



JEEIT 2019 List of Accepted Papers

Track: Biomedical Engineering

Paper Title: A Comparison of Time Delay Estimation Methods and Interpolation Methods in Signal-Averaged ECG: Preliminary Results

Authors: Samer I. Awad, Mohammad Al-Abed and Amer Al Saraira (Hashemite University, Jordan)

Abstract: Signal-Averaged Electrocardiogram (SAECG) is a technique used to analyze ECG records for the detection of subtle changes in the electrical activity of the heart. Waveform alignment (or time delay estimation) of PQRST complexes is the core process in creating an SAECG. In this work, we employed several time delay estimation and interpolation methods to produce SAECG from 60, normal ECG Lead II, 10-second records, with added synthesized -30 dB white noise. Performance evaluation was carried out by calculating the ratio of signal to noise ratio (SNR) before and after averaging. Spline interpolation method consistently resulted in better performance compare to the linear and cosine methods. Additionally, the results of this study indicate that the sum of square differences (SSD) and sum of absolute differences (SAD) methods have comparable performances to that of the computationally costly cross correlation method.

Track: Biomedical Engineering

Paper Title: Gaussian Model of Electrooculogram Signals

Authors: Hiam Alquran, Ali Mohammad Alqudah, Isam Abu Qasmieh and Sami Almashaqbeh (Yarmouk University, Jordan)

Abstract: Modeling of biomedical signals is crucial and vital in compression, transmission, understanding, feature extraction, and prediction. Researchers devoted their efforts on modeling cardiac related signals such as ECG, PPG, and APP without concerning other types of biosignals such as EOG. This paper addresses the modeling of EOG signal with a novel method that employs a linear combination of 7 gaussian basis functions. The proposed method succeeded on modeling of 15 different eye movements directions with average RMS error of 1%.

Track: Biomedical Engineering

Paper Title: Classification of Fundus Images for Diabetic Retinopathy Using Artificial Neural Network

Authors: Nor Hazlyna Harun and Yuhanis Yusof (Universiti Utara Malaysia, Malaysia); Faridah Hassan (Universiti Malaysia Perlis, Malaysia); Zunaina Embong (Universiti Sains Malaysia, Malaysia)

Abstract: People with diabetes may suffer from an eye disease called Diabetic Retinopathy (DR). This is caused by damage to the blood vessels of the light-sensitive tissue at the back of the eye (i.e retina). Fundus images obtained from fundus camera are often imperfect; normally are in low contrast and blurry. Hence, causing difficulty in accurately classifying diabetic retinopathy disease. This study focuses on classification of fundus image that contains with or without signs of DR and utilizes artificial neural network (NN) namely Multi-layered Perceptron (MLP) trained by Levenberg-Marquardt (LM) and Bayesian Regularization (BR) to classify the data. Nineteen features have been extracted from fundus image and used as neural network inputs for the classification. For analysis, evaluation were made using different number of hidden nodes. It is learned that MLP trained with BR provides a better classification performance with 72.11% (training) and 67.47% (testing) as compared to the use of LM. Such a finding indicates the possibility of utilizing BR for other artificial neural network model.

Track: Biomedical Engineering

Paper Title: Spinal Curvature Kinematics of Stair Ascending for the Second and the Third Trimesters of Simulated Pregnancy in a Month by Month Basis

Authors: Sami Almashaqbeh, Qasem Qananwah, Hiam Alquran, Esra'a Alkhatib, Aya Alomari and Roa Alzain (Yarmouk University, Jordan)

Abstract: Pregnant women may adopt some postural adjustments, especially in the lumbar and thoracic regions of the spinal column, in order to cope with the weight gained during pregnancy to improve the stability. Stair climbing is one of the daily activity pregnant women perform almost everywhere they present. The objective of the current study is to investigate stair ascending spinal curvature kinematics in simulated pregnancy during the second and the third trimesters in a month by month basis. Compared to non-pregnant, simulated pregnancy in the 9th month show significantly greater thoracic angle ($P=0.005$). The 7th,8th, and 9th month of simulated pregnancy show greater lumbar angles with P values of 0.033, 0.01, and 0.046, respectively, compared to non-pregnant. The increase of lumbar extension Angle may be adopted in order to relocate the position of the center of gravity posteriorly in response to the anteriorly added mass to improve stability.

Track: Biomedical Engineering

Paper Title: Smart Muscle Strength Assessment Glove for Rehabilitation Purposes

Authors: Fatima Khaled Khwaileh (Jordan University Of Science And Technology, Jordan); Yahia F. Makableh (Jordan University of Science and Technology, Jordan); Enas Yassir Ghabashneh (Jordan University of Science & Technology, Jordan); Tasneem Harahsheh (Jordan University of Science and Technology, Jordan)

Abstract: Muscle strength assessment is the first and most important step in the evaluation of the injured people. This test is usually performed by experienced therapeutic personals. Yet, the assessment is being performed in manual methods, where only the therapeutic experience is used in this process. This involves many errors and misunderstanding of the exact muscle behavior of the injured person. Hence, there is a critical need for a low cost, easy to use, and portable muscle strength assessment device that can help physiotherapists' during their patient's evaluation process. This work presents a smart wearable glove device that can measure muscles functionality, and injury classification with high accuracy in real time. The hardware is designed using force resistive sensors fixed on the tip of glove fingers, and load cell on the palm in order to take force measurements with high accuracy. Artificial Neural Network algorithm is implemented by using backpropagation method for the classification of the injury level with high accuracy. Real data were gathered from charity takaful association located in Al Ramtha, with sample size equals to 50 patients at different strength levels. Based on the measured data a neural network was trained to classify such data into the different five levels. The newly designed system is successfully trained by the measured data and the neural classifier shows (98%) testing accuracy, the hardware after implementation was successfully used by a physiotherapist in the patients' evaluation process.

Track: Biomedical Engineering

Paper Title: Epileptogenic Foci Time Varying Source Localization Using Source Affine Image Reconstruction (SAFFIRE) Algorithm

Authors: Sajedah Ahmad Al-Momani (American University of Sharjah, United Arab Emirates); Hasan Al-Nashash (AUS, United Arab Emirates); Hasan Mir (American University of Sharjah, United Arab Emirates)

Abstract: This paper presents the performance of the Source Affine Image reconstruction algorithm (SAFFIRE) on an epileptogenic foci time-varying source localization. This algorithm is based on the recursive implementation of the minimum mean squared error (MMSE) estimator. The SAFFIRE algorithm is applied on a synthetic EEG signal originated from different sources' scenarios. The simulation results show how the algorithm is able to localize and track the sources as they vary with time with a high resolution even if the sources are located close to each other.

Track: Biomedical Engineering

Paper Title: ECG Abnormality Detection from PPG Signal

Authors: Sajidah Al-Hammouri (Jordan University of Science and Technology, Jordan); Awad Al-Zaben (Yarmouk University, Jordan); Malak Fora (Jordan University of Science and Technology)

Abstract: Cardiac Arrhythmia is a serious and common cardiovascular disease. Electrocardiographic signal (ECG) is usually used for diagnosis. In addition, multi model signal is also used to reduce false alarms in detecting abnormalities. New directions were turned around using Photoplethysmographic signal (PPG) because of its tremendous advantages. This paper presents an algorithm to detect heart beat abnormalities from PPG signal only (mono type). This method relies on 11 features extracted from 3 subgroups: 4 features from hemodynamic system frequency response where each PPG beat was assumed to be the output, 5 features were extracted from statistical parameters of fitting technique. In which each PPG pulse was approximated as a mixture of Poisson function. Moreover, 2 features were related to time domain-properties. This algorithm was tested and evaluated using MIMIC and MIMIC III databases. Features were then classified using Random forest tree and k-nearest neighbors (KNN) classifiers, promising results were obtained from both with values of 99% , 95% for accuracy, precision respectively.

Track: Biomedical Engineering

Paper Title: Automated Cell Counting System for Chronic Leukemia

Authors: Nor Hazlyna Harun, Nur Azzah Abu Bakar, Uvagheshvary Mohan, Maslinda Mohd Nadzir and Mohamad Ghozali Hassan (Universiti Utara Malaysia, Malaysia)

Abstract: Leukemia is a group of cancers which create a large amount of immature white blood cells. Abnormal numbers of white blood cells may suggest a screening of leukemia, and the blood sample is examined under the microscope to observe if the cells appear abnormal. The manual screening of chronic leukemia is time consuming and tedious while the Automated Hematology Analyzer is too expensive, particularly for the third world countries. This has been made exacerbated by the gold standard of biopsy inspiration which is painful and invasive for the patient. An automated cell counting (ACC) system for chronic leukemia has been developed to support and ease the routine of hematologist and technologist in the screening process and to give a quick and accurate result. The fusion of image processing technique has been proposed, which include four main stages, i.e. image acquisition, image segmentation, noise removal and counting process. Based on the sensitivity test over 100 images of chronic cells, an overall result shows 98.94% sensitivity of the system performance and the processing time recorded is less than 6 second per image. This proved an excellent level of ACC system performance. It is concluded that the system is suitable to be used as an automated counting system for chronic leukemia disease due to its sensitivity and ability to reduce the time taken for screening process.

Track: Communications

Paper Title: ICI and PAPR Enhancement in MIMO-OFDM System Using RNS Coding

Authors: Mohamed Abd ElGhany (Al-Azhar University - CAIRO - EGYPT, Egypt); Amr El-Sayed Emam and Mohamed Ibrahim Youssef (Faculty of Engineering - AL-Azhar University, Egypt)

Abstract: The Inter-Carrier-Interference (ICI) is considered a drawback in the utilization of Multiple-Input-Multiple-Output Orthogonal Frequency Division Multiplexing (MIMO-OFDM) systems, due to the sensitivity of the OFDM towards frequency offsets which lead to loss of orthogonality, presence of signal interference and degrading the overall system performance. In this paper Residue Numbers as a coding scheme is impeded in MIMO-OFDM systems, where the ICI levels is measured and evaluated with respect to the conventional ICI mitigation techniques as pulse shaping, windowing and self-cancellation techniques implemented in MIMO-OFDM system. The Carrier-to-Interference Ratio (CIR), Bit-Error-Rate (BER) and the Complementary Cumulative Distribution Function (CCDF) for MIMO-OFDM system with Residue Number System (RNS) coding are analyzed and evaluated. The results demonstrated a performance enhancement in the transmission model with RNS implementation.

Track: Communications

Paper Title: Performance Analysis of a JPEG Image Compression and Transmission System Using LabVIEW®

Authors: Mussawir Hosany and Heman Joyekurrun (University of Mauritius, Mauritius)

Abstract: The JPEG image compression standard is the most popular standard in use today. Due to increasing demand for image transmission in communication, the research in the field of image compression has increased significantly. Image compression is also very important for efficient transmission and storage. This research work analyses the different lossy image compression using Discrete Cosine Transform (DCT) and Discrete Wavelet Transform (DWT) strategies for JPEG image transmission. Both image compression techniques have been evaluated using RGB and grayscale images so as to justify which techniques give the best PSNR value. In the proposed technique an image was converted to JPEG and DCT image compression has been applied to reduce the consumption of expensive resources such as storage space and transmission bandwidth. DWT image compression was performed using Daubechies wavelet type to achieve the best image compression with better PSNR value of the reconstructed image. A gain of 4dB in PSNR was observed with DWT over DCT image compression. Two image transmission systems have been designed and implemented in LabVIEW®. It is shown that our transmission system successfully transferred the image over the TCP/IP and SMTP protocols. This proposed system therefore, provides an enhanced solution for the compression and transmission of JPEG images employing DWT technique and a gain of 4dB which implies a significant improvement in image fidelity. This novel technique can be applied in real life applications and communication systems.

Track: Communications

Paper Title: Design of Ka-band Transceiver for Satellite Communication

Authors: Hamed Alsuraistry (King Abdulaziz City for Science and Technology, Saudi Arabia); Tian-Wei Huang (National Taiwan University, unknown); Ian Huang (National Taiwan University, Taiwan)

Abstract: This paper presents the design of Ka-band low- power transceiver. Due to the rapid development of the Internet of Thing (IoT), the strong demand for low power wireless communication system is growing day by day. With the rapid progress of CMOS technology, the cutoff frequency of transistor is greatly increased. There are many new opportunities for CMOS in RF circuits. However, it's still a challenging mission to realized low-power consumption and high-performance CMOS RF circuits. This paper tried to use the standard 0.18- μm CMOS process with a compact chip size to realize the LNA/driver amplifier/frequency converter/phase shifter for Ka-band satellite communications. The final output stage is using GaAs p-HEMT for high power amplifier.

Track: Communications

Paper Title: Stub Resonator Tunable Bandpass and Lowpass Filters Using Shunt Stub Resonators

Authors: Yanal S Faouri (University of Jordan, Jordan); Hanin Sharif and Leena Smadi (The University of Jordan, Jordan)

Abstract: In microwave applications, filters are used to pass frequencies within a certain range(s), and rejects the other. The microwave bandpass filter at high frequencies above 0.3 GHz will be constructed using transmission lines instead of lumped elements due to the shorter wavelength. This project is intending to design a tunable microwave bandpass filter to be used in WIFI, Bluetooth and GSM applications, within the range of 1.85 GHz to 3.27 GHz with a maximum insertion loss of 1.14 dB, and a low pass filter with cutoff frequency varies from 0.61 GHz to 0.93 GHz. So, this filter is designed to work for these applications by changing the resonant frequency, using a varactor diode. The proposed filter is a maximally flat third order filter implemented using stubs

Track: Communications

Paper Title: Dual-Band Tunable Microwave Bandpass Filter Using Stepped Impedance Technique

Authors: Yanal S Faouri (University of Jordan, Jordan); Hanin Sharif and Leena Smadi (The University of Jordan, Jordan)

Abstract: This paper is focused on designing a BPF at microwave bands that uses alternating very high and very low characteristic impedance microstrip transmission lines and can be electronically tuned by using a hyper-abrupt junction varactor to shift the center frequency. intending to present a Dual-Band Tunable microwave bandpass filter to be used in WIFI, Bluetooth, GSM, and other antennas applications. The filter is a maximally flat third order filter, implemented using a stepped impedance method. The first band is tuned between 1.75 - 2.66 GHz with an

average bandwidth of 160 MHz, and the second band covers the range between 3.85 - 4.54 GHz with an average bandwidth of 70 MHz.

