafa I.** Using Corrected Biased For Developing New Weighted Mixed Estimator for Linear Regression Model **Abstract:** A study of a new type of corrected weighted mixed estimator has been proposed for linear stochastic restricted regression model . This model is one in which the sample information and the prior information do not hold the same amount of importance. The suggested estimator bias , variance matrix , and mean square error (MSE) are computed and compared in this paper . The performance of this estimator was evaluated in comparison to that of other estimators by utilising the mean square error criterion. In the end, a numerical example was analysed in order to learn more about the evaluation of how well the new estimator works
53	**Njim, Emad; Mohammad , Ahmed H. ; Al-Waily, Muhannad; Jweeg, Muhsin J** Analyzing the mechanical performance of porous TPEs under various operating conditions. **Abstract:** Synthetic polymers have developed since the early sixties and have become integral to modern society. Polymer materials have been increasingly used in the medical industry, and three-dimensional printing technology has made it possible to manufacture and develop implants and replacement parts of the human body in terms of low cost and lightweight. To discuss the absorption of energy when exposed to sudden forces and mechanical friction and the extent to which the artificial intervertebral disc can resist or adapt to these forces, samples were printed by the three-dimensional printer from the Thermoplastic elastomers (TPE), including PLA, PLA+ for the two Tests in 5 groups with a 100% filling, 90%, 80%,70%, and 60%. PLA + samples appeared to significantly outperform if exposed to shock forces, i.e., suddenly by 94%, 93%, 92%, 90% and 89%, respectively, for the filling percentage. PLA+ has also been shown to behave adaptively with laboratory conditions, especially when loaded or exposed to low speeds in test wear. If the samples are loaded with overstrained loads or low speeds, then the behaviour of the friction scheme and horizontal forces is relatively stable. This means the samples respond well and give homogeneous and predictable results in these conditions. However, the samples fail when the speed and load are increased by a force of 20 N 20 min after the start of the test. In this case, the samples experienced a more significant weight loss of 0.0148 g for the porosity ratio of 30%. This suggests that they fail in high friction, wear, and loads.
54	**Njim, Emad; Mohammad , Ahmed H.; Al-Waily, Muhannad; Jweeg, Muhsin J** Design and analysis of artificial IVD by 3D printing technology using functionally graded materials **Abstract:** Artificial intervertebral disc (IVD) is considered one of the modern medical developments aimed at treating some problems and diseases associated with the spine. The artificial intervertebral disc restores or improves the function of the spine, and it is also considered an emergency surgical option to help relieve pain and reduce the need for traditional spinal fixation operations. Polylactic acid (PLA) is an easy-to-print polymer capable of achieving biocompatibility, making it suitable for medical and biomedical applications. This study studied porous functionally graded materials by choosing (PLA+) and manufacturing them with a three-dimensional printer with FDM technology to design artificial intervertebral discs for humans. For the reason that the artificial intervertebral disc in the L4-L5 segment is greatly affected by the tooth of overweight people, the intervertebral disc was discussed in terms of compressive stresses of different forces 2KN,4.75 KN, max load 80KN experimentally, and 31 cases were studied with a porous gradient with the help of ANSYS22R2 with the same forces in one case and another with the addition of the moment effect,7.5 Nm with the same forces and the last case only moment. The

	compression test results showed the possibility of using porous compositions to reduce the change of the surface area of the disk Artificial vertebra in the event that it is subjected to high or medium loads. In the best sample model with a porous gradient of 8 layers, the first and last layers are sold, while the inner layers are porous with a porosity of 0.1.
47	**Mazhir, Sabah N.; Abbas, Ehsan M.; Abdalameer, Nisreen kh.; Abbas, Huda H.** CuO Nanoparticles Prepared by Pulsed Laser Ablation: Evaluation of Their Anti-Proliferative Activity Against Colon Cancer Cells **Abstract:** in this study, stable and cost-effective CuO NPs nanoparticles were synthesized from pure copper metal by a simple physical technique (pulsed laser ablation in liquid PLAL). The synthesis of crystalline copper oxide nanoparticles was confirmed by various analytical techniques such as measurement of particle concentration using atomic absorption spectrometry (ASS), optical energy gap measurement by photoluminescence PL examination, X-ray diffraction meter (XRD) to determine the crystal size and identification of the crystal structure of the prepared particles, scanning FE-SEM electron microscopy, moreover, the cytotoxicity of nanoparticles was tested for their activity, as the test was carried out on a normal cell line (HdFn) and cancer cell line (human Colon Caco-2). The percentage of cytotoxicity was calculated after 24 hours of exposure. The maximum toxicity of Caco-2was 97.85 at a concentration of 500 after 24 hours of exposure, as the substance was tested on this line after 14 days of preparation in the laboratory. As for the normal line, the maximum toxicity was 23.26% at a concentration of 500 after 24 hours of exposure. This means that the CuO nanomaterial has a selective effect on the cells. The maximum toxicity was reached on the Caco-2 cancerous line, and the lowest on the normal HdFn line. We conclude from this that the compound has the potential to be a good anti-cancer drug because it does not kill healthy cells
