



18th International Learning & Technology (L&T) Conference 2021

# Artificial Intelligence: Towards Digital Transformation of Life, Work, and Education

Akila Sairete<sup>a</sup>, Zain Balfagih<sup>a</sup>, Tayeb Brahimi<sup>b</sup>, Mohamed El Amin Mousa<sup>b</sup>, Miltiades Lytras<sup>c</sup>, Anna Visvizi<sup>d</sup>

<sup>a</sup>*Effat College of Engineering, Computer Science Department, Effat University, Jeddah, K.S.A.*

<sup>b</sup>*Effat College of Engineering, Energy and Technology Research Center, Effat University, Jeddah, K.S.A.*

<sup>c</sup>*Visiting Researcher, Effat College of Engineering, Effat University, Jeddah, K.S.A.*

<sup>d</sup>*Visiting Researcher, Effat College of Business, Effat University, Jeddah, KSA*

## 1. Introduction

A new time of intelligence is rising, with Artificial Intelligence (AI) at the forefront of the changes we are living in a rapidly evolving world. AI is restructuring our lives, inspiring change, and hence shaping our future world. In the time of the Covid-19 pandemic, AI offers several opportunities thus giving the science of medicine the power to turning mountains of data into lifesaving breakthroughs, identifying diseases from a simple drop of blood, and attempting to stop the spread of the disease while developing effective vaccines in record time. Usually, the process can take 10 to 15 years to develop. AI, robots, and drones are being deployed to stop the spread of the disease, help track the pandemic, enforce restrictive measures, and provide critical support to healthcare delivery. Using AI, it is possible to transport medical supplies by drone, disinfect patient rooms, and search approved prescription databases for drugs that may also be effective against Covid-19. AI is also a tool to finding quick ways to bring cures to market, assisting customers in stores, adjusting to new inputs, performing human-like tasks, and enabling the achievement of 134 targets across all 17 sustainable development goals (SDGs) of the United Nations (UN).

According to the consulting firm PwC (\*\*\*) , by 2030, AI could boost global GDP by 14%, with the highest gains in China and North America. The fastest-growing industries will be healthcare, financial services, and retails. In the Middle East, AI is expected to grow at a rate of 20% to 34% per year, with the U.A.E. and Saudi Arabia leading the way. The potential impact of AI in the Middle East is estimated to be US\$320 billion by 2030. This impact could be even larger if governments continue to push the boundaries of innovation and implementation of AI across businesses sectors. The PwC consulting firm, the second-largest professional services network globally, estimated that by 2030 AI could contribute \$135 billion or 12.4 percent to Saudi Arabia's GDP. AI opened a pool of opportunities for digital transformation and innovative services, one of the key concepts of the Saudi Vision 2030. There is no doubt that the development of non-oil sectors through investment in AI technologies could strategically position Saudi Arabia to serve as a springboard for the future.

Saudi Arabia's Vision 2030 and the National Transformation Programme recognize the importance of AI in the country's future. The National Digitization Unit (N.D.U.) is working to establish the Kingdom as a new tech hub for the modern Arab world, support industries and private sectors, and ultimately reduce the country's dependence on oil through economic diversification. In October 2020, Saudi Arabia hosted the Global AI Summit to become the world leader in AI events. This event brought together worldwide competitive AI experts, stakeholders from public

**and private sectors, investors and entrepreneurs, industrial companies, researchers, and educators to shape the future** of AI As part of the national agenda for Data & AI, the Saudi Data & AI Authority (SDAIA) was established to elevate the Kingdom as a global leader in the elite league of data-driven economies.

In collaboration with the Ministry of Education, the Ministry of Communications and Information Technology (MCIT) of Saudi Arabia, developed training programs on machine learning that will be incorporated into the curriculum of the Ministry of Education (MoE). In addition, key STEM training and courses were also introduced to enhance AI and technology skills. Moreover, King Abdulaziz City for Science and Technology (KACST) established a Data Analytics and AI Center to provide a world-class research environment. The Saudi government has heavily invested in Tesla, Uber, SoftBank Group Corp., and Virgin Group on the investment side. Furthermore, the Ministry of Investment Saudi Arabia (MISA) attracts AI companies abroad to invest and operate in Saudi Arabia.