Track: Communications

Paper Title: Outage Performance of Multiuser Mixed RF/Parallel Relay-assisted FSO Systems

Authors: Wagdy Ameen Alathwary and Essam Saleh Altubaishi (King Saud University, Saudi Arabia)

Abstract: In this work, we study the outage performance of multiuser mixed radio frequency (RF)/parallel relay-assisted free-space optical (FSO) systems with decode-and-forward (DF) relaying over strong turbulence conditions, where the FSO link experiences Gamma-Gamma distribution with pointing errors and path loss, and the RF link experiences Nakagami-m fading. A closed-form expression for the outage probability is derived. The results show that both multiuser diversity and parallel relays introduce an improvement in the outage performance of the considered system, where the system performance is dominated by the FSO link at the low values of the average signal-to-noise ratio (SNR) of the FSO link, whereas, the RF link is dominated at larger values. The perfect match of the numerical results and Monte Carlo simulations confirms the accuracy of the derived expression.

Track: Communications

Paper Title: Hexagonal Patch Antenna with Triple Band Rejections

Authors: Yanal S Faouri (University of Jordan, Jordan); Noor Awad (University of Jordan & University of Jordan, Jordan); Mohamed K Abdelazeez (University of Jordan & Electrical Engineering Dept, Jordan)

Abstract: In this paper, a new planar hexagonal shaped antenna with triple band rejections is presented. The hexagonal patch is designed on FR4-substrate, having circular cuts at its vertices and fed by 50 Ω micro-strip triangular tapered feed line. This antenna with a partial ground plane and five half circular sleeves achieves a 26.15 GHz bandwidth (with return loss ≥ 10 dB). Triple-frequency band rejections are achieved by adding an inverted E-shaped stub in addition to two triangular slots in the patch and square slot with a parasitic square inside. The proposed antenna is investigated using the high-frequency structure simulator (HFSS). The simulated scattering parameter S11 (Reflection Coefficient) results show three band rejections (1.66 - 3.29), (4.72 - 5.81) and (7.86 - 8.62) GHz to reject the unwanted interference from several applications. A small value of gain at the rejection bands with good radiation patterns in E-plane and H-plane are achieved.

Track: Communications

Paper Title: A Robust Sparse System Identification via Integrating an Individualized Time-Varying Stepsize Adjustments

Authors: Haider Mohamed K and Ikhlas Abdel-Qader (Western Michigan University, USA); Moath Alsafasfeh (Al-Hussein Bin Talal University & College of Engineering, Jordan)

Abstract: In this paper, we present a new adaptive filter solution that mitigates the impact of highly correlated input signals to a system with sparse and long impulse response, reduces negative effect of sparsity measures on the performance of sparse related algorithms, and improves the trading-off between achieving a fast convergence rate and attaining a small steady-state MSE. We based this new solution on a recently proposed technique [18] that innovatively employs a tap-individualized time adjusting stepsize. Based on the total input power and input signal associated with the underlying tap, each tap of the adaptive filter has its own variable stepsize adjustment. This adjustment is based on a logarithmic formulation designed to deliver a consistent reduction in stepsize in each iteration by leveraging the low input excitation and, at the same time, compressing the high input excitation into a relatively moderate input range. Simulation results show that the proposed algorithm delivers superior performance, at various system sparsity levels and input types, compared with known sparse-aware algorithms.

Track: Communications

Paper Title: A Compact Ultra-Wideband Patch Antenna with Dual Band-Notch Performance for WiMAX / WLAN

Services

Authors: Mohamed S. Soliman (Taif University, Saudi Arabia); Majed Dwairi and Amjad Hendi (Faculty of Engineering Technology Al-Balqa Applied University, Jordan); Ziad Alqadi (BAU, Jordan)

Abstract: This paper presents a compact size ultra-wideband (UWB) patch antenna operating over frequency range of 3.02-13.84 GHz and has dual-band notched characteristics for WiMAX and WLAN wireless narrow-band applications. The designed antenna has a monopole nature constructed on a FR4-epoxy substrate with a microstrip transmission line feed style and has a partial ground plane configuration. For developing a dual-band notch performance, a mirror L-shaped connected together from the top has been etched near to the of the feed line terminal connected to the patch for suppressing the WiMAX operating band. Furthermore, a split ring resonator (SRR) slot configuration has been notched on the lower part of the patch for eliminating the WLAN frequency band. The proposed antenna has been designed using CST-EM software package. All the dimensions introduced in the proposed antenna have been optimized to obtain the proper antenna performance. The antenna characteristics have been investigated in terms of the impedance bandwidth, surface current distribution, maximum gain, radiation efficiency, and radiation pattern. The simulation results demonstrate that the antenna has good performance for UWB services.

Track: Communications

Paper Title: Dispersion Diagram of a Novel Multi Band EBG Structure Using FDTD/GPOF Technique

Authors: Abdulla Abograin and Ahmed Abulkassem (University of Tripoli, Libya)

Abstract: The problem of surface waves usually degrades the performance of planar circuits and antennas, to reduce its effects, the electromagnetic band gap (EBG) structures are applied to suppress these undesired waves at certain bands. In this paper a novel multi band planar structure is simulated using finite difference time domain where the eigen frequencies are captured using the generalized pencil of function (GPOF) technique. By plotting the dispersion diagram of the structure, a surface wave propagation at 1.92-3.05GHz, 3.77-4.48GHz and 4.65-5.78GHz bands is prohibited, thus making the proposed structure suitable for WLAN requirements.

Track: Communications

Paper Title: Two Feed Reconfigurable Microstrip Patch Antenna for Polarization Diversity

Authors: Malek Al-mallah and Zaid Saleh (The University of Jordan, Jordan); Yanal S Faouri (University of Jordan, Jordan)

Abstract: This paper proposes a rectangular patch antenna fed from two orthogonal microstrip lines for polarization diversity. Different polarization states are achieved by using four PIN diodes placed at the patch corners. The PIN diodes are biased by an external DC circuitry to switch their states. This antenna has an operating frequency of around 2.4 GHz and can produce LHCP, RHCP, and linear polarization when the signal is fed from the horizontal feed and the vertical feed, so six polarization states are achieved. Antenna characteristics such as reflection coefficient, axial ratio, gain, and radiation pattern are being investigated through optimizing all antenna dimensions. This antenna is suitable for many wireless applications.

Track: Communications

Paper Title: Applications of Visible Light Communication for Distance Estimation: a Short Survey

Authors: Yousef Almadani (Manchester Metropolitan University, United Kingdom (Great Britain)); Muhammad Ijaz (Manchester Metropolitan University, Manchester, United Kingdom (Great Britain)); Sujana Rajbhandari (Coventry University, United Kingdom (Great Britain)); Umar Raza (Manchester Metropolitan University & University of Bradford, United Kingdom (Great Britain)); Bamidele Adebisi (Manchester Metropolitan University, United Kingdom (Great Britain))

Abstract: Visible light communication (VLC) technology using light emitting diodes (LEDs) is projected to be widely used for a variety of applications due to its many advantages. Using VLC for positioning and vehicle communications is just a few of the applications envisioned for this technology. These applications, however, rely

on accurate distance measurements. In this paper, a survey on distance estimation using VLC is presented. The survey presents a range of methods proposed in the literature that differ in design requirements and complexity. Furthermore, this paper also discusses the challenges and the corresponding applications for the examined methods.

Track: Communications

Paper Title: An Efficient Algorithm for large-scale RFID Network Planning

Authors: NI H T (UTHM, Malaysia); Khalid Hasnan (Universiti Tun Hussein Onn Malaysia, Malaysia); Azli Nawawi (Universiti tun Hussein Onn Malaysia (UTHM), Malaysia); Adel Elewe, AM (Faculty of Mechanical and Manufacturing Engineering & UTHM, Malaysia); Abdullah Haslina (Universiti Kebangsaan Malaysia, Malaysia); Suhaidah Tahir (Ipoh Campus, Malaysia)

Abstract: The radio frequency identification RFID is widely used technology for RNP Network Planning. The large scale network planning design process needs a significant number of interrogating antennas based on the reader-tag range communication. The challenges of large scale RNP problems considered a high computational cost due to the time consuming of RFID readers placement error. It results in less than optimal tag coverage. In this paper, a model of multi-objective function for RFID readers placement was conducted on different large scale condition to evaluate the effect of network planning expansion. A comparative analysis performed with three developed algorithms based on the same dataset. The dataset was performed for the area of 80m x 80m and 150m x 150m. Simulation results exhibited that the performance of Gradient-Based Cuckoo Search (GBCS) present optimal tags coverage with the minimum number of deployed readers and superior in solving large scale RNP problems.

Track: Communications

Paper Title: Retinex-Based Framework for Visibility Enhancement During Inclement Weather with Tracking and Estimating Distance of Vehicles

Authors: Marwan Alluhaidan (Western Michigan University & Western Michigan University, USA); Moath Alsafasfeh (Al-Hussein Bin Talal University & College of Engineering, Jordan); Ikhlas Abdel-Qader and Osama Abudayyeh (Western Michigan University, USA)

Abstract: Inclement weather directly impacts the number of vehicle accidents and fatalities, due to low and no-visibility conditions. According to the U.S. Department of Transportation, there are more than 1,259,000 crashes each year. On average, 6,000 people are killed, and more than 445,000 people are injured annually due to severe weather conditions. These accidents could be significantly reduced if real-time visibility enhancement systems were made available. However, eliminating the impact of weather conditions on visibility is still lacking and beyond our control. In this paper, the Retinex technique was selected as the framework for developing a system capable of enhancing visibility for drivers. It was selected for its ability to achieve a good dynamic range compression and spectral rendition. Hence, an innovative system is proposed through a multistage framework that not only incorporates a modified Retinex technique but also integrates object detection and depth estimation to overcome some of the current algorithms' and systems' drawbacks. The performance of the proposed system, along with histogram equalization and the basic Retinex enhancement techniques, are presented. The Performance was assessed using Peak Signal to Noise Ratio (PSNR) and Structural SIMilarity (SSIM) parameters.

Track: Communications

Paper Title: Characteristics of Actively Mode-Locked Erbium Doped Fiber Laser Utilizing Ring Cavity

Authors: Shaymaa Tahhan (Al-Nahrain University, Iraq); Ahmad Atieh (Optiwave Systems Inc & University of Ottawa, Canada); Mudhafar Hussein Ali (AL-Iraqia University, Iraq); Mehedi Hasan (Bangladesh University of Business and Technology (BUBT), Bangladesh); Abdulla Khudiar Abass (Universit of Technology, Iraq); Trevor J Hall (University of Ottawa, Canada)

Abstract: A simple active mode-locked erbium-doped ring fiber laser is proposed. The fiber laser operates in the wavelength range 1525nm to 1565nm. A Gaussian pulse train drives an intensity modulated placed inside the laser cavity. The active mode-locked laser produces a train of pulses with width as low as 30ps at a repetition rate of

1GHz.

Track: Communications

Paper Title: Regular-Shaped Geometry-Based Stochastic Model for Vehicle-to-Vehicle Visible Light Communication Channel

Authors: Farah M. Alsalami (Coventry University, United Kingdom (Great Britain)); Zahir Ahmad (Coventry, United Kingdom (Great Britain)); Olivier Haas (Coventry University & Control Theory and Applications Centre, United Kingdom (Great Britain)); Sujan Rajbhandari (Coventry University, United Kingdom (Great Britain))

Abstract: This paper proposes an outdoor vehicle-to-vehicle visible light communication (VVLC) channel model. Due to the lack of a realistic channel model that takes the vehicles mobility and the light propagation nature into consideration, we propose a regular-shaped geometry based stochastic channel model (RS-GBSM). Particularly, we suggest the ellipse shape to describe the line of sight (LOS) and the reflection components of the VVLC. This approach offers flexibility to describe vehicles' locations, speed and direction as well as stationary and non-stationary reflectors which are changing rapidly and continuously. The simulation results demonstrate that the LOS channel component is more affected by the direction of motion than the reflection component, whereas the reflection component is more affected by the relative speed of the vehicles.

Track: Communications

Paper Title: ZF/MMSE and OSIC Detectors for UpLink OFDM Massive MIMO Systems

Authors: Abdelhamid Riadi, Mohamed Boulouird and Moha M'Rabet Hassani (Cadi Ayyad University, Morocco)

Abstract: This paper describes a Least Squares (LS) channel estimation scheme for Massive MIMO systems combined with Orthogonal Frequency Division Multiplexing (OFDM). First, we compute the Mean Square Error (MSE) of the LS channel estimated in a Rayleigh fading channel. Second, if channel estimation was available at the receiver (Base Station), the data detection could be made by linear and nonlinear detectors i.e (ZF, MMSE) and (SNR-Based Ordering, OSIC-SINR-Based Ordering) respectively. Simulation show that when we increase the number of antennas at the Base Station (BS), the nonlinear detectors perform more in terms of Bit Error Rate (BER).

Track: Communications

Paper Title: Tunable FSS Using PIN Diodes and Microcontroller

Authors: Khalid S Alsatti and Safwan Ibrahim (King Abdulaziz University, Saudi Arabia)

Abstract: In this paper, we proposed a tunable frequency selective surface (FSS) which is electronically switchable using a microcontroller. The unit cell of the FSS has the shape of a square loop aperture, each aperture includes a pin diode at 90-degree interval. This active FSS design has two features, it can transmit at 2.45 GHz with an ON and OFF switch. Also, the measurement shows that the frequency response of the proposed design cannot be affected with respect to the angle of incidence changes up to ± 45 degree from normal. The integration of the microcontroller makes the ability of the switching property easier, which has the potential of developing smart applications.

Track: Communications

Paper Title: Jumping Particle Swarm Optimization Algorithm for Robust Image Watermarking

Authors: Atheer Bassel (Universiti Kabangsan Malaysia (UKM), Malaysia)

Abstract: The tradeoff between the embedding energy of watermark and the perceptual translucence and the image fidelity following attacks represent an important issue in watermarking images. In this paper, proposed a population based method called jumping particle swarm optimization algorithm (JPSO) to solve the improve ownership and imperceptibility of image. We employed JPSO algorithm to optimize the watermarked image quality (robustness) of the extracted watermarks. The former can be overcome by embedding the owner's components of the watermark into the host image, the latter is dependent on how much the quantity for the scaling factor of the

principle components is embedded. To improve the quality of watermarking (robustness), JPSO is used for optimize the suitable scaling factor. In JPSO invisible watermarking, the global and local characteristics of the host as well as watermark images within the Singular Value Decomposition (SVD) domain were utilized. Experimental result of the proposed technique proves the watermark image ownership and can be reliably identified even after severe attacks. The comparison of the proposed technique with the state of the art show the superiority of our proposed technique where it is outperforming the methods in comparison.

Track: Communications

Paper Title: Parasitic Element Based Decoupling Network for a Two-Element MRI Phased Array

Authors: Sanaa Salama (Arab American University, Palestine); Ashraf Abuelhaija (Applied Science Private University, Jordan)

Abstract: A parasitic-element based Decoupling Network (DN) for 7-Tesla Magnetic Resonance Imaging (MRI) phased arrays is presented to compensate for the effect of mutual coupling between array active elements. The DN network consists of an open circuited parasitic element in parallel between a two-element MRI array, each element in the array is a rectangular loop-shape microstrip transmission line Radio Frequency (RF) coil. L-shaped tunable matching network is integrated, the whole structure is optimized to operate at the resonant frequency of the 7-Tesla MRI system. Numerical modeling of the whole structure is carried out using CST to characterize and verify the performance of the open circuited parasitic element based decoupling network for a two-element MRI array.