46	**Esam, Rawaa; Issam; Ali; Akram Mohammed** Effect of Beta Radiation Exposure on The Properties of Tin Sulfide (Sn2S3) Thin Films For Solar Cell Applications **Abstract:** Electromagnetic radiation and charged particles affect semiconductors by excitation of electrons, ionization process that leads to the generation of additional charge carriers, and the formation of crystal defects within the lattice. In this paper, the effect of exposure to beta radiation on some properties of tin sulfide (SnS) thin films prepared by spray pyrolysis technique for the application of solar cells was studied. The prepared thin films were examined with XRD, FE-SEM and UV absorbance before and after exposure to a pure beta source (Sr-90) for 3 days. The result shows significant effects of beta radiation on the structural properties as the degree of crystallization and crystal size decreased, as well as a clear effect on the surface topography, and its effect on the optical properties by increasing the absorption, while the optical energy bandgap slightly decreased. The SnS3/Si heterojunction exhibits photovoltaic effect and the efficiency enhanced from 1.01 to 1.40% after irradiation
45	**Aobaid, Ali Kalaf; Dahash, Fadhil Ketab; Al Maamori, Mohammed H.** The effect of chlorophyll on the mechanical properties of natural rubber (NR) and the penetration of X-ray **Abstract:** After extracting chlorophyll from the Alfalfa plant and tree leaves as a plasticizer and antioxidant with different ratios (20 - 60) pphr and its effect on the mechanical properties of the prepared rubber Composite was studied, The results were showing a decrease in the tensile , elasticity and the hardness while increasing the elongation . As for the X-ray penetration results , was very weak even at high chlorophyll levels (60) pphr and at (10) KV voltage. The sample was not relibling for radiation protection
44	**Assaf, Abdulkareem H.; Obaid, Ahmed S.; Salih, Emad Mohammed** Eco-friendly synthesis of platinum nanoparticles using cold plasma method: the effect of concentration and time exposure **Abstract:** In this study, platinum nanoparticles PtNPs are synthesized in their liquid phase by cold plasma method using plasma jetting technique. Colloidal platinum nanoparticles are prepared using aqueous platinum salts (H2PtCl6.6H2O) with different concentration (10,20 and 30) ppm by non-ionic water as a solvent agent. The plasma is generated with Argon gas by dielectric barrier discharge jet. PtNPs are produced with a relative exposure time duration of plasma ignition. The samples are characterized by the absorption of UV-visible radiation at a wavelength of (216) nm. The initial composition of the prepared nanoparticles is determined, changing their color to dark yellow. The structure of the prepared sample is examined by X-ray diffraction (XRD). Shearer formula is used to calculate crystal size. Surface morphology and the calculated particles size are studied using scanning electron microscopy (SEM). The researchers concluded that the formed shapes are spherical or irregular
43	**Tawfeeq, Hasan Ali; Rzaij, Jamal M.** Effect of Thickness on the Structural and Optical Properties of Cadmium Oxide Thin Films Deposited by Thermal Vacuum Evaporation Technique **Abstract:** The authors present an effective Thermal Vacuum Evaporation (TVE) method for producing cadmium oxide (CdO) thin films with thicknesses of 100, 200, and 300 nm. The X-ray diffraction (XRD) results confirmed the presence of all diffraction peaks of CdO thin films with high purity and crystallization, with no significant shift in the diffraction angles. The

	field-emission scanning electron microscope (F-ESEM) confirmed the presence of a uniform distribution of nanoparticles with a change in nanoparticle shapes when increasing the thickness. Optical results indicate the dependence of the transmittance on the thickness, the transmittance is reduced to a minimum at the thickness of 300 nm with a sharp absorption edge at the wavelength of 300 nm. The results of the optical energy gap (Eg) calculation confirmed the presence of a blue shift towards the ultraviolet region in all samples due to the quantum confinement effect and the high surface area of nanoparticles. The authors suggest that the current results could have many industrial and medical applications dealing with thin-film fields
41	**Ahmed, Majeed Shihab; Ramizy, Asmiet; Al Mashhadany, Yousif** Analysis of Real Measurement for EMG Signal Based on Surface Traditional Sensors **Abstract:** Due to its special qualities, including extensibility, skin-matching interfaces, biocompatibility, and wear ability, surface electrodes make an excellent platform for gathering high-quality electrophysiological information. The performance and efficacy of electrodes on the skin have significantly improved during the last ten years. Electrodes on the skin are becoming more and more crucial in Electrophysiological (EP) monitoring and human-machine interfaces thanks to ongoing development and significant promise for Human-Machine Interface (HMI). This paper provides an overview of the most recent developments in the design of skin electrodes and their integrated system. From a performance standpoint, desirable attributes of the electrodes on the skin are described. Analyzed and described is the fundamental design of the microcontroller-based electrometric measurement system. The MATLAB integrated development environment from Mathwork Technology Inc. was used to create software. Also developed is a user interface that is simple to use. Finally, a developed and exhibited arm strengthening training equipment with an electromyograms (EMG) control system. The experimental findings demonstrate the viability and accuracy of the created whole system
49	**Arif, Ghassan E.; Yaseen, Suha K. ; Khalel, Nihad Sh.** A New Mathematical Models or Estimation the Radon Concentrations in Medical Herbs by Using Numerical Methods **Abstract:** The objective of this study is to develop mathematical models to determine the concentration of radon in eleven medicinal plants with varying human applications utilizing crime techniques theoretical definition and a variety of numerical approaches. Using a variety of mathematical methodologies, simulations were conducted and compared to empirical results. There are four mathematical approached: Least square method, Neville method, Hermite method, and Graph theory which has been indicted for obtaining results. The obtained results demonstrated where a new mathematical model implicitly from the second order has been obtained for radon concertation estimation with the low error percentage