Becoming a key international player in AI and data would require significant investments, upskilling, and equipping our youth with AI tools and techniques to unleash their potential in this field. This is why we have chosen "Artificial Intelligence: Towards Digital Transformation of Life, Work, and Education". This year's conference explored the major impact Artificial Intelligence technologies have on Education, Energy, Healthcare, the economy, and every aspect of our lives. This theme was selected for this conference due to its great impact. AI is changing everything we use, produce, and even feel. Computers soon will replace many jobs done by humans. It is expected that more than 80% of current tasks that needs human will be assigned to robots and automated intelligent software.

## 2. About the L&T conference

For almost two decades, the Effat University envisioned a convenient platform that brings educators, researchers, and tech enthusiasts under one roof and functions as a fount for creativity and innovation. It was a dream that such a platform bridges the existing gap and becomes a leading hub for innovators across disciplines to share their knowledge and exchange novel ideas. In 2003, this dream was realized, and the first Learning & Technology symposium was held. Up until today, the conference has covered a variety of cutting-edge themes such as Digital Literacy, Cyber Citizenship, the Global Learning Environment, MOOCs, Makerspace, IoT, Artificial Intelligence and Machine Learning, 5G and Beyond: Paving the way to 5G, to cite just a few. The L&T18 Conference has also attracted key, prominent figures in AI, sciences, and technology who addressed large, eager-to-learn audiences and inspired many unique stories. This year's conference explored the major impact Artificial Intelligence technologies have on Education, Energy, Healthcare, the economy, and every aspect of our lives. For further details about the organizational structure of the conference, please, check the "Notes" section at the end of this editorial. ~~This theme (AI) was selected for this conference due to its great impact.~~

Six invited speakers presented the up-to-date research related to the field of AI, Machine Learning, Digital Transformation, Data Science, Technology and Innovation, Covid-19, Education, and a workshop on Amazon Web Services.

1. Dr. Aseel Addawood, Oracle AI & Data Science Ambassador for K.S.A.
2. Prof. Mazhar Bari, S.V.P. technology & Innovation, Mind Sphere Application Center, K.S.A., Siemens Ltd
3. Dr. Kaoutar El-Maghraoui, AI Researcher at IBM
4. Prof. Selwa Al-Hazaa, Founder C.E.O., Saudi Development Med (S.D.M.), Clinical Professor & Senior Consultant of Ophthalmology
5. Dr. Areej Al Wabil, Associate Professor, Software Engineering, Alfaisal University & C.E.O. at HCID and Director of HCI Lab
6. Mr. Abdulrahman Shiekh, V.P., Education E-Solutions, Technology Strategy Advisor, Big Innovation Center

**Workshop:** Mr. Hesham Galal, A.W.S. Public Sector Solutions Architect, Amazon, Saudi Arabia

As part of Saudi Arabia's Vision 2030 and National Transformation Program, aiming to create a vibrant society, a thriving economy, and an ambitious nation, AI is at the heart of this transformation by building a digital society, a digital economy, and a digital economy nation. The contribution of the conference to the Digital Transformation in the Kingdom of Saudi Arabia is multifold:

- It contributes to the body of knowledge in the scientific domain of Learning and Technology through the

integration of robust, progressive, theoretical, and applied knowledge and ideas

- It mobilizes a vibrant and talented community of academics and industry partners to boost technology's creative thinking, innovation, and entrepreneurship.
- It provides a platform for the design, implementation, and testing of AI for effective learning and technology.
- It creates and supports learning, technology, and innovation hubs, bringing together diverse stakeholders and partners.
- It contributes significantly to the research capacity of Effat university by promoting high quality, leading research of its faculty and researchers
- It enhances policy-making and crafting of strategies for the digital transformation of Education in Saudi Arabia.