Track: Computer Engineering

Paper Title: A Reverse Converter for Three-Moduli Set $(2^k, 2^{n-1}, 2^{n+1})$, $k < n$

Authors: Ahmad Hiasat (Princess Sumaya University for Technology, Jordan)

Abstract: This work proposes a new residue-representation to binary-representation arithmetic converter for the three-moduli set $(2^k, 2^{n-1}, 2^{n+1})$, where n and k are positive integers such that $1 < k < n$. The proposed reverse conversion algorithm uses the Chinese-Reminder-Theorem. The paper also introduces the multiplicative inverses needed to implement the conversion process. The structure suggested in this paper is more efficient than other similar recently proposed structure. Based on VLSI layout simulation results, the proposed structure has a better area, time and power performance by 22.5%, 24.6%, and 20.5%, respectively, when compared with the competitive structure.

Track: Computer Engineering

Paper Title: Linear Processor Array Architectures for Similarity Distance Computation

Authors: Awos Kanan (Princess Sumaya University for Technology, Jordan); Fayez Gebali (University of Victoria, Canada); Atef Ibrahim (Prince Sattam Bin Abdulaziz University & Electronics Research Institute, Saudi Arabia); Kin Fun Li (University of Victoria, Canada)

Abstract: Processor array architectures have been employed, as an accelerator, to compute similarity distance found in a variety of data mining algorithms. However, most of the proposed architectures in existing literature are designed in an ad hoc manner. Furthermore, data dependencies have not been analyzed and often only one design choice is considered for the scheduling and mapping of computational tasks. In this work, we present a systematic technique to design linear processor arrays for the computation of similarity distance matrices. The technique employed is used to define the computation domain of the algorithm, with time restrictions on input and output variables. Six scheduling vectors and their associated projection matrices are generated to illustrate our systematic technique. The six possible design options obtained are analyzed in terms of area and time complexities. We are also able to derive a previously existing processor array in the literature by modifying the scheduling vector for one of the proposed architectures. Field Programmable Gate Array (FPGA) Implementations show that our proposed architecture achieves better performance in both speed and area.

Track: Computer Networks

Paper Title: Performance Enhancement in 5G Cellular Networks Using Priorities in Network Slicing

Authors: Mohammad M. Shurman, Raffi Al-Qurran, Eyad Taqieddin, Abd Alrahman Al Nounou and Omar Oudat (Jordan University of Science and Technology, Jordan)

Abstract: Network Slicing is one of the key features of the new 5G cellular network communication, it proposes the division of one physical network into multiple virtual networks to achieve specific goals such as security, flexibility and control over the network that will provide logical isolation in the devices, services and core networks set up for different characteristics and different types of services. Our proposed work uses end-to-end network slicing concept in 5G networks to solve the key issue of isolating the slices via prioritizing them in order to increase performance and decrease latency for high priority applications. Simulation results using NS-3 network simulator prove our claims and show enhancements in latency and performance

Track: Computer Networks

Paper Title: Advanced Survey of Blockchain for the Internet of Things Smart Home

Authors: Maha AbuNaser and Ahmad Alkhatib (Al-Zaytoonah University of Jordan, Jordan)

Abstract: Internet of things have many applications, one of them is smart homes. The main drawback of IoT that depends on a centralized cloud. The Blockchain approach with a decentralized technique will solve the centralized cloud approach. Smart homes have many security issues, threats, attacks, user privacy, integrity, etc. Blockchain is playing role in many IoT applications also the solution of these security problems. This paper explains the Blockchain in smart home with the main three tiers, how Blockchain can help to secure the data, transaction, also describe the security analysis in IoT smart homes.

Track: Computer Networks

Paper Title: The Impact of Nodes Distribution on Energy Consumption in WSN

Authors: Yousef Jaradat and Mohammad Masoud (Al-Zaytoonah University of Jordan, Jordan); Ismael Ahmad Jannoud (AlZaytoonah University of Jordan, Jordan)

Abstract: In this paper, a study of the effect of different node distributions on energy consumption in wireless sensor network is conducted. Three different node placement distributions are utilized namely, uniform, normal, and exponential distributions. LEACH clustering algorithm is utilize to evaluate the performance of the three node placement strategies in terms of energy expenditure, network throughput and network lifetime. In general, it was noticed that normal distribution of network nodes outperforms the other distributions regarding energy consumption, throughput and network lifetime especially when the sink node is distant.

Track: Computer Networks

Paper Title: To Cluster or Not to Cluster: A Hybrid Clustering Protocol for WSN

Authors: Mohammad Masoud and Yousef Jaradat (Al-Zaytoonah University of Jordan, Jordan); Ismael Ahmad Jannoud (AlZaytoonah University of Jordan, Jordan)

Abstract: Clustering protocols in wireless sensors networks (WSN) have dominated as a tailored routing protocols to harvest and route data from sensors nodes to the sink station. A lot of clustering protocols have been proposed in the literature. However, does clustering algorithms work correctly in all cases? In other words, is it necessary for the nodes to be clustered during the network lifetime? In this work, a new Hybrid Clustering Routing Protocol (HCP) is proposed. The new protocol consists of two main phases; cluster formation and data forwarding. In the first phase, sensors nodes decide to forward the traffic to the cluster head or directly to the sink node according to a threshold value. In this case, if the number of nodes in the network becomes small and scattered, no clustering will be performed. We simulated HCP and compared its performance with LEACH and LEACH-T. The results show reduction in network power consumption and an increase of the network lifetime by 30%.

Track: Computer Networks

Paper Title: An Enhanced End to End Route Discovery in AODV Using Multi-Objectives Genetic Algorithm

Authors: Firas Albalas (Jordan University of Science and Technology & Jordan, Jordan); Omar Mohammad Almomani (The World Islamic Science & Education University, Jordan); Reema Abujazoh and Yaser Khamayseh (Jordan University of Science and Technology, Jordan); Adeb Alsaaidah (The World Islamic Sciences & Education University (WISE), Jordan)

Abstract: this paper presents a multi objectives genetic algorithm approach for the Ad-hoc On-Demand Distance Vector (AODV) Routing Protocol for Wireless Sensor Network (WSN). AODV used individual routing metric in the form of minimum-hop count and this led to generate two problems: First, utilizing shortest path all time that can be overload in the selected path which produce to unbalanced energy depletion and traffic congestion. Secondly, routing during short path and weak link quality is more harmful than over long path strong link quality as it can suffer retransmissions and packet drops. The propose algorithm will overcomes these problems by using Genetic algorithm in which composite multi metric routing criterion by integrating three parameters energy factor, traffic load and hop factor the protocol called MGAOVD. Routing based multiple criterions can be combined into a individual criterion to get better performance. The MGAOVD proposed protocol implemented using simulation environments using NS2 simulation. Results from MGAOVD propose algorithm show outperform compare to original AODV in terms of increase packet delivery ratio, decreased energy consumption, decreased end-to-end delay, and decreased overhead.

Track: Computer Networks

Paper Title: Virtual Node Schedule for Supporting QoS in Wireless Sensor Network

Authors: Wesam Almobaideen (Rochester Insitute of Technology, United Arab Emirates); Mohammad Qatawneh and Orieb Talal AbuAlghanam (University of Jordan, Jordan)

Abstract: Providing a Quality of Services (QoS) in Wireless Sensors Network (WSN) is one of the challenging issues due to resource constraints in terms of memory, bandwidth, processing power, and power sources that are inherent properties of WSN nodes. To overcome these limitations, and improve QoS provisioning in clustered and TDMA scheduled WSN, we introduce the Virtual Nodes concept to improve the throughput, and decrease the overall latency of delivering data sent from critical nodes to the sink node. Simulation results show that the latency is reduced compared with non-use of virtual node. In addition to that throughput increases as the number of critical nodes increases.

Track: Computer Networks

Paper Title: Hybrid Neural Network to Impute Missing Data for IoT Applications

Authors: Nabeel Refat Al-Milli and Wesam Almobaideen (University of Jordan, Jordan)

Abstract: The new development of the Internet of Things (IoT) depends on reliable data delivery, where transferring data between devices should be accurate and fast to ensure high performance for IoT applications. In general, IoT applications that have low quality of data delivery due to several factors such as connections error, sensor faults, or man in middle attacks. Low quality of data delivery will reduce the performance of IoT applications since the collected data is incomplete. Complete data should be achieved to meet the main requirements of IoT applications. In this paper, we propose a hybrid neural network with genetic algorithm to impute the missing data for medical IoT application. A deep learning neural network (Jordan network) is used to as a model to predict the missing data, while the genetic algorithm is adopted to optimize the weights of the neural network. The obtained results show that the proposed algorithm is able to impute missing data with high classification value based on Area Under the Curve (AUC).

Track: Computer Networks

Paper Title: Mobility Effect on the Authenticity of Wireless Sensor Networks

Authors: Iman Almomani (Prince Sultan University, Saudi Arabia); Katrina Sundus (University of Jordan, Jordan)

Abstract: Wireless Sensor Networks (WSNs) are highly targeted by security attackers due the importance of

applications they support and provide. Usually the services provided by sensors are controlled by a Base Station (BS). BS broadcasts command/request messages to control the functionality of all sensor nodes. Ensuring the authenticity of these messages is significant. Many solutions were proposed for broadcast Authentication without giving much attention to the effect of mobility of both BS or/and sensors on the performance of their solutions. Forwarding First (FF) Protocol and Authentication First (AF) Protocol are considered main standard designs that many existed authentication protocols were built based on. This paper examines the impact of mobility on these two standard protocols by testing them over four major mobility models. The results reveal that the protocols behaved differently in terms of energy consumption and network delay with respect to mobility. Although the same authentication technique was used in the two protocols, but the mobility itself was a reason to enhance or degrade the performance of the authentication service which consequently affects the security of WSNs and their provided services.

Track: Computer Networks

Paper Title: Horizontal Offloading Mechanism for IoT Application in Fog Computing Using Microservices. Case Study: Traffic Management System

Authors: Ahmad Khater (Arab Academy for Science, Technology & Maritime Transport & K&A Company, Egypt); Mostafa Abd Al-Azim (Arab Academy for Science, Technology and Maritime Transport, Egypt)

Abstract: Fog computing is a new computational paradigm proposed by Cisco that subdues the shortcomings of cloud computing in Internet of Things (IoT) by transferring some of the core functions of the cloud towards the edge of the network to provide mobility, low latency, real-time, and location-aware services required for billions of devices located at the edge of the network. But in case of high load on some fog layer, it's fog nodes do vertical offloading to a higher layer or to the cloud faraway again from the edge which in turn increases the latency while in this case the need for low latency is highly required to handle the load quickly. The main goal of this research is to develop a horizontal offloading mechanism for IoT applications in fog computing to keep the computation as much as possible in the same fog layer in case of high load using the same available resources instead of offloading to a higher layer or to the cloud depending on three main technologies, Virtualization, Containerization and Microservices. By nature, while moving toward the edge the capabilities of fog nodes decrease but at the same time the number of nodes increase and this is exactly the point which this research depends on. If its possible to well utilize the larger number of fog nodes in lower layers near to the edge to overcome the shortage in capabilities then high load can be horizontally handled in the same layer without offloading to a higher layer or to the cloud using the same available resources also the number ad nature of functions that can be carried out in the fog will increase. But IoT is a very dynamic environment so that the mechanism must wok in a cognitive and context-aware fashion in order not to affect the performance of the nodes used for offloading also its very important to efficiently decide when to consider horizontal over vertical offloading and vice versa in order not to wast time trying to handle the load horizontally while vertical offloading is the appropriate decision. By simulating the proposed mechanism on the traffic management use case, each fog node can handle extra requests over it's maximum capacity up to 30% for each hosted microservice by offloading to 2 microservices without offloading to higher layer or to the cloud using the same available resources. The percentage can be increased up to 100% in case there are 7 available offloading microservices.

Track: Computer Networks

Paper Title: An Efficient Digital Image Encryption Using Pixel Shuffling for Wireless Network Applications

Authors: Islam Almalkawi (The Hashemite University, Jordan); Jamal Al-Karaki (Abu Dhabi Polytechnic, United Arab Emirates)

Abstract: Most of the proposed security algorithms for wireless networks consider only securing scalar data, which are not suitable for other data types, e.g., digital images. In addition, many methods add noticeable overhead in securing such data types hence affecting the provided security level and network performance. In this paper, we propose an efficient security scheme based on Chaotic algorithm to efficiently encrypt the digital images over wireless network applications while taking into consideration the processing capability and time constrains of most wireless networks. Our proposed security algorithm processes the digital images in three phases: security key generation, permutation, and transposition. The 2D Logistic chaotic map is used in permutation and substitution

stages for image pixel shuffling and transposition in order to enhance the required level of security and resist against various security attacks. Security performance analysis based on standard test images show that our proposed scheme satisfies the needed security requirements and has better performance compared with other proposed techniques.

Track: Computer Networks

Paper Title: Using Machine Learning to Detect DoS Attacks in Wireless Sensor Networks

Authors: Abdulaziz Ibrahim Al-issa (Saudi Electronic University, Saudi Arabia); Mousa T. AL-Akhras (The University of Jordan, Jordan); Mohammed Seili ALSahli (Saudi Electronic University & Cyber Security, Saudi Arabia); Mohammed Alawairdhi (SEU, Saudi Arabia)

Abstract: Widespread use of Wireless Sensor Networks (WSNs) introduced many security threats due to the nature of such networks, particularly limited hardware resources and infrastructure less nature. Denial of Service attack is one of the most common types of attacks that face such type of networks. Building an Intrusion Detection and Prevention System to mitigate the effect of Denial of Service attack is not an easy task. This paper proposes the use of two machine learning techniques, namely decision trees and Support Vector Machines, to detect attack signature on a specialized dataset. The used dataset contains regular profiles and several Denial of Service attack scenarios in WSNs. The experimental results show that decision trees technique achieved better (higher) true positive rate and better (lower) false positive rate than Support Vector Machines, 99.86% vs 99.62%, and 0.05% vs. 0.09%, respectively.

Track: Computer Networks

Paper Title: Energy Efficient Sleep/Wake-up Techniques for IOT:A Survey

Authors: Jumana Haimour (Princess Sumaya University for TEchnology, Jordan); Osama M. F. Abu-Sharkh (Princess Sumaya University For Technology, Jordan)

Abstract: Energy efficiency is a vital factor that is contributing in the implementing of IOT, since IOT devices are powered by batteries or energy harvesting sources, thus it's very important to extend the lifetime of the overall network. This can be achieved using energy efficient techniques which have sorted into five types regarding the ISO model. One of them is the sleep/wakeup schemes which are considered in this paper. Duty cycling, wake-up radios, and topology control were discussed and some of the newest works have been reviewed. However, every technique has its own limitations and advantages. This paper also determines some of the open research areas that companies between energy efficiency and some new technologies, standards or network and application types.