### 3. About the content of the volume

This volume provides a forum for the latest research, innovations, and applications in AI. From technology to healthcare, engineering, IoT, and education, the special issue examines AI's modern practices and potential in reshaping how we live, learn, and work. The discussion includes the impact of AI on Innovation, the Role and Impact of AI in the Transformation of Life, Work and Education, AI for technology and Innovation, AI for Education and Learning, AI in Medicine and Healthcare, AI for Energy and Sustainability, and AI Infrastructure and Security. Representing the spirit of the academic discussions held during the L&T conference, this volume features thirty high-quality papers. Among them, six papers discussed AI for Technology and Innovation, three papers discussed AI for Education and Learning, six papers discussed AI in Medicine and Healthcare, five papers discussed AI for Energy and Sustainability, and ten papers discussed AI Infrastructure and Security. The following paragraphs offer an overview of the content of the papers.

The authors of the paper titled "*Comparison of Bagging and Boosting Ensemble Machine Learning Methods for Face Recognition*" discuss face recognition using ensemble learning methods and proposed different algorithms employing skin color for face detection, histogram for the feature extraction, and ensemble methods for recognition part. The Bagging with Random Forest decision tree reached 99% correct classification on FERET face database.

In the paper "*Comparative Analysis of Machine Learning based Filtering Techniques using MovieLens dataset*," the authors compare the different filtering techniques and attempt to improve the accuracy with the resampling mechanism. The comparison was conducted using the WEKA tool on a large sample of the MovieLens dataset. Results showed better results in comparison with other techniques with 99.39% accuracy.

In the paper "*Factors that affect LoRa Propagation in Foliage Medium*," the author discusses Long Range (LoRa) communication technology used for various smart city operations and then analyses factors such as those responsible for the degradation of LoRa channel quality. Also, an experimental study was undergone in the foliage medium to investigate the LoRa physical layer performance utilizing different spread factors (SF7-SF12). Results showed the measured RSSI values are higher than the expected values for LoRa propagation in foliage medium.

A comparative assessment is conducted on the performance of three popular ensemble methods (Bagging, AdaBoost, and Stacking) based on five base learners (Naive Bayes, Linear Regression, Decision Tree, K-Nearest Neighbor, and Support Vector Machine) to predict sentiment classification. Authors of this paper titled "*Improving Sentiment Prediction using Heterogeneous and Homogeneous Ensemble Methods: A Comparative Study*" show that the ensembles generally have better performance than the individual classifiers with an average of 0.83 for precision and 0.82 for recall. Stacking (heterogeneous ensemble method) shows better results, with Bagging (homogeneous ensemble method) showing the lowest performance.

Authors of the paper "*Knee Images Classification using Transfer Learning*" the authors stress the main problem in the medical research field: the lack of datasets and the time taken for data to be processed. In this work, the author proposes using the NASNetMobile pre-trained deep learning model to classify knee diseases and reduce the amount of data used in training by taking the max pooling for each image slice instead of training all image slices but gained good accuracy due to the power of retrained CNN. The authors found that classification using an external classifier gives the highest accuracy for a random forest classifier.

The authors discuss the lack of datasets and the time taken for data to be processed in medical research in the paper "*Knee Images Classification using Transfer Learning*." In this work, the author proposes using the NASNetMobile pre-trained deep learning model to classify knee diseases and reduce the amount of data used in training by taking the max pooling for each image slice instead of training all image slices but gained good accuracy due to the power of retrained CNN. The authors found that classification using an external classifier gives the highest accuracy for a random forest classifier.

In the paper "*The Impact of Randomized Algorithm over Recommender System*," the authors mentioned the

amount of information that was increasing drastically and incorporated the concept of a recommender system to filter the users' data and come up with the exact amount of information required according to the needs and preferences of the users. But, the existing recommender systems face issues in the corporate world. To minimize such issues, the authors incorporate randomization such that random factors can be integrated into the design of recommender systems. The author concludes by stating that the proposed approach provides a platform for researchers to enhance the recommender system using randomized algorithms.

The paper "A Model for Good Learning Environment Using Learning Data Analytics" discusses an attempt to develop a progressive model for qualitative analysis of students' learning experiences is discussed in the paper "*A Model for Good Learning Environment Using Learning Data Analytics*." The authors explore the engineering students' feedback messages and integrated data mining techniques. The authors worked on students' Twitter posts and also collected students' data through Google forms. The feature selection and classification were used to analyze data and detect issues and problems encountered during their study. Students' problem classification was set as "heavy study load," "lack of sleep," "a deficiency of group activities," "diversity problem," "negative emotions and other issues related to studies." This work helps enhance campus placement, success, and retention of the students. At the same time, the classifier can be used as a detector to detect student-at-risk from a particular university without repeating the manual work frequently.

The authors of the paper "*Classification of Academic Performance for University Research Evaluation by Implementing Modified Naive Bayes Algorithm*" present the preliminary classification and prediction of the research and academic performances of the university staff before evaluating the Research Assessment. They implemented the Modified Naïve Bayes classification algorithm. First, the model is generated using a training data set. Next, the model is tested with a testing data set without an attribute class. As a result of the study, the Modified Naïve Bayes classification can classify the academic performances with research activities better than the decision tree and ordinary Naïve Bayes, 96.15% and 94.23%, respectively. Nevertheless, this study result fits preliminary classification for university research office level before submitting to the respective national educational authority for further evaluation.

In the paper "*Sentiment Analysis of Covid-19 Vaccine through Tweets*," the author uses bibliometric analysis to uncover trends and research of sentiment analysis and COVID-19 vaccines. A range of analyses is conducted using the open-source tool VOSviewer and Scopus database from 2020-2021 to acquire a deeper insight and evaluate current research trends on COVID-19 vaccines. The quantitative methodology used generates various bibliometric network visualizations and trends as a function of publication metrics such as citation, geographical attributes, journal publications, and research institutions. Results of network visualizations revealed that understanding the the-state-of-the-art in applying sentiment analysis to the COVID-19 pandemic is crucial to local government health agencies and healthcare providers to help in neutralizing the infodemic and improve vaccine acceptance.

A bibliometric analysis to uncover trends and research of sentiment analysis and COVID-19 vaccines is presented in the paper "*Sentiment Analysis of Covid-19 Vaccine through Tweets*". The author conducts a range of analyses using the open-source tool VOSviewer and Scopus database from 2020-2021 to acquire a deeper insight and evaluate current research trends on COVID-19 vaccines. The quantitative methodology used generates various bibliometric network visualizations and trends as a function of publication metrics such as citation, geographical attributes, journal publications, and research institutions. Results of network visualizations revealed that understanding the the-state-of-the-art in applying sentiment analysis to the COVID-19 pandemic is crucial to local government health agencies and healthcare providers to help in neutralizing the infodemic and improve vaccine acceptance.

Authors in the paper "*A Survey of Artificial Intelligence Solutions in Response to the COVID-19 Pandemic in Saudi Arabia*" focus on the trends of AI applications and how they help predict and prevent the progress of COVID-19 in Saudi Arabia. The method used in this study is based on a narrative review of recent literature on AI and COVID-19 and a survey conducted on 211 participants. Results show that AI is a crucial element to overcoming COVID 19. The use of COVID-19 related Apps that helped reduce the pandemic spread was more common among participants ranging from 15 - 30. The study concluded that COVID-19 made a positive impact on everyone, and by the use of technology, things got much more comfortable to help in enduring any long-term health consequences.

Electrocardiograms (E.C.G.) are discussed in the paper "*Arrhythmia detection using multi-lead E.C.G. spectra and Complex Support Vector Machine Classifiers*." In this work, the authors investigate machine learning classification algorithms for E.C.G. analysis and arrhythmia detection. Four beat types, Normal (N), Premature Ventricular Contraction (P.V.C.), Atrial Premature Contraction (A.P.C.), and Right Bundle Branch Block Beat (RBBB), are simultaneously presented to a Complex Support Vector Machine (CSVM) classifier. The E.C.G.