Track: Control, Robotics, and Mechatronics

Paper Title: Automatic Optical Inspection Aided Augmented Reality-based PCBA Inspection: A Development

Authors: Chyi-Yeu Lin (National Taiwan University of Science and Technology, Taiwan); Joel Murithi Runji (National Taiwan University of Science and Technology, Taiwan)

Abstract: Augmented Reality-based (AR-based) inspection has been demonstrated to be up to 2-3 times more efficient than the traditional manual and computer-based inspection [1]. Previous studies have focused on standalone inspection systems often relying on external markers for registration. In this study, we present a novel optical see-through head-mounted display (OST-HMD) AR-based inspection guidance and monitoring system on printed circuit board assemblies (PCBAs). A resizable ideal reference image is contextually registered on-demand for comparison with an AOI localized defect on the board by a remote user wirelessly networked without utilizing external markers. Results of this study demonstrate our developed system's registration precision to be invariant to planar pose (position and orientation) of the PCB board and robust to board size.

Track: Control, Robotics, and Mechatronics

Paper Title: Automated Linear Book-Scanning System (ALBS)

Authors: Osama W. Ata, Ahmad Dadou and Mohammad Ismail (Palestine Polytechnic University, Palestine)

Abstract: We propose the design of an automated linear book-scanning system (ALBS) which has several attributes. For a start, the moving saddle by a stepper motor can hold up to 3 Kg weight and the system contains a suitably designed channel slot. Such a design is implemented as a new variation on the idea of pneumatic page turning. This involves the use of a vacuum cleaner device to pull book pages into a channel that flips them to the other side of the book, in order to allow two installed scanners to take an instant image of the two exposed pages, convert and successively merge them into a PDF file. The system is simple, economic and serves as a prototype for a consequent production line that would target various libraries and institutional sectors.

Track: Control, Robotics, and Mechatronics

Paper Title: Optimal Design of Lead Compensator Using Nature-Inspired Algorithms

Authors: Zaer Abo-Hammour and Mohammad I. Al Saaideh (The University of Jordan, Jordan); Malek Alkayyali (Philadelphia University, Jordan); Hussam J Khasawneh (The University of Jordan, Jordan)

Abstract: There are numerous algorithms for designing lead compensators, some of which are graphical whereas others are analytical. When designing a lead compensator, the parameters of the compensator are considered as an optimization problem which aims at getting the required time and frequency specifications. This paper presents a comparison between lead compensators designed by nature-inspired algorithms against those designed by conventional algorithms for various types of systems. The nature-inspired algorithms considered in this paper are the genetic algorithm (GA), which is based on a natural selection process that imitates biological evolution, and the particle swarm optimization (PSO), which is stimulated by social behavior of fish schooling or bird flocking. In this paper, two different examples are considered to demonstrate the comparison between the design methods. The simulation results of these examples show that the nature-inspired algorithms provided better transient response due to reduced settling and rise times and provided better relative stability due to zero overshoot and higher phase margin.

Track: Control, Robotics, and Mechatronics

Paper Title: A Leader-Follower Communication Protocol for Multi-Agent Robotic Systems

Authors: Lubna Najjar, Noor Ghassan Johari and Manar Qamhieh (An-Najah National University, Palestine)

Abstract: The implementation of multi-agent robotic systems is becoming a trending technology due to its useful applications that require the coordination between multiple robots without external interference from humans. Such systems require the combination of successful communication, artificial intelligence and self-organization. In this paper, we propose a new leader-follower communication protocol implemented upon wireless communication to establish the coordination between multiple robots. The communication protocol specifies the message format between a leader robot and its followers in the system while taking into consideration some practical considerations like obstacle avoidance and communication loss scenarios. The correctness of the proposed communication protocol is tested on two robotic cars using Arduino micro-controller boards and nrf24l01 wireless module.

Track: Control, Robotics, and Mechatronics

Paper Title: Optimal Lead Compensator for Two-Loop Control System of Linear DC Motor

Authors: Hussam J Khasawneh (The University of Jordan, Jordan); Osama Abdelaal (University of Jordan, Jordan); Mohammad I. Al Saaideh and Zaer Abo-Hammour (The University of Jordan, Jordan)

Abstract: This paper proposes a two-loop position/speed control system for linear DC motors. The control system is based on the parametrization of lead compensator using the genetic algorithm (GA) optimization method. The proposed approach uses the objective function that aims to minimizing the time specifications for position and speed responses of linear DC motor. The linear DC motor is modeled using Simscape toolbox in MATLAB/Simulink platform. The simulation shows that the results successfully demonstrate the effectiveness and good dynamic performance of the proposed two-loop control system under specific constraints and various test conditions.

Track: Control, Robotics, and Mechatronics

Paper Title: Experimental Hysteresis Characterization in Pneumatic Artificial Muscles

Authors: Malak Soud Al-Ma'aitha (Jordan water Company, Jordan); Moudar Zgoul (University of Jordan, Jordan); Mohammad Al Janaideh (Memorial University, Canada)

Abstract: Pneumatic artificial Muscles (PAMs) are increasingly being explored for varied applications due to their advantages over other types of actuators such as the high force to weight ratio, light weight, structural flexibility, no mechanical wear and low cost. However PAMs exhibit hysteresis nonlinearities between the input pressure and the output force as well as the contraction ratio and the input pressure. Such nonlinearities are known to cause oscillations in the open-loop system's responses, as well as poor tracking performance and potential instabilities. This work is aimed to accurately characterize the hysteresis nonlinearities in PAMs experimentally to study the effects in order to facilitate the modeling and design of controllers for compensating for the hysteresis effects. The tracking performance of PAMs could be significantly enhanced through compensation of hysteresis effects. In an effort to understand the hysteresis properties Laboratory experiments is designed and performed to measure output-input properties of a PAM under different inputs and frequencies in order to fully characterize hysteresis nonlinearities.

Track: Data Science

Paper Title: A Text Feature Selection Technique Based on Binary Multi-Verse Optimizer for Text Clustering

Authors: Ammar Abasi (Malaysia, Malaysia); Ahamad Khader (Universiti Sains Malaysia, Jordan); Mohammed Al-Betar (AL-Balqaa University, Jordan); Syibrah Naim and Sharif Naser Makhadmeh (Universiti Sains Malaysia, Malaysia); Zaid Abdi Alkareem Alyasserri (School of Computer Sciences, University Science Malaysia, Malaysia)

Abstract: Feature selection is regarded as an important task in data mining. The applications of machine learning eliminate irrelevant, redundant features so that the learning performance is improved. A novel feature selection method for unsupervised text clustering, that is, binary multi-verse optimizer algorithm (BMVO) is proposed in this paper. A new application of the MVO algorithm is introduced via this method, which selects important text features. Then, these important features are tested using a k-means clustering algorithm to enhance performance and lessen the cost of the proposed algorithm computational time. The BMVO performance is examined on 6 datasets that are published including Classic4, Wap, tr41, tr12, 20Newsgroups, and CSTR. Based on the measures of the evaluation, the obtained results showed that the BMVO performance has outperformed the rest of the comparative algorithms.

Track: Data Science

Paper Title: Invoice Classification Using Deep Features and Machine Learning Techniques

Authors: Ahmad S. Tarawneh (Eötvös Loránd University, Hungary); Ahmad Hassanat (Mutah University, Jordan); Dmitry Chetverikov (Eötvös Loránd University, Hungary); Imre I Lendák, IV (University of Novi Sad & Faculty of Technical Sciences, Serbia); Chaman Verma (ELTE Informatikai Kar & Eotvos Lorand Tudomanyegyetem Informatikai Kar, Hungary)

Abstract: Invoices are issued by companies, banks and different organizations in different forms including handwritten and machine typed ones; sometimes, receipts are included as a separated form of invoices. In current practice, normally, classifying these types is done manually, since each needs a special kind of processing such as making them suitable for optical character recognition systems (OCR). In this paper, we propose an automatic approach to classify invoices into three types: handwritten, machine's typed and receipts. The proposed method is based on extracting features using the deep convolutional neural network AlexNet. The features are classified using various machine learning algorithms namely including Random Forests, K-nearest neighbours (KNN), and Naive Bayes. Different validation approaches are applied in the experiments to ensure the effectiveness of the proposed solution. The best classification result was 98.4%, which was achieved by the KNN, such an almost perfect performance allows the proposed method to be used in practice as a preprocess for OCR systems, or as a standalone application.

Track: Data Science

Paper Title: A Review of Natural Language Processing and Machine Learning Tools Used to Analyze Arabic Social Media

Authors: Tarek Kanan (Alzaytoonah University of Jordan, Jordan); Odai Sadaqa, Amal Aldajeh, Hanadi Alshwabka and Wassan S. AL-dolime (AlZaytoonah University of Jordan, Jordan); Shadi AlZu'bi (Zaytoonah University of Jordan, Jordan); Mohammed Elbes (Al Zaytoonah University of Jordan, Jordan); Bilal Hawashin (Alzaytoonah University of Jordan, Jordan)

Abstract: Arabic Language is spoken widely in the world. It has very special characteristics that made it hard to be handled by computers. Recently, Social Media is considered as one of the richest source for knowledge sharing and information gathering in the internet. Arabic Natural Language Processing (ANLP) tools play major role when trying to understand the content of any Arabic textual data (e.g. social media), it helps clean noisy data, stem words, etc. Also, it assists with understanding of the semantic or sentiment contents. We use Arabic Machine Learning (Classification and Clustering) with social media to discover the polarity or opinion in the contents. Many kinds of classifiers and clusters used with Social Media content detection, like SVM and K-Mean. In this paper we review the literature of the popular ANLP tools with AML software on social media contents toward identifying the best tools in these domains.

Track: Data Science

Paper Title: An Improved Video Steganography: Using Random Key-Dependent

Authors: Mohammad Alia (Al Zaytoonah University of Jordan, Jordan); Khulood Abu Maria (Al-Zaytoonah University of Jordan, Jordan); Maher Alsarayreh (Al Zaytoonah University of Jordan, Jordan); Eman Abu Maria (Al-Zaytoonah University of Jordan, Jordan); Sally Almanasra (Assistant Prof, Jordan)

Abstract: Steganography is defined as the art of hiding secret data in a non-secret digital carrier called cover media. Trading delicate data without assurance against intruders that may intrude on this data is a lethal. In this manner, transmitting delicate information and privileged insights must not rely on upon just the current communications channels insurance advancements. Likewise should make more strides towards information insurance. This article proposes an improved approach for video steganography. The improvement made by searching for exact matching between the secret text and the video frames RGB channels and Random Key - Dependent Data, achieving steganography performance criteria, invisibility, payload/ capacity and robustness.

Track: Data Science

Paper Title: Information Security Policy Perceived Compliance Among Staff in Palestine Universities: An Empirical Pilot Study

Authors: Yousef M Iriqat (International Islamic University of Malaysia, Palestine); Abd Rahman Ahlan and Nurul Nuha Abdul Molok (International Islamic University Malaysia, Malaysia)

Abstract: In essence, universities implement information systems in everyday activities recognize the importance of protecting their information assets from insider and outsider threats. Staff as one of the possible insider threats to Information Security (IS) being recognized as the weakest link. Staff should be aware of this raising challenge. Understanding staff perception of compliance behaviour is critical for universities wanting to leverage their staff capabilities to mitigate IS risks. Therefore, this research seeks to get insights into staff perception based on factors adopted from several theories by using proposed constructs i.e. "perceived" practices/policies and "perceived" intention to comply. Drawing on the General Deterrence Theory, Protection Motivation Theory, Theory of Planned Behaviour and Information Reinforcement, made relevant to the context of Palestine universities. We integrate staff awareness of Information Security Policies (ISP) countermeasures as antecedents to "perceived" influencing factors (perceived sanctions, perceived rewards, perceived coping appraisal, and perceived information reinforcement). The research is designed to take empirical, quantitative, exploratory and descriptive approaches. Partial least squares structural equation modelling is used to inspect the reliability and validity of the measurement model and hypotheses testing for the structural model. The research covers ISP awareness among staff and seeks to assert that information security is the responsibility of all academic and administrative staff from all

departments. Overall, our pilot study findings seem promising, and we found strong support for our theoretical model

Track: Data Science

Paper Title: Compression-based Tag Models for Evaluating Arabic Parts-of-speech Taggers

Authors: Ibrahim S Alkhazi (Tabuk University, Saudi Arabia); William Teahan (Bangor University, United Kingdom (Great Britain))

Abstract: Part-of-speech (POS) tagging is normally the initial step in any linguistic analysis and a particularly significant intermediate step in the construction and development of many natural language processing applications such as information retrieval and machine translation systems. Many Arabic POS systems have reported a high accuracy output. This paper investigates the use of tag-based text compression for the Arabic text as a means of evaluating the performance and quality of the Arabic POS taggers. The results of the experiments show that the tag-based compression of the text can effectively be used for assessing the performance of Arabic POS taggers when used to tag different types of the Arabic text, and also as a means of comparing the performance of two Arabic POS taggers on the same text.

Track: Data Science

Paper Title: CarChain: A Novel Public Blockchain-based Used Motor Vehicle History Reporting System

Authors: Mohammad Masoud and Yousef Jaradat (Al-Zaytoonah University of Jordan, Jordan); Ismael Ahmad Jannoud (AlZaytoonah University of Jordan, Jordan)

Abstract: Blockchain Technology has been proposed to tackle author, centrality and storage issues. It converts centralized applications into dynamic distributed ones. Many researchers have proposed protocols and applications for mapping the old central applications into blockchain based distributed application. In this work, new system framework for Public World Wide Used Motor Vehicle History Reporting System, named CarChain, is proposed and designed. The framework constructs a peer-to-peer (P2P) overlay network that broadcasts transactions as any end system multicasting system in P2P live streaming applications. The framework allows car owners, repairing companies and insurance agencies to register and add new histories for cars in a simple method. Four different smart contracts control block updates in CarChain. In addition, database technology has been leveraged to cache intermediate data. We show in this paper the challenges and research opportunities that encounter blockchain based applications, such as CarChain.