signals are obtained from the St Petersburg INCART 12-lead Arrhythmia Database (INCARTDB). The detection of E.C.G. Wave (P, Q.R.S., T) is performed with the Wave Form Database (WFDB) Software Package, which is used to read the annotation files and find the R (peak) location. For feature extraction, the Discrete Fourier Transform (DFT) is used. The study aims to establish the advantage of CSVM over standard SVM in simultaneously detecting different types of arrhythmias based on multi-lead recordings following signal compression in the Fourier domain. The CSVM classification algorithm provided better performance than the standard SVM classifier with an accuracy of 98.25%. Future work will concentrate on the further development of E.C.G. signal pre-processing using adaptive wavelet algorithms and classification with Clifford SVMs.

Continuing the study of covid-19 and AI, in the paper "*AI-based Power Screening Solution for SARS-CoV2 Infection: A Sociodemographic Survey and COVID-19 Cough Detector*," the authors propose the Artificial Intelligence (AI) power screening solution for SARS-CoV2 infection that can be deployable through the mobile application. To overcome the shortage of SARS-CoV2 datasets, the transfer learning technique is applied. Multipronged mediator for risk-averse Artificial Intelligence Architecture is induced for minimizing the false diagnosis of risk stemming from the problem of complex dimensionality. This proposed application provides early detection and initial screening for SARS-CoV2 cases. Huge data points can be processed through the AI framework that can examine the users and classify them into "Probably COVID," "Probably not COVID," and "Result indeterminate."

In the paper "*Lung Cancer Diagnosis Based on Chan-VEse Contour and Polynomial Neural Network*," the authors introduce a computer-aided detection (CAD) system using computed tomography (C.T.) scans for nodule classification. The proposed system is divided into four stages involving image pre-processing using Gabor filter and Kuwahara filter, image segmentation by applying Chan- Vese active contouring. Feature extraction where features are computed using Discrete Wavelet Transform (DWT) at one, two, and three decomposition levels. After that, 13 features are computed from each wavelet sub-band. As a result, the output features are compared, and the best output is used to train Polynomial Neural Network (P.N.N.) classification method to classify benign and malignant nodules. The result of the proposed system shows high performance in both the segmentation and the classification, with an accuracy of 96.66% for the classifying method.

Authors in the paper "*A Meta-Analysis of Artificial Intelligence Applications for Tracking COVID-19: The Case of the U.A.E.*" focus on analyzing the applications used in Covid-19 and the impact of AI on the breakout of the pandemic based on the most recent applications used in the United Arab Emirates. The authors investigated different applications such as Dubai Police Movement Restriction Monitoring System, Taxis Preventive Measures Compliance System, Mobile App "Wai-Eye," Smart Helmets, Virtual Doctor, and The Department of Health – Abu Dhabi (DoH) Remote Healthcare App. Results showed that AI applications provided the necessary prevention of the spread of COVID-19, assisted in monitoring restrictions and preventive measures violations, and provided remote healthcare, which directly impacted the number of hospital visits amidst the lockdown. The study concluded that AI has proven to be effective in supporting governments in fighting the pandemic.

AI for energy and sustainability session starts with "*Arduino Based Automatic Solar Panel Dust Disposition Estimation and Cloud-Based Reporting*." The authors investigate the photovoltaic energy losses caused by dust deposition. The idea is to employ the IoT framework in this regard intelligently. The system is based on a modular design approach. Each module digitizes the status of a concerned P.V. panel by using an embedded front-end controller. The readings are conveyed to a specifically developed automatic maintenance decision algorithm. The intended P.V. module data is logged to the cloud in a real-time fashion for post-analysis. In parallel, the designed software analyzes the instantaneous open-voltage value of the P.V. panel and makes real-time decisions if a maintenance notification is required or not. In this fashion, they can efficiently act for the P.V. maintenance to get the most out of the P.V.s over the system lifecycle. The constructed prototype successfully achieved its goals of automatically detecting unexpected voltage drops from a P.V. panel due to dust disposition and reported it to the concerned parties.