Track: Data Science

Paper Title: A Proposed Virtual Private Cloud-Based Disaster Recovery Strategy

Authors: Siham Hamadah and Darah Aqel (Al-Zaytoonah University of Jordan, Jordan)

Abstract: Disaster is an unexpected event in a system lifetime, which can be made by nature or even human errors. Disaster recovery of information technology is an area of information security for protecting data against unsatisfactory events. It involves a set of procedures and tools for returning an organization to a state of normality after an occurrence of a disastrous event. So the organizations need to have a good plan in place for disaster recovery. There are many strategies for traditional disaster recovery and also for cloud-based disaster recovery. This paper focuses on using cloud-based disaster recovery strategies instead of the traditional techniques, since the cloud-based disaster recovery has proved its efficiency in providing the continuity of services faster and in less cost than the traditional ones. The paper introduces a proposed model for virtual private disaster recovery on cloud by using two metrics, which comprise a recovery time objective and a recovery point objective. The proposed model has been evaluated by experts in the field of information technology and the results show that the model has ensured the security and business continuity issues, as well as the faster recovery of a disaster that could face an organization. The paper also highlights the cloud computing services and illustrates the most benefits of cloud-based disaster recovery

Track: Data Science

Paper Title: An Indoor Localization Approach Based on Deep Learning for Indoor Location-Based Services

Authors: Mohammed Elbes (Al Zaytoonah University of Jordan, Jordan); Eyad Almaita (Tafila Technical University, Jordan); Thamer Alrawashdeh (Alzaytoonah University Of Jordan, Jordan); Tarek Kanan (Alzaytoonah University of Jordan, Jordan); Shadi AlZu'bi (Zaytoonah University of Jordan, Jordan); Bilal Hawashin (Alzaytoonah University of Jordan, Jordan)

Abstract: The rapid increase in the demand of location based services (LBS) for indoor environments has attracted scholars to indoor localization based on fingerprinting due its high accuracy. In this paper, we propose our novel indoor localization approach based on fingerprints of Received Signal Strength Indicator (RSSI) measurements. We present our approach of fingerprint preparation and setup and how we utilized machine learning techniques using Long Short-Term Memory (LSTM) Neural Networks for location estimation. Our experimental results shows that our localization approach outperforms well-known existing approaches like the KNN and localization techniques.

Track: Data Science

Paper Title: Detection of Wangiri Telecommunication Fraud Using Ensemble Learning

Authors: Mais Arafat and Abdallah Qusef (Princess Sumaya University for Technology, Jordan); George Sammour (Princess Sumaya University for Technology & PSUT, Jordan)

Abstract: Fraudsters can manipulate telecom regulatory systems to their advantage, and to the disadvantage of the telecom operator, in ways that are difficult to detect, trace, and prosecute. A subscriber whose network has been compromised will often refuse to pay large fraudulent charges, leaving the operator to cover the bill resulting in revenue losses. Moreover, attacks frequently happen over holidays and weekends, when networks are often less monitored closely. This calls for an intelligent automated solution for telecom fraud detection. Wangiri (Japanese term) telecom fraud also referred to as "one ring and cut fraud" relies on this single ring method for a quick way to make money. Missed calls from unknown callers entice subscribers to call back unknowingly premium numbers where they are deceived to stay on the line for as long as possible in an effort to inflate their bill. This paper proposes the use of varied ensemble classifiers to overcome the highly biased dataset and help make a more precise classification in an efficient and effective manner. Extreme Gradient Boosting algorithm was found to have the best results in terms of correctness and performance.

Track: Data Science

Paper Title: Robust and Transparent Audio Watermarking Based on Spread Spectrum in Wavelet Domain

Authors: Aliakbar Attari (School of Electrical Engineering, Iran University of Science & Technology (IUST), Iran); Ali Asghar Beheshti (Iran University of Science and Technology, Iran)

Abstract: This paper proposes a robust and blind audio watermarking scheme based on spread spectrum in Discrete Wavelet Transform (DWT) domain. For this purpose, the watermarks are embedded in low-frequency coefficients, which are less audible. The main aim is to divide the audio signal into small frames and modify the magnitude of the 6th level approximation coefficients of DWT using the direct sequence spread spectrum (DSSS) technique. In addition, psychoacoustic model is used for enhancing in imperceptibility, and Savitsky-Golay filter is employed for increasing in the extraction accuracy. The experimental results confirm high robustness against the most common attacks, including, re-sampling, requantizing, Gaussian noise addition MP3 compression and low pass filter, without significant perceptual distortion (ODG is higher than -1). The proposed scheme's data payload is about 83 bps.

Track: Data Science

Paper Title: Big Data Impacts and Challenges: A Review

Authors: Zaher Ali Al-Sai (Universiti Sains Malaysia, Malaysia & Malaysia, Jordan); Rosni Abdullah and Mohd Heikal Husin (Universiti Sains Malaysia, Malaysia)

Abstract: Data is everywhere, organizations, governments, clicks, web server, business partner, and even our

body. Big Data comes to life with insights to improve the technology fashion and lifestyle with calling for readiness to change. Big Data has become a significant factor that could be a material asset for both business and government organizations. As such, it is important to understand the definition of Big Data, their key characteristics, and the challenges surrounding the concept and characteristics. The implementation of Big Data brings new critical challenges that need to be addressed before starting the Big Data journey. The main challenges that are commonly faced by organizations are the implementation of Big Data alongside the critical challenges that involve the challenges related to technology, organization, process, data management, and skills. The challenges are difficult and the growth in terms of Big Data is increasing exponentially which calls for further investigation. This paper reviewed the existing literature on Big Data to achieve three objectives: first, to highlight the definitions and characteristics of Big Data and to summarize the most common definitions of existing works; second, to identify the impacts and the opportunities for the Big Data; third, to present and identify the main critical challenges related to Big Data and categorize these challenges as (People, Technology, Organization, Process, and Data management) challenges.

Track: Data Science

Paper Title: Flower Pollination Algorithm with Profile Technique for Multiple Sequence Alignment

Authors: Ahmad MohdAziz Hussein and Rosni Abdulah (Universiti Sains Malaysia, Malaysia)

Abstract: This paper focuses on solving the Multiple Sequence Alignment (MSA) problem by using a Flower Pollination Algorithm (FPA) that is hybridised with the profile technique. The FPA is considered a new meta-heuristic method based on a particular population. MSA is used in numerous applications, for example, an identification of conserved motifs, phylogenetic analysis, protein structure prediction and genome primer identification. In a study related to the MSA, a major challenge is attempting to propose a method for maximising the Sum-of-Pairs (SP) score and column score (CS) in order to obtain the most optimised MSA method. Accordingly, a profile technique is proposed to increase the quality of the MSA. The outcomes are compared against 7 other methods by using one standard of benchmark datasets. Our proposed method showed better results compared to other methods related to the group RV12 from Balibase3.0 dataset except for the MSAProbs method in terms of both measurements Q and CS scores.

Track: Data Science

Paper Title: Lessons Learned from Event Detection from Arabic Tweets: The Case of Jordan Flash Floods near Dead Sea

Authors: Fatima Barakat Shannag and Bassam H Hammo (University of Jordan, Jordan)

Abstract: Event detection is essential for decision makers to understand the events surrounding their real world. Social media microblogging platforms play a significant role in our life. One of these platforms is Twitter, which has an extreme high exchange rate and accordingly has become a valuable and relevant source for many political and social events. Event detection from social media attracted the attention of many researchers for many natural languages. Extracting and detecting events from Arabic tweets is still under investigation. In this paper we present a model for filtering and detecting extracted events from Arabic tweets based on two classifiers. The first classifier filters the collected tweets using two passes. The first pass identifies the hashtags while the second pass does a shallow analysis on the tweets content. The second classifier performs a deep analysis of the text extracted from the tweets. As a case study, we present the tragic events of the Jordan flash floods near the Dead Sea. The model successfully filtered all the collected tweets and picked the ones describing the incidents within that region. Analyzed data revealed important information to learn from this lesson in future. The solution can be generalized and adapted to other problems.

Track: Data Science

Paper Title: Extending QoM Taxonomy for Complex XML Schema Matching

Authors: Mohammed Alghanim (Zarqa University, Jordan)

Abstract: This paper focuses on the quality of match relatedness measurements among XML schemas. The Quality

of Match (QoM), that is used to distinguish the "goodness" of one match metrics, is extended to provide the qualitative and quantitative analysis techniques to evaluate the complex QoM of two given schemata. The introduced taxonomy of schema matches as a weight-based match model is extending the QoM model from a syntactic matching on the node level, to a model that detects complex matches by integrating it with the semantic technologies, such as ontologies. The new equations that calculate these weights are derived and proved throughout practical examples.

Track: Data Science

Paper Title: A Review on Big Data Maturity Models

Authors: Zaher Ali Al-Sai (Universiti Sains Malaysia, Malaysia & Malaysia, Jordan); Rosni Abdulah and Mohd Heikal Husin (Universiti Sains Malaysia, Malaysia)

Abstract: Big Data is the current currency in the competitive market of the digital economy. The ability to be successful in Big Data is related to the maturity level of the organization. A Maturity Model (MM) is a tool that can be applied to assess the "As-is" situation regarding specific key dimensions, where the maturity levels indicate an organization's current capabilities and the desirable state. Most of the available literature on the Maturity Models for Big Data is still in white papers, reports, and internet materials from developers' websites. The existing literature might not have covered all the available Maturity Models for Big Data. This paper reviewed the existing literature to achieve three objectives: first, to provide a comprehensive overview about the Maturity, Maturity Model, Capability Maturity Model, and the Maturity Model for Big Data; second, to identify the existing Big Data Maturity Models and to summarize the most used models; third, to highlight the limitations of the existing Big Data Maturity Models.

Track: Data Science

Paper Title: An Intelligent Road Traffic Management System Based on a Human Community Genetic Algorithm

Authors: Adnan Hnaif (Al-Zaytoonah University of Jordan, Jordan); Nagham AL-Madi (Al-Zaytoonah University of Jordan & Faculty of Science & IT, Jordan); Mohammad Abduljawad and Amal Ahmad (Al-Zaytoonah University of Jordan, Jordan)

Abstract: Traffic congestion are recognized as major problem in the modern urban cities. In this paper, an Intelligent Road Traffic Management System based on Human Community Genetic Algorithm (IRTMS) is proposed. IRTMS concludes that it has the minimum total time and waiting time compared with the current traffic lights system.

Track: Data Science

Paper Title: Advanced Weighted Exact Matching Algorithm (AWEMA)

Authors: Nancy Al-ramahi, Adnan Hnaif and Khalil Awad (Al-Zaytoonah University of Jordan, Jordan)

Abstract: Enhanced Weighted Exact Matching Algorithm (EWEMA) is an exact string matching algorithm that find the pattern 'P' in the text 'T'. EWEMA contains two phases, the preparing phase and the matching phase. In this paper, an Advanced Weighted Exact Matching Algorithm was proposed (AWEMA) which also contains the same two phases. The preparing phase in the two algorithms depends on creating an index array (matrix) of size $[n * m]$ for every text 'T' with the alphabetical characters. This matrix presents all indices of each alphabetical character in 'T'. While, the matching phase of EWEMA check the index of the minimum weight character with the index of first character in 'P', where AWEMA checks the index the minimum weight character located between the index of first and last characters in 'P'. The simulation results presented the improvement in the algorithm AWEMA over EWEMA.

Track: Data Science

Paper Title: Reconstructing Big Data Acquired from Radioisotope Distribution in Medical Scanner Detectors

Authors: Shadi AlZu'bi (Zaytoonah University of Jordan, Jordan); Alaa Mughaid (The Hashemite University, Jordan); Darah Aqel (Al-Zaytoonah University of Jordan, Jordan); Bilal Hawashin (Alzaytoonah University of Jordan, Jordan); Mohammed Elbes (Al Zaytoonah University of Jordan, Jordan); Tarek Kanan (Alzaytoonah University of Jordan, Jordan); Thamer Alrawashdeh (Alzaytoonah University Of Jordan, Jordan)

Abstract: In the last few years, CAD systems has been optimized significantly medical applications. Digital systems have been employed recently in diagnosing procedures and facilitate the process in determining illness in patients. Different scanner system have been used to acquire medical images, which are different the quality output. The main problem associated to image acquisition is the amount of information in the acquired images, and what are the exact time and bed displacement in each scan. This work tests different factors in PET scanners leading to standards for optimizing the scanner variables in medical diagnosis area. Simulated body phantom is experimented here due to the closure properties regarding to real patient data. The phantom out put images were acquired under different circumstances with different scanning time at each bed scan. The segmentation process is then applied on the best slice evaluating the actual spheres' size. We propose an efficient way to set the best scanner variables during the scanning process, which lead to the most accurate segmentation result.

Track: Data Science

Paper Title: Efficient Texture Classification Using Independent Component Analysis

Authors: Bilal Hawashin (Alzaytoonah University of Jordan, Jordan); Ayman Mansour and Jafar Abukhait (TTU, Jordan); Fayez Khazalah (Al al Bayt University, Jordan); Shadi AlZu'bi (Zaytoonah University of Jordan, Jordan); Tarek Kanan (Alzaytoonah University of Jordan, Jordan); Mohammad Obaidat (TTU, Jordan); Mohammed Elbes (Al Zaytoonah University of Jordan, Jordan)

Abstract: Texture classification is the assignment of texture to one or more texture classes. It has been largely used in various fields. This paper proposes a system for Texture Classification using Independent Component Analysis (ICA) using set of classifiers. Independent Component Analysis proved its efficiency in many domains. Our objective is to improve texture classification by adopting the use of ICA with a classifier in this domain. After extracting the main features of the image, classification using set of classifiers is performed. Experimental results have shown that ICA has a promising performance in texture classification. When combined with neural networks, Texture classification accuracy reached the accuracy of 91%. Furthermore, Naive Bayes showed both exceptional training and testing times, and therefore, it proved to be efficient for big datasets.

Track: Data Science

Paper Title: SmartCert Blockchain Imperative for Educational Certificates

Authors: Tarek Kanan (Alzaytoonah University of Jordan, Jordan); Ahamd Obaidat (Avertra Corporation, Jordan); Majdleen Al-Lahham (AlZaytoonah University of Jordan, Jordan)

Abstract: The electronic authentication system works to authenticate the documents electronically through the blockchain technology, which enables us to use this technology to implement an integrated system of official documents of all kinds for the Al- Zaytoonah University of Jordan, and guarantee that; this technology allows us to build a robust database system that cannot be tampered with, modified, destroyed or altered, ensure the safety of documents issued within the university departments and documents that are exported or deported outside the university system such as financial documents, official documents and academic certificates, this system guarantees us a very high level of security on data and information with a high level of confidentiality. Our system will be built by using a database that provides 100% true information about the exports of that system. This used technology will help users end the forgery of the data and official documents issued by the University of Al-Zaytoonah, both internally and externally and also enable the departments inside the university to issue documents to the other party with the strict to not allow the other party to deny those documents and the health of their content.