In the paper, AI for energy and sustainability session starts with the paper "*Enhanced Energy Efficient Routing for Wireless Sensor Network Using Extended Power-Efficient Gathering in Sensor Information Systems (E-PEGASIS) Protocol*" the authors propose an Extended Power-Efficient Gathering in Sensor Information Systems (E-PEGASIS) protocol for enhanced energy-efficient data transmission based on PEGASIS protocol. In this method, the average distance between the sensor nodes is considered the criterion for chaining and fixing the base station's outermost node's radio range value. Later it chains the related nodes available in the radio range. Consequently, the chained node checks its distance with the next nearest end node to go on with the chaining procedure, enhancing data transmission performance between the sensor node and the base station. The simulation of the proposed work shows that the network's lifetime is increased when compared to the LEACH and PEGASIS protocol.

Authors in the paper "*Modeling of the N.D. 240QCJ SHARP photovoltaic solar module and study the influence*

of the variation of the parameters" present the photovoltaic array model simulated with a circuit simulator using the Simulink Matlab as software for P.V. model simulation in all stages. This study's objective is to model and simulate the electrical operation of a solar P.V. model in the standard conditions and variants, whether environmental such as temperature and irradiation or physical such as series resistance and shunt and clarification influence of these variants on system behavior. In this analysis, authors design a P.V. system where the P.V. generator is the ND-240QCJ 240 watt module manufactured by SHARP Solar Electricity producing, under standard test conditions (S.T.C.), a peak power of 240 W, an optimum current of 8.75 A, and an optimum voltage of 37.5 V, is used as a reference.

To track the optimal operating point of solar energy, the authors in the paper "*Solar Energy Conversion Systems Optimization using Novel Jellyfish based Maximum Power Tracking Strategy*" present a novel computational intelligence technique used in the presence of normal and disturbed operating conditions. The novel Jellyfish optimization technique is used to modify the voltage of the photovoltaic array using a boost DC-DC converter. Experimental results of the implemented algorithm in a D.S.P. microcontroller show a good performance of the optimization algorithm in both normal and disturbed operating conditions.

In the paper "*5G Network Performance*," the authors propose to make a total cost optimization assignment cell to servers in an Edge computing network where a so-called meta-heuristic (M.H.) optimization method was chosen. The first task of the work is devoted to different methods used in server Edge placement network optimization, including M.H. methods. Second, the cell assignment to the Edge server problem is formulated. The third task is taken up by developing a Tabu Search (T.S.) application (of fourteen cells network and three Edge servers as a quasi-optimal procedure) for total costs of networks, simulated under MATLAB software. From perspectives, the results compared with other M.H. methods should be validated, and each cell's server capacity and traffic constraints have to be added.

AI infrastructure and security session starts with the paper "*Analysis of Machine Learning for Securing Software-Defined Networking*." The authors review and analyze machine learning-based schemes for securing the S.D.N. environment targeted by DDoS attacks, then discuss the schemes' method, performance metrics, datasets, and other remarks such as benchmarks, strengths, and weaknesses. The CIC-DDoS 2019 dataset is used to evaluate the performance of a set of classification algorithms widely used in machine learning-based DDoS attack detection in the S.D.N. environment. Finally, challenges and future directions in the development of machine learning-based detection schemes in S.D.N. are discussed.

The authors of the paper "*Lightweight Trust Model with Machine Learning scheme for secure privacy in VANET*" address the security threats as intelligent and smart devices became more and more common in everyday life. The authors propose machine learning and artificial intelligence on the road transport nodes by comparing trust and cryptography based on applications and security requirements of VANET, a vehicular ad hoc network transforming public transport into a safer wireless network, increasing its safety and efficiency.

In the paper "*Authentication mechanisms for IoT system based on distributed MQTT brokers: review and challenges*," the authors suggest leveraging Fog computing by developing a distributed architecture for MQTT that contains multiple brokers. In this case, IoT services can be coordinated and managed between Fog Computing and Cloud computing. The authors present the taxonomy and realization process of the IoT authentication scheme and include the challenges of applying authentication mechanisms for IoT systems based on distributed MQTT brokers.

A study on "*The 5G network slicing using S.D.N. based technology for managing network traffic*" provides 5G network traffic enhancements with the availability of 5G slices using Software Defined Multiple Access (SoDeMa). The author investigated three types of standardized slices (eMBB, IoT, and URLCC) to determine the availability of 5G slices. SoDeMa accessing technique is considered an excellent multiple access scheme for massive wireless connectivity in 5G and 5G+ wireless networks. In this novel network traffic model, generic SoDeMa is an innovation; it plays an important role in reducing the processing time, receiver complexity, and implementation cost. For future work, authors plan to develop a new network model with SoDeMa that could solve the real-time traffic problems to data handlers, service providers, etc.

Authors of the paper "*The 5G network slicing using S.D.N. based technology for managing network traffic*" provide 5G network traffic enhancements with the availability of 5G slices using Software Defined Multiple Access (SoDeMa). Three types of standardized slices (eMBB, IoT, and URLCC) to determine the availability of 5G slices are studied. SoDeMa accessing technique is considered an excellent multiple access scheme for massive wireless conn

Cryptography plays a vital role in achieving that level of security required on the cloud. Hybrid cryptography takes advantage of integrating more than one cryptographic algorithm to enhance the overall security and performance. The authors of the paper "*Implementation and Performance Analysis of Hybrid Cryptographic Schemes applied in Cloud Computing Environment*" present a comparative study for two-tier versus three-tier

hybrid cryptographic models applied to secure data on the cloud. Practical implementation is made to the studied hybrid models using python simulation. A performance analysis is conducted regarding encryption time, decryption time, average throughput, and efficiency using relatively larger data files. The Advanced Encryption Standard (A.E.S.) hybrid model showed better performance results than other algorithms. Also, the two-tier hybrid cryptographic model is more efficient than the three-tier model but with less security.

A new fault detection model based on deep learning for extracting features and detecting faults from large-sized digital circuits is introduced by the authors of the paper "*Fault Detection based on Deep Learning for Digital VLSI Circuits.*" The main goal of the proposed model is to avoid the search space using a stacked sparse autoencoder, a specific type of artificial neural network. The model consists of three phases: test pattern generation using ATALANTA software, feature reduction using SSAE, and classification for fault detection. Test vectors are utilized in SSAE as training data for the unsupervised learning phase. The performance of feature extraction is tested by changing the architecture of the SSAE network and sparsity constraint. The maximum fault coverage using the ATALANTA tool delivers around 99.2% using ISCAS'85, while the maximum validation accuracy of the SSAE model delivers around 99.7% in the feature reduction phase.

Authors of the paper "*Design and Implementation of a Face Recognition System Based on API mobile vision and Normalized Features of Still Images*" present a face recognition system for the Android mobile phone platform. The system includes face detection using a face detector available in the Android called object detection (Google's API mobile vision), features extraction (nose detection, mouth detection, eyes detection, and cheek detection) using the same algorithm object detection API. The system will accept a person's facial image as authenticated and allow access to the mobile applications if the percentage of correlation is greater than a chosen threshold; otherwise, it rejects the image. The recognition rate of the proposed approach achieved an accuracy of more than 95% compared to other approaches.

Predicting the trends in stock market expenses is a completely difficult task due to the many uncertainties involved and many variables that affect the marketplace value. The authors of the paper "*Stock Market Prediction Using Machine Learning*" compare stock market prediction by inputting different classifiers. Each machine learning algorithm is tested against the National Association of Securities Dealers Automated Quotations System (NASDAQ), New York Stock Exchange (NYSE), Nikkei, and Financial Times Stock Exchange (FTSE). Furthermore, several machine learning algorithms are compared with a normal and a leaked data set. Results conclude that Random Forest with leaked dataset and Bagging with leaked dataset provides better performance.