Track: Data Science

Paper Title: The Role of Data Mining Techniques in the Decision-Making Process in Jordanian Commercial Banks

Authors: Khaled Musa and Abdul-Razzak AlShehadeh (Alzaytoonah University of Jordan, Jordan); Raed Alqerem (Al-Zaytoonah University of Jordan, Jordan)

Abstract: Technology is one of the most essential factors that affect the business environment of modern banking organizations, allowing new capabilities to support the decision making process at all levels of the organizations to influence the immediate working environment. The use of data mining is one of the important recommendations of the study that will affect the efficiency and effectiveness efficiency of banking operations. The use of data mining technology strengthen the knowledge base and provide all the necessary data that will assist the Jordanian commercial banking industry in its decision-making process. The purpose of this study was to explain the role of applying data mining tools in the industry and decision making in Jordanian commercial banks. To achieve this objective, the researchers used descriptive analytical methodology based on the questionnaire distributed to the members of the study community.

Track: Data Science

Paper Title: Towards an Inpainting Framework for Visual Cultural Heritage

Authors: Nesreen Jboor, Abdelhak Belhi and Abdulaziz Al-Ali (Qatar University, Qatar); Abdelaziz Bouras (College of Engineering, Doha, Qatar); Ali Jaoua (Qatar University & College of Engineering, Qatar)

Abstract: Cultural heritage takes an important part in defining the identity and the history of a civilization or a nation. Valuing and preserving this heritage is thus a top priority for governments and heritage institutions. Through this paper, we present an image completion (inpainting) approach adapted for the curation and the completion of damaged artwork. Our approach uses a set of machine learning techniques such as Generative Adversarial Networks which are among the most powerful generative models that can be trained to generate realistic data samples. As we are focusing mostly on visual cultural heritage, the pipeline of our framework has many optimizations such as the use of clustering to optimize the training of the generative part to ensure a better performance across a variety of cultural data categories. The experimental results of our framework are promising and were validated on a dataset of paintings.

Track: E-Technologies

Paper Title: Virtual Dressing Room Application

Authors: Aladdin Masri and Muhannad Al-Jabi (An-Najah National University, Palestine)

Abstract: Trying clothes in clothing stores is usually a time consuming activity. Besides, it might not even be possible to try-on clothes in such cases as online shopping. Our motivation here is to increase the time Efficiency and improve the accessibility of clothes try on by creating a virtual dressing room environment. In this work, we introduce a virtual dressing room application using the Microsoft Kinect sensor. Our proposed approach is mainly based on extraction of the user from the video stream, alignment of models and skin color detection. We use the modules for locations of the joints for positioning, scaling and rotation in order to align the 2D cloth models with the user. Then, we apply skin color detection on video to handle the unwanted occlusions of the user and the model. Finally, the model is superimposed on the user in real time. The problem is simply the alignment of the user and the cloth models with accurate position, scale, Rotation and ordering. First, detection of the user and the body parts is one of the main steps of the problem. In literature, several approaches are proposed for body part detection, skeletal tracking and posture estimation. And superimposing it onto a virtual environment in the user interface. The project is implemented in C# programming environment for real time, Kinect hacking application. Kinect driver's middleware are used for various fundamental functions and for the tracking process in combination with the Microsoft Kinect.

Track: E-Technologies

Paper Title: Social Media Engagement on Malaysian Government Agencies Facebook Pages: An Empirical Analysis

Authors: Maslinda Mohd Nadzir, Nor Hazlyna Harun and Mohamad Ghozali Hassan (Universiti Utara Malaysia, Malaysia)

Abstract: The increasing use of social media has led government agencies to take initiatives for using social media

as an additional platform, apart from websites, to disseminate information; especially, regarding the services offered by government agencies. However, a paucity of empirical research on social media engagement with regard to government agencies has been recorded. The present study explores social media usage and engagement on Malaysian government agencies' Facebook pages. Eight government agencies with the highest usage of Facebook have been selected. Data are collected from Graph API for the publicly visible posts. The content analysis is conducted on texts and messages. The findings related to social media engagement are presented, revealing that likes are the most common mode of engagement. Further study is required, using statistical analysis, to measure social media engagement on government agencies social media platform.

Track: E-Technologies

Paper Title: The Challenges and Opportunities of E-banking Adoption for Small to Mid-Sized Enterprises - SMEs in Jordan

Authors: Shakir Karim (Central Queensland University, Australia)

Abstract: This paper focuses on the strengths and weaknesses of in Jordanian E-banking sector. It also discusses the local awareness and familiarisation of E-banking in Small to Midsized Enterprise-SMEs of Jordan and gives a consistent assessment of Jordan's current and future E-banking best practices. This paper initially has used secondary data to provide a study of E-banking in Jordan, how to overcome the hurdles in SMEs of Jordan necessary for SMEs to help facilitate E-banking adoption. The research is subject to top academic journal articles, corporate project data and reports, media articles, government and non-government corporation-based documents and other appropriate information. Data were also collected by using interviews from Jordan E-business based organizations those are offering goods and services on electronic channels and professionals involved with E-banking related activities. The study found that E-banking is steadily transforming the way businesses to be conducted and changing the business environment in Jordan. E-banking can provide speedier, faster and reliable services to the customers for which they are relatively happy. E-banking services not only can develop new competitive advantages, it can improve its relationships with customers. As a developing country, Jordan is not fully known about E-banking sector. As a result, this paper also overviews the issues associated with E-banking e.g. cybercrime and try to explore the future challenges and prospects in Jordan. This paper also compares the local E-business sites with worldwide brand E-business sites to make an effective solution of Jordan's E-banking.

Track: E-Technologies

Paper Title: Ensuring Interoperability of E- Learning and Quality Development in Education

Authors: Arshi Naim (Saudi Arabia & King Khalid University, India); Mohammad Rashid Hussain (Saudi Arabia, Saudi Arabia); Noorulhasan Naveed Quadri, Naim Ahmad and Shamimul Qamar (King Khalid University, Saudi Arabia); Nawsher Khan (Office A/3/30, King Khalid University, Saudi Arabia); Toleen Abu Hweij (Az-Zarqa, Jordan)

Abstract: In the current scenario E-Learning faces two major challenges, first to ensure the interoperability of E-Learning and secondly, developing quality learning through e-Learning. To impart learning and teaching through E-learning, King Khalid University (KKU) has adopted Learning Management Services (LMS) through Blackboard. The university has three types of learning and teaching methods; full online, Blended and Supportive. This research studies the concept, scope and dimensions of interoperability of E-Learning in KKU then the connection and interdependence between with quality development. In this paper we have described the dimensions of quality and the standards of E- Learning for the objectives of interoperability of E-Learning and quality development in KKU. The research is based principally on secondary data observed from KKU E-Learning deanship. Also sample of 20 E-Learning experts at KKU were given closed ended as well as semi closed questionnaires for evaluating the assurance of interoperability of E-Learning and quality development. These experts are mainly certified online facilitators and admin staff. Results provide the verification of application and presence of interoperability of E-Learning and assured the quality development process in KKU in imparting knowledge.

Track: E-Technologies

Paper Title: The Acceptance of Using Enterprise Resource Planning (ERP) System in Higher Education: A Case Study

of Jordanian Universities

Authors: Ahmad Althunibat (Al-Zaytoonah University of Jordan, Jordan); Bassam Mahadeen (Tafila Technical University, Jordan); Feras Altarawneh (AL-Zaytoonah University of Jordan, Jordan); Fuad El-Qirem (Al-Zaytoonah University of Jordan, Jordan)

Abstract: Enterprise resource planning (ERP) systems become very significant in managing business processes. However, higher education institution (HEI) should think more about implementing ERP systems to manage their processes and produce high quality output. Certainly, many research on ERP adoption have revealed that the organizations often faced many barriers and the failure rate is very high. In addition, different research projects conclude that, oftentimes, universities do not gain the expected benefits from adoption the ERP system. The HEI in Jordan should understand the factors that affect the acceptance of ERP in order to gain the expect benefits of ERP. Hence, it is significant to determine the factors affect the adoption of ERP in HEI in Jordan, that is, whether the universities is ready for implementing it. Therefore, the main purpose of this study is to determine the factors that affect the acceptance of using ERP by Jordanian universities, by evaluating through the questionnaire survey, in order find the most appropriate and prepared universities that willing to adopt ERP system in Jordan.

Track: E-Technologies

Paper Title: A Comparison of Web Data Extraction Techniques

Authors: Mosa Salah and Basem Al Okush (Al-zaytoonah University of Jordan, Jordan); Mustafa Al Rifaae (Al-Zaytoonah University of Jordan, Jordan)

Abstract: Extracting a structured text data from a published webpages has drawn attention in the last decade, the process of web data extraction has many challenges, due to variety of web data and the unstructured from of HTML files. The aim of this survey is to provide a comprehensive overview of current web data extraction techniques, in term of extracted data quality, where the redundant and the noise data should be eliminated. Merits and demerits for each web information extraction technique will be stated, and finally a classification framework for the discussed techniques will be provided.

Track: E-Technologies

Paper Title: Knowledge Based Economy a Great Challenge to Leadership Models in Developing Countries (Bulgarian Case)

Authors: Nikolay Shterev, Tsvetana Stoyanova and Daniel Parushev (UNWE, Bulgaria)

Abstract: New challenges to the contemporary business models appear with introduction of the new technologies and speeding up the technology transfer within worldwide industrial chains. As the business model in the economic developed countries is based on the increasing role of research and science intense companies that leads to increasing competitiveness, the business model in the developing countries is not well enough sufficient to be part of this knowledge based economy. So, the biggest challenge for competitiveness and growth of developing countries is to improve the social leadership model as a compensation of less innovations. So, the basic goal of the paper is to present a challenging approach of leadership business model, that is suitable for application in the developing countries. The Bulgarian example helps to introduce not just the advantages but to present the hidden obstacles of generating growth in knowledge based economy. Thus, the structure of the paper is: 1. Introduction to the knowledge based economy model; 2. Management and leadership approaches in knowledge based economy description; 3. Existing leadership models in Bulgaria; Conclusions.

Track: E-Technologies

Paper Title: Interactive Blackboard for Web-based Real-time Tutoring System

Authors: Adnan Salman and Ata Aburajab (An-najah National University, Palestine)

Abstract: In this paper we provide the design and implementation of a web-based real-time interactive blackboard that can be used in a web-based tutoring system. The goal of the tool is to help moving the classroom experience to the web, where teachers and students can communicate with each other in real-time by voice and by writing

and drawing on the same blackboard. The main advantage of this system is to reduce tutoring cost by saving the time required for students and teachers to meet. Further, it allows teachers to tutor students from different cities or even different countries. The system is designed to be a module in a tutoring system environment. HTML5 canvas and WebSockets is used in this implementation. The complete code is available on GitHub code hosting website.

Track: E-Technologies

Paper Title: E-ring: A Non-Invasive Electricity Consumption Monitoring System

Authors: Sinan A Assaid (University of Jordan, Jordan); Mohammad Nader Saleh (Jordan & TFG and fills Co., Jordan); Marwan Kamal (University of Jordan, Jordan); Hussam J Khasawneh (The University of Jordan, Jordan)

Abstract: Monitoring electricity consumption has a key role in reducing energy consumption. This monitoring can be frequent (several times per week) or continuous. Recent studies showed that such monitoring can reduce residential energy consumption by as much as 15% and the development of energy management systems in the monitoring systems and intelligent energy meters have been going for a while. In this paper, we will present a new electricity monitoring device called "E-ring". E-ring is a non-invasive tool mainly made from a current transformer that clamps to your home's main electricity cables and measures the electrical consumption and sends the measured data to an online server and then makes it accessible from the user's mobile phone using a specially-developed mobile application. It has many advantages such as low data rate, low price, and can provide real-time data about consumption and simultaneously calculate the estimated price for the household\industrial electricity bill with a tolerance of around 2%.

Track: E-Technologies

Paper Title: Steam's Early Access Model: A Study on Consumers' Perspective

Authors: Mais Arafat and Abdallah Qusef (Princess Sumaya University for Technology, Jordan); Samar Al-Taher (University of Jordan, Jordan)

Abstract: Involving consumers as influencers of the video game development process is the main feature of Steam's early access model. This has led to the exponential increase in the popularity of Steam's early access games. Steam being the most widespread digital distribution platform for video games on computers is part of the reason for the success of the early access model. Another part is the abundance of possibilities for game developers to communicate with end users and vice versa. The model is considered a success by the game development community as numerous games using Steam's early access as their distribution platform have gained a large user base (game owners) and high sales, even though, on principle early access games are not complete and are offered for sale in alpha and beta stages with no guarantees on release date or development schedule. Hence, the success of such a model cannot just be measured with owner and sale numbers. This paper aims to explore the interconnection between employing Steam's early access model and the satisfaction of consumers.

Track: Information Technology Trends

Paper Title: Enterprise Resource Planning Quality Model ERPQM

Authors: Sultan T Alanazi (Universiti Sains Malaysia, Saudi Arabia & Imam Mohammad Ibn Saud Islamic University, Malaysia); Mohammed Akour (Yarmouk University, Jordan)

Abstract: This paper proposes the enterprise resource planning (ERP) quality model depending on the ISO standard (9126). This quality model is used to ensure that whether the ERP implementation will fail or succeed. Six quality attributes are proposed to be as minimum requirements for building and developing the ERP quality model, including functionality, maintainability, reliability, efficiency, usability, and portability. The quality attributes could not directly be measured. Thus why we divided those attribute into twenty three sub-attributes. After that we will compare the proposed model with the other software quality common models

Track: Information Technology Trends

Paper Title: Hiding Malware on Distributed Storage

Authors: Joanna Moubarak (USJ, Lebanon); Maroun Chamoun (Université Saint Joseph, Lebanon); Eric Filiol (ESIEA, France)

Abstract: The Blockchain technology has been one of the major innovations in recent years. Crypto-currencies and decentralized applications are increasingly adopted. Their principles led the foundation for new ideas underlying others distributed ledger technologies (DLTs). In particular, decentralized storage employs non-recursive functions and similar algorithms compared to the Blockchain technology. Furthermore, digital signatures procedures have been used for storage validation. This paper summarized IPFS and swarm technologies and exposes how we managed to hide our malware on distributed storage. Our demonstration results illustrates the possibility to hide malicious content by segregating it and reveals that decentralized storages have many concerns and lacks security verification procedures.

Track: Information Technology Trends

Paper Title: Disaster Recovery Techniques in Cloud Computing

Authors: Abdelfattah A. Tamimi (Al-Zaytoonah University of Jordan, Jordan); Raneem Dawood and Lana Sadaqa (Jordan, Jordan)

Abstract: Electronic data has been created today in large quantities requiring data recovery services organization's work may experience the various type of disasters whether it was natural or man-made, which may result in huge loss of data. The purpose of recovery technology is the possibility of retrieving information from the backup server when the main data server is lost in the event of disasters. There are some difficulties such as time and cost complexity that make it difficult to implement such techniques. When you use disaster conditions as a service, these disasters can be remedied and data recovery speeds at low cost. In this paper, we compared and discuss the various techniques to create a unique backup and recovery system. In general, all these techniques focus on three different aspects: cost control, data replication, and security issues.