Predicting the trends in stock market expenses is a completely difficult task due to the many uncertainties involved and many variables that affect the marketplace value. Authors of the paper "*A Hybrid Watermarking Scheme Using Walsh Hadamard Transform and S.V.D.,*"

With the development and advent of Internet communications and multimedia technology, digital media need security, including audio, video, speech, and images. Several important requirements need to be met for effective watermarking data, such as transparency, low computational cost, robustness, and security. Authors in the "*A Hybrid Watermarking Scheme Using Walsh Hadamard Transform and S.V.D.*" present a full hybridized medical images watermarking approach based on Walsh-Hadamard Transform (W.H.T.) and singular value decomposition (S.V.D.). Both the host and watermark images were modified with singular values obtained by the (S.V.D.) approach. The simulation results demonstrate that this proposed watermarking framework is robust and achieves a high peak signal-to-noise ratio (PS NR) and high structure similarity index.

Finally, the authors of the paper "*5G Network Performance by Cell-Edge Servers Optimization Assignment (5GNP-CESOA)*" propose a mobile network by the combinatorial developed optimization methods, *i.e.*, the T.S. used in operational research and artificial intelligence. The perspectives of this work are to validate and compare the obtained results with other M.H. methods and add the server capacity and traffic constraints for each cell. Results obtained from the developed model show satisfactory output.

We want to thank the L&T Conference community for making this event possible. We would also like to thank the Guest Speakers for their enlightening and motivating presentations. Finally, we would like to thank the conference participants for joining the discussion. We look forward to welcoming you again to Effat University in Jeddah, Saudi Arabia, and hope you stay healthy and safe.

The Editors  
Akila Sarirete  
Zain Balfagih  
Mohamed El Amin Moussa

Miltiadis Lytras  
Anna Visvizi

### **Notes: The organizational structure of the L&T conference**

#### Patronage:

- Under the Patronage of Princess Lolwah Al Faisal – Vice Chair of the Board of Trustees & General Supervisor of Effat University

#### **The honourable conference committee members:**

- Dr. Haifaa Jamal Al-Lail – Effat University President.
- Dr. Mervat Chouman, Provost
- Dr. Mady Mohamed, Vice Dean, Graduate Studies and Research

Conference Chair: Dr. Akila Sarirete

#### Program Committee:

- Conference Chair: Dr. Akila Sarirete
- Program Chair: Dr. Zain Balfagih
- Program Co-Chair: Dr. Tayeb Brahimi

#### Scientific Committee:

- Dr. Mohamed El Amin Mousa
- Dr. Zain Balfagih
- Dr. Tayeb Brahimi
- Dr. Miltiades Lytras
- Dr. Anna Visvizi
- 

#### Keynote speakers who have greatly contributed to this conference:

- Dr. Aseel Addawood, Oracle AI & Data Science Ambassador for K.S.A.
- Prof. Mazhar Bari, S.V.P. technology & Innovation, Mind Sphere Application Center, K.S.A., Siemens Ltd
- Dr. Kaoutar El-Maghraoui, AI Researcher at IBM
- Prof. Selwa Al-Hazzaa, Founder C.E.O., Saudi Development Med (S.D.M.), Clinical Professor & Senior Consultant of Ophthalmology
- Dr. Areej Al Wabil, Associate Professor, Software Engineering, Alfaisal University & C.E.O. at HCID and Director of HCI Lab
- Mr. Abdulrahman Shiekh, V.P., Education E-Solutions, Technology Strategy Advisor, Big Innovation Center
- Mr. Hesham Galal, A.W.S. Public Sector Solutions Architect, Amazon, Saudi Arabia

#### Moderators and Sessions Chairs:

- Dr. Adel Ilahi, IT Director, Organization of Islamic Countries (O.I.C.).
- Dr. Enfel Barkat, Ass. Professor, Electrical and Computer Engineering, Effat University
- Dr. Basmah Al-Harbi, Ass. Professor, Department of Computer Science, Jeddah University
- Dr. Manal AbdulRahman Linjawi, Ass. Professor, Department of Artificial Intelligence, Jeddah University
- Prof. Shuyu Sun, Computational Transport Phenomena Laboratory, Physical Science and Engineering Division, KAUST
- Mrs. Suzane Katamoura, Senior Data Analyst, KACARE, Saudi Arabia