Track: Information Technology Trends

Paper Title: Survey of Online Social Networks Threats and Solutions

Authors: Muneer Bani Yassein, Shadi Aljawarneh and Yarub Wahsheh (Jordan University of Science and Technology, Jordan)

Abstract: In the last few years, a new form of Internet-based services has started, which is called Online Social Networks (OSNs). The impact of OSNs on human lives is foreseen to be very large with unprecedented amount of data and users. OSN users share their ideas, photos, daily life events, feelings and news. Since OSNs' security and privacy challenges are more potential than ever before, it is necessary to enhance the protection and filtering approaches of OSNs contents. This paper provides a comprehensive analysis of OSNs' threats and challenges, and categorize them into: account-based, URL-based and content-based threats. We analyze the existing protection methods and highlight their limitations and weaknesses. Finally, we provide a set of recommendations for a security system that fill the gaps of the currently applied methods.

Track: Information Technology Trends

Paper Title: Using Clause Slicing as Program Robustness Measurement Technique

Authors: Mohammad Abdallah and Ayman M. Abdalla (Al-Zaytoonah University of Jordan, Jordan)

Abstract: Program slicing technique is abstracting technique that focuses on the program code. Clause Slicing is the type of program slicing that is only focus on how the code clauses, which allow the quality assurance to measure the program robustness by measuring every code clauses against the programming language standards. The proposed model, give a new way on how the robustness quality factor can be measured using program clause slicing.

Track: Information Technology Trends

Paper Title: Solving Traveling Salesman Problem Using Firefly Algorithm and K-means Clustering

Authors: Bara'ah Fawwaz Matalkeh, Waed Diabat and Ameera Jaradat (Yarmouk University, Jordan)

Abstract: Traveling Salesman Problem (TSP) is one of the combinatorial optimization problems. TSP is NP-hard problem which defined as a set of cities and each city should be visited once with minimum tour length. This paper solved this problem using Firefly Algorithm (FA) and k-means clustering by three steps: cluster the nodes, finding the optimal path in each cluster and connect the clusters. The first step is to divide all nodes into sub-problems using k-means clustering, the second step is to use FA to find the optimal path in each cluster, finally connect all clusters and find the path between them. The experimental results show that FA with k-means clustering has better results than ant colony algorithm using clustering and FA in most instances.

Track: Information Technology Trends

Paper Title: Workflow Scheduling in Cloud Computing Using Memetic Algorithm

Authors: Abdulsalam Alsmady and Tareq Al-Khraisshi (Jordan University for Science and Technology, Jordan); Wail Mardini (Jordan University of Science and Technology & School of Information Technology and Computer Engineering, Jordan); Hadeel Alazzam (University of Jordan, Jordan); Yaser Khamayseh (Jordan University of Science and Technology, Jordan)

Abstract: Cloud computing is a distributed computing system which can be used to efficiently solve large size computational problems. One of the main models used cloud computing is the "pay as you go" model for the provided service. Workflow can be scheduled on virtual machines in data centers to use resources efficiently. Workflow scheduling known as one of the NP-complete problems, due to the dynamism and heterogeneity nature of cloud systems. In this paper, a Memetic Algorithm (MA) is proposed to solve the cloud workflow-scheduling problem considering cost and deadline as two objectives to optimize scheduling of scientific workflow in a cloud-computing environment. The proposed algorithm used hill climbing local search algorithm as an extra operator for Genetic Algorithm (GA) to improve individual solutions during global search. The experiment results show that the proposed MA decreases the makespan of the workflow and performs better compared to GA and Particle Swarm Optimization (PSO) algorithms.

Track: Information Technology Trends

Paper Title: A Code Complexity Model of Object Oriented Programming (OOP)

Authors: Hussam Hourani (Alzaytoonah University of Jordan, Jordan); Hiba Wasmi (Al-Zaytoonah University of Jordan, Jordan); Thamer Alrawashdeh (Alzaytoonah University Of Jordan, Jordan)

Abstract: The Code Complexity and Object Oriented Programming (OOP) is an important topic due to the role of OOP playing in most of the software design and architectures nowadays. In OOP there are key design concepts like Encapsulation, Polymorphisms and Inheritance that affect the coding design, structure and style. The challenge is how to minimize the Complexity in OOP and complying with the key concepts of OOP design. This paper reviews the literature on current solutions for code complexity and proposes a new model for OOP code complexity. The new model has added into OOP complexity metrics the following characteristics: abstraction and class details complexity. The proposed model is based on the following attributes selection criteria: Readability, Understandability, Maintainability, Reusability, Extensibility and Consistency of the programming code.

Track: Information Technology Trends

Paper Title: A Proposed Quality Model for the Internet of Things Systems

Authors: Mohammad Abdallah, Tamara Jaber, Nour Alabwaini and Alaa Abd Alnabi (Al-Zaytoonah University of Jordan, Jordan)

Abstract: The Internet of things systems has a significant impact on different aspects of our lives. For that reason, IoT systems should be in high quality and clean of defects. The quality measurements for IoT systems vary according to the type of the IoT system and its applications. Therefore, IoT systems should be quality measured

differently considering the presence of heterogeneous objects bound together to build the IoT system. This diversity leads to a variety of quality measurement model, which makes the process of measuring quality more challengeable, less accurate, and less applicable. In this research, different quality models for IoT systems have been studied and compared regarding the quality factors. Besides, a new quality model for IoT has been proposed. The new model focused on all the characteristics related to IoT systems, by introducing quality factors that measure them.

Track: Information Technology Trends

Paper Title: Towards Reducing Reversible Circuit Synthesis Time

Authors: Amjad W Hawash, Ahmed Awad and Baker Abdalhaq (An-Najah N. University, Palestine)

Abstract: Synthesizing reversible circuits is still an important issue in the area of low power consumption circuit design. Several algorithms have been proposed in the field in order to synthesize reversible circuits with minimum cost in terms of line number and quantum cost with sacrificing the objective of reducing the synthesis time. However, for large scale circuits to be synthesized, long synthesis time is required since some algorithms perform iterative synthesis during the optimization process. Binary Decision Diagram (BDD) is considered a step forward in this field due to the minimization of cost achieved. In this work, we are moving from the BDD node-based to subtree-based mapping in the process of reversible circuit synthesis. We propose considering a complete BDD subtree to be converted in one step into a cascade of reversible gates instead of single node mapping in order to minimize the synthesis time. All possible subtrees are saved in a two column lookup table of subtrees and their corresponding reversible gates. Theoretically, our proposed algorithm can be more than 2X faster the transitional single node-to-gate synthesis.

Track: Information Technology Trends

Paper Title: Determination of Monthly Wind Speed of Kayseri Region with Gray Estimation Method

Authors: Hatice Citakoglu (Erciyes University, Turkey); Alper Aydemir (Nuh Naci Yazgan University, Turkey)

Abstract: Wind has been used to facilitate human life throughout history, but besides being a beneficial renewable energy resource it could transform into a hazardous disaster which could result high loss of life and property. The wind energy was first used for purposes such as produce cereals, transport sailing ships in the sea. Nowadays, wind energy is used in electricity production. The temporal spatial variability and difficulties faced during measurement process of wind speed increased the importance of studies related with wind speed forecast. In this study, Gray estimation method was applied to monthly wind speed data measured between 2000–2017 years at three weather stations in Kayseri. Three different GM(1,1) equations were obtained from results of analysis. The average of coefficients obtained from GM(1,1) equations were used to forecast monthly wind speed data between 2014-2017 of other six weather stations located in Kayseri. Accuracy of wind speed estimates were investigated with statistics mean absolute error (MAE) and root mean squared error (RMSE). According to MAE and RMSE criteria, GM (1,1) model has the best result in 18207 station (MAE: 0.28; RMSE: 0.32), while the worst result in 18457 station (MAE: 1.93; RMSE: 1.99). Results of the study indicated that the forecast of wind speed for locations without measurement could be accurately predicted with GM(1,1) model obtained from the other near stations.

Track: Information Technology Trends

Paper Title: Document Expansion Method for Digital Resource Objects

Authors: Wafa' Za'al Alma'aitah (Universiti Sains Malaysia, Malaysia & The Hashemite University, Jordan); Abdullah Hj Talib and Mohd Azam Osman (Universiti Sains Malaysia, Malaysia)

Abstract: Digital Resource Objects (DROs) suffer from shortage of its contents, and this leads to reduction in the effectiveness in its retrieval results. In order to increase the retrieval effectiveness of DRO, adding extra information to its contents is required. However, the extra information must be related to the structure of DRO. Each document contains metadata units with multiple topics. Document expansion (DE) methods utilize the unstructured documents to increase the document contents. In the same way, in this paper, an Enhanced Document Expansion (EDE) method is proposed by utilizing structured documents. DE method is a way of feeding

and providing documents with new information to increase the effectiveness of the documents. Usually, traditional DE methods add terms to the original documents. In the proposed EDE method, a new procedure to increase the information content according to specific steps is added and aimed at adding new information which is more relevant and closer to each metadata unit in each document. The proposed EDE method calculates the nearest sentences to the content of the metadata unit by improving the probability estimation equation. The experiments which are conducted on cultural heritage CHIC2013 collections show a statistically significant improvement over the traditional document expansion methods.

Track: Information Technology Trends

Paper Title: Towards Look-ahead Strategies for Work Item Selection

Authors: Horst Pichler (JOANNEUM Research Robotics, Australia); Johann Eder (University of Klagenfurt, Austria)

Abstract: We introduce look-ahead strategies to sort work lists of workflow agents in order to improve key performance indicators for business process execution. In contrast to well known local strategies like first-in first-out (FIFO) or earliest-deadline-first (EDF) our look-ahead approach utilizes structural, organizational, empirical, and current workload information of the process to provide a heuristics for computing recommendations for process actors, which work-item should be selected next for execution.

Track: Information Technology Trends

Paper Title: An Efficient and Secure Key Exchange Protocol Based on Elliptic Curve and Security Models

Authors: Ahmad Abusukhon and Zeyad Mohammad (Al Zaytoonah University of Jordan, Jordan); Ali Al-Thaher (Al-Zaytoonah University of Jordan, Jordan)

Abstract: Nowadays, the success of many online applications relays on keeping the data sent through the global network secure and far away from hackers. To carry out this task, the two communicating parties must exchange keys during their session. Some of the key exchange protocols are called key agreement protocols. The Elliptic Curve-Diffie Hellman (ECDH) is one of the most efficient algorithms for securing data. The ECDH is more efficient than other traditional techniques such as Rivest-Shamir-Adleman (RSA) in terms of key size, computation and network bandwidth. The Authenticated Key Agreement (AKA) protocol is used for establishing a common session key between the two communicating parties. The common session key is used for subsequent cryptography goals. Most of the key agreement protocols (e.g. MQV family) generate one key per session therefore increasing the opportunities for guessing the session key. In this paper, we focus on developing an enhanced multiple sessions key which is based on ECDH. We propose an efficient and secure AKA protocol which is based on the ideas of the hashed MQV (HMQV), the YAK protocol as a robust key agreement based on public key authentication and multiple session keys. The proposed protocol generates multiple common keys per a session, where the generated common key depends on the static and ephemeral keys. Furthermore, the proposed protocol overcomes the attacks on the HMQV and YAK protocols and provides desirable security properties as compared with the related works in this paper.

Track: Information Technology Trends

Paper Title: Implementing the Unique Existential Quantifier in Digital Logic Design

Authors: Nesreen A. Hamad (Al-Zaytoonah University of Jordan, Jordan); Maher Nabulsi (Alzaytoonah University of Jordan, Jordan)

Abstract: Nowadays, digital circuits are widely applied in different equipment such as computers, cell phones, digital watches, etc. As a result, new approaches to implement digital circuits are needed. Applying predicate logic is one way for achieving that. In particular, quantification (which is a commonly studied topic in predicate logic) can be used in the translation of a given logical statement which would assist in designing digital circuits. As a result, this paper proposes a new approach to implement the unique existential quantifier in digital circuits.

Track: Information Technology Trends

Paper Title: A User Perspective Overview of the Top Infrastructure as a Service and High Performance Computing Cloud Service Providers

Authors: Rawan Raid Aljamal (The University of Jordan, Jordan); Ali El-Mousa (Princess Sumaya University for Technology, Jordan); Fahed Jubair (University of Jordan, Jordan & Purdue University, USA)

Abstract: This paper introduces an extensive overview of the Infrastructure as a Service offering that are presented today by the top ranked cloud providers. It surveys their solutions related to Infrastructure as a Service and High Performance Computing, presenting their benefits and drawbacks from a cloud user perspective. Four leading cloud provider were chosen for this paper, Amazon Elastic Compute Cloud, Microsoft Windows Azure Cloud, Google Cloud and Oracle Cloud. Each one of these providers has its competitive advantages that already persuade its existing customer to invest more in their cloud and to attract new ones to migrate their resources to.

Track: Information Technology Trends

Paper Title: Improved Monkey Tool for Random Testing in Mobile Applications

Authors: Mohammed Lafi and Hiba Wasmi (Al-Zaytoonah University of Jordan, Jordan); Mohamed Saadeldine Osman (AlZaytoonah University of Jordan, Jordan)

Abstract: The growth of developing mobile application increases the need for mobile application testing to create free of errors application. Random testing such as monkey tool is frequently used to test mobile application. However, monkey tool suffers from shortcomings such as long time and low accuracy. In this paper, we propose an approach to improve the monkey tool. The proposed approach solves the monkey tool shortcoming and it decreases the time needed to run the test and increases the ability of the tool to catch errors.

Track: Information Technology Trends

Paper Title: Security Challenges and Attacks in Dynamic Mobile Ad Hoc Networks MANETs

Authors: Farhan Abdel-Fattah and Khalid A. Farhan (Al-Zaytoonah University of Jordan, Jordan); Feras Altarawneh (AL-Zaytoonah University of Jordan, Jordan); Fadel Altamimi (Al-Zaytoonah University of Jordan, Jordan)

Abstract: Mobile Ad hoc Network (MANET for short) is a new art of wireless technology that connects a group of mobile nodes in a dynamically decentralized fashion without the need of a base station, or a centralized administration, whereas each mobile node can work as a router. MANET topology changes frequently, because of the MANET dynamically formation nature, and free to move randomly. MANET can function as standalone or can be connected to external networks. Mobile nodes are characterized with minimal human interaction, weight, less memory, and power. Despite all the pros of MANET and the widely spreading in many and critical industries, MANET has some cons and suffers from severe security issues. In this survey we emphasize on the different types of attacks at MANET protocol stack, and show how MANET is vulnerable to those attacks.

Track: Information Technology Trends

Paper Title: Optimal Placement and Capacity of Electric Vehicle Charging Stations in Urban Areas: Survey and Open Challenges

Authors: Mohammad Aljaidi and Nauman Aslam (Northumbria University, United Kingdom (Great Britain)); Omprakash Kaiwartya (Nottingham Trent University, Sweden)

Abstract: Electric vehicle (EV) Fast charging stations (FCSs) are connected to the electric grid and can fully charge an EV battery in less than thirty minutes. Determining the capacity and location of charging stations has a significant challenge on the electrical network operator, as well as the owner of the station and EV users. This study introduces a technique in order to find a solution of the problem of finding the optimal placement of the FCSs, as well as the capacity of these FCSs, considering many factors that affect EV charging, such as the EVs population in the study area, EV drivers' convenience, the total expected cost for EV charging, as well as the existence of CSs that have been placed in the same study area. The efficiency of the proposed technique will be tested in an urban area using Matlab in order to obtain the optimal location and capacity of FCSs that can help EV drivers, which in turn helps in increasing the adoption of the EVs in urban areas.

Track: Information Technology Trends

Paper Title: 3 Dimensional Point Cloud Filtering Using Differential Evolution Algorithm

Authors: Tuba Kurban (Erciyes University, Turkey); Erkan Beşdok (Erciyes University, Turkey)

Abstract: The ability to model an object or an environment using 3 dimensional point clouds is very important for applications about photogrammetry, remote sensing, material processing and production, reverse engineering, construction industry, virtual reality and medicine. However, the measurements obtained with the existing technologies contain some noise due to the nature of the respective measurement devices. Therefore, it has great importance filtering raw point clouds or surface elements derived from the point clouds to increase the quality of the obtained 3D model. In this study, a filtering method based on plane fitting was developed by differential evolution algorithm in order to remove the noise of point clouds. The proposed heuristic algorithm-based filtering method is compared with the singular value decomposition method, which is frequently used in obtaining the plane parameters. Both visual and numerical results show that the plane fitting method based on the differential evolution algorithm is more successful to remove noise than the classical filtering method based on singular value decomposition.

Track: Information Technology Trends

Paper Title: A Survey of Authenticated Key Agreement Protocols for Securing IoT

Authors: Zeyad H Dasouqi (Al-Zaytoonah University of Jordan, Jordan); Ahmad Abusukhon (Al Zaytoonah University of Jordan, Jordan); Thaer Abu Qattam (IT Faculty Al-Zaytoonah University of Jordan, Jordan)

Abstract: Internet-of-Things (IoT) is defined as an inanimate object which is designed with built-in wireless connectivity, and monitored, controlled and linked over the internet. As any new technology, IoT is confusing for the normal consumer especially as debates swirl around standardization, security and privacy. This paper presents the IoT applications such as Home automation, Healthcare, Smart grid, Smart city and Smart car and focuses on how to secure the generated data by IoT devices from an unauthorized access. The IoT consists of devices which are constrained in their computational capability, network bandwidth, packet size and memory such as sensor nodes. This paper demonstrates that a lightweight and mutual authentication protocols are a fundamental building block for providing the mutual authentication between user and devices in the IoT applications. Furthermore, this paper surveys some of authenticated key agreement protocols for securing IoT and presents a comparison between them in terms of security and performance.

Track: Information Technology Trends

Paper Title: Intention to Use BI Tools: Integrating Technology Acceptance Model (TAM) and Personality Trait Model

Authors: Yousra Harb and Sahar Faisal Alhayajneh (Yarmouk University, Jordan)

Abstract: This study extends the existing literature of users' acceptance of business intelligence technologies by proposing a comprehensive model integrating personality five factors model (FFM) and technology acceptance model (TAM) to investigate the intention to use business intelligence (BI) tools to support business decision making. We expect that this study will present an example of the integration between FFM and TAM to provide a better understanding about the relationship between personality and intention to use within the context of BI.

Track: Information Technology Trends

Paper Title: Security Weaknesses and Attacks on the Internet of Things Applications

Authors: Zeyad H Dasouqi (Al-Zaytoonah University of Jordan, Jordan); Thaer Abu Qattam (IT Faculty Al-Zaytoonah University of Jordan, Jordan); Kholoud Saleh (Al-Zaytoonah University of Jordan, Jordan)

Abstract: Internet of Things (IoT) is a contemporary concept for connecting the existing things in our environment with the Internet for a sake of making the objects information are accessible from anywhere and anytime to

support a modern life style based on the Internet. With the rapid development of the IoT technologies and widely spreading in most of the fields such as buildings, health, education, transportation and agriculture. Thus, the IoT applications require increasing data collection from the IoT devices to send these data to the applications or servers which collect or analyze the data, so it is a very important to secure the data and ensure that do not reach a malicious adversary. This paper reviews some attacks in the IoT applications and the security weaknesses in the IoT environment. In addition, this study presents the challenges of IoT in terms of hardware, network and software. Moreover, this paper summarizes and points to some attacks on the smart car, smart home, smart campus, smart farm and healthcare.

Track: Information Technology Trends

Paper Title: Pilot Study of Healthcare COTS Software Evaluation and Selection

Authors: Feras Altarawneh (AL-Zaytoonah University of Jordan, Jordan); Ahmad Althunibat (Al-Zaytoonah University of Jordan, Jordan)

Abstract: In the recent years, the healthcare Commercial Off-The-Shelf (COTS) products are being increasingly integrated in the healthcare industry in order to decrease the development cost and increase the overall system productivity. Consequence, the selecting process of healthcare COTS software becomes problematic and more difficult, thus the well-defined method for evaluating and selecting the appropriate products that will be accepted in the real life becomes a necessity. Thus, this study was carried out to investigate the current practices, problems, activities and techniques of the evaluation and selection healthcare COTS software in healthcare industry. The survey and data collection was carried out in Jordanian healthcare sector. The descriptive statistics analysis was applied to categorize the identification techniques based to their importance. This paper presents the data, the analysis and finding based on pilot survey. These actual findings of this survey will facilitate constructing new framework for healthcare COTS software evaluation and selection, and also will provide useful information to those who are interesting in the same field.

Track: Information Technology Trends

Paper Title: Survey Paper on Multicast Routing in Mobile Ad-hoc Networks

Authors: Khalid A. Farhan and Farhan Abdel-Fattah (Al-Zaytoonah University of Jordan, Jordan); Feras Altarawneh (AL-Zaytoonah University of Jordan, Jordan); Mohammed Lafi (Al-Zaytoonah University of Jordan, Jordan)

Abstract: This paper surveys the various multicast routing protocols proposed for mobile ad-hoc networks. Some of the protocols use tree based approaches for creating multicast routes, some use graphs to construct multicast trees for routing, some protocol use the flooding approach to send multicast packets. This paper makes a detailed analysis and talks about the merits and demerits of various multicast protocols for mobile ad-hoc networks. The paper focuses on the number of control messages used in every protocol, the data structures used to maintain information, the merits of the protocol, the demerits and overhead involved during routing, the bandwidth utilized due to these message overheads. Also this paper studies the advantages and disadvantages of using trees, graphs and flooding for routing.

Track: Information Technology Trends

Paper Title: Code Smells Analysis Mechanisms Detection Issues and Effect on Software Maintainability

Authors: Mohammed Lafi, Joseph W. Botros, Ahmad Bassam Al-Dasoqi, Hamza Al-kfaween and Abdelfattah A. Tamimi (Al-Zaytoonah University of Jordan, Jordan)

Abstract: Software evolution is an inevitable process in most of the businesses, software that doesn't accommodate changes is hard to survive the market needs, however changes affect the overall design of the software and sometimes in a corrupting way, affecting the maintainability and evolvability of the software, which introduces technical debt that needs to be solved by continuous refactoring and restructuring of software, Code smells are useful indicators to identify the parts of the code to be refactored to improve the overall maintainability of the software. We present an overview of software code smells, detection & analysis mechanisms and difficulties. Also, we address the effect of refactoring on software maintainability and error-proneness of software.

Track: Information Technology Trends

Paper Title: A Survey on Parallel Join Algorithms Using MapReduce on Hadoop

Authors: Malek Mahmoud Barhoush (Yarmouk University, Jordan); Anas Mohammad Ramadan ALSobeh (Yarmouk University); Ahmad Al Rawashdeh (Jordan University of Science and Technology, Jordan)

Abstract: In this paper, we will present a recent survey on the improvements over parallel join algorithms using the popular MapReduce framework on the distributed file system Hadoop. We will talk briefly about MapReduce and Hadoop frameworks, and we will discuss the general main steps to install, configure and start using Hadoop. Then we will talk about parallel join algorithms where we are going to divide join algorithms into categories, and we will discuss in each category the main works of improvements from the beginning to the date in chronological way. After that, we will organize these works into an easy-to-learn table, and we will present an analysis of these works in term of advantages and disadvantages. This survey will help researchers to study the improvements over parallel join algorithms in a chronological manner in one place to simplify the process of improving and proposing new approaches to improve parallel join algorithms using MapReduce on Hadoop.

Track: Information Technology Trends

Paper Title: Word Matching Algorithm Based on Relative Positioning of Letters

Authors: Majed Said AbuSafiya (Al-Ahliyya Amman University, Jordan)

Abstract: In this paper, we propose a word matching algorithm that can be used to find the valid shifts of given word in a text. The new idea in this paper is based on using pre-set information about the likelihood of relative positioning of each pair of letters in a word in the language under consideration. This information will help to decide the order in which the letters of the search word with the words in the search text. This will help to eliminate un-matching words in T in less number of comparison that those needed for KMP algorithm.

Track: Intelligent Systems

Paper Title: An Application of Hybrid Swarm Intelligence Algorithms for Dengue Outbreak Prediction

Authors: Zuriani Mustaffa and Mohd Herwan Sulaiman (Universiti Malaysia Pahang, Malaysia); Mohamad Farhan Mohamad Mohsin and Yuhanis Yusof (Universiti Utara Malaysia, Malaysia); Ferda Ernawan and Khairunisa Amalina Mohd Rosli (Universiti Malaysia Pahang, Malaysia)

Abstract: Dengue fever is a hazardous infectious disease which is channeled by Aedes mosquito. A serious infection of dengue may lead to a potentially lethal complication, known as severe dengue, which includes Dengue Haemorrhagic Fever and shock syndrome. In recent decades, this disease becomes a global burden which has grown dramatically around the world. Unfortunately, until today, a specific anti-viral medicine for dengue is still undiscovered. Therefore, it is a huge responsibility to the community in finding an effective solution to prevent a widespread of this disease in advance. Concerning this matter, this study presents an application of hybrid Swarm Intelligence (SI) algorithms for a dengue outbreak prediction. For simulation purposes, a monthly dengue cases time series data in the area of Indonesia were employed, which are fed to four hybrid SI algorithms, namely Moth Flame Optimization (MFO), Grey Wolf Optimizer (GWO), Firefly Algorithm (FA) and Artificial Bee Colony (ABC) algorithm. These algorithms are individually hybrid with Least Squares Support Vector Machines. Guided by Mean Square Error (MSE) and Root Mean Square Percentage Error (RMSPE), findings of the study indicate that the identified hybrid algorithms were able to produce competitive result, with a slightly favor to ABC-LSSVM.

Track: Intelligent Systems

Paper Title: Emotion Recognition Based on Third-Order Circular Suprasegmental Hidden Markov Models

Authors: Ismaill M. Shahin (University of Sharjah, United Arab Emirates)

Abstract: This work focuses on recognizing the unknown emotion based on the Third-Order Circular Suprasegmental Hidden Markov Models (CSPHMM3s) as a classifier. Our work has been tested on Emotional

Prosody Speech and Transcripts (EPST) database. The extracted features of EPST database are Mel-Frequency Cepstral Coefficients (MFCCs). Our results give average emotion recognition accuracy of 77.8% based on CSPHMM3s. The results of this work demonstrate that CSPHMM3s are superior to Third-Order Hidden Markov Models (HMM3s), Gaussian Mixture Models (GMMs), Support Vector Machines (SVMs), and Vector Quantization (VQ) by 6.0%, 4.9%, 3.5%, and 5.4%, respectively, for emotion recognition. The average emotion recognition accuracy achieved based on CSPHMM3s is comparable to that found using subjective assessment by human judges.

Track: Intelligent Systems

Paper Title: Emotions and the Structure of the Language

Authors: Ahmad Hammoudeh (Princess Sumaya University for Technology, Jordan); Sara Tedmori (Princess Sumaya University For Technology, Jordan)

Abstract: Emotions have an impact on almost every facet of human life - from daily behavior going to work efficiency, everyday decisions, human interactions, as well as human health. Humans express their emotions through the use of language and the things that people say do affect our emotions, but can these emotions affect the structure of the language? And if so, to what extent? Do people speak more or less when they experience certain emotions? Do emotions affect the selection of the grammar? For example, are people more likely to use verbs rather than nouns when experiencing a certain emotion? Do emotions influence the transition between grammars? The aim of this paper is to contribute to the answers of the aforementioned questions by computationally analyzing emotionally rich text. The paper proposes the use of Natural Language Processing techniques to investigate the relation between emotions and language. Results show that emotions affect the length of text and to a lesser degree the tendency toward choosing some parts of speech (i.e. nouns vs verbs). For the structure of the sentence and the transition between grammatical categories, the influence of emotions is negligible.

Track: Intelligent Systems

Paper Title: Selective Ensemble Model for Telecom Churn Prediction

Authors: Ahmad Hammoudeh, Malak Ziyad Fraihat and Mahmoud Almomani (Princess Sumaya University for Technology, Jordan)

Abstract: Customer based companies are concerned about costumers who decide to stop using their services (churn) because the cost of acquiring new customer is much higher than satisfying an existing customer. With the rapid development of the telecom industry, churn prediction emerges as one of the fundamental tasks for gaining the competitive advantage in the market. This paper introduces Selective Ensemble Model (SEM) as a powerful technique for churn prediction. Among a set of machine learning models, SEM dynamically selects a combination of models to participate in forming the final outcome. Experimental results show that SEM outperforms its constituent models and the averaging ensemble model.

Track: Intelligent Systems

Paper Title: Driving Behavior Profiling and Prediction in KSA Using Smart Phone Sensors and MLAs

Authors: Vani Vasudevan, V (AlYamamah University, Saudi Arabia); Absar Abdul Rahman and Waleed Saleem (Alyamamah University, Saudi Arabia)

Abstract: Driving behavior plays an important role in traffic safety and eco driving. In this paper, using low-cost smartphone sensors driving profiles(dataset) of various drivers were collected to predict aggressive behavior while driving in the Kingdom of Saudi Arabia (KSA). The prediction was performed using various Machine Learning Algorithms (MLAs) on the dataset with different tools which helped to identify the prediction model that outperforms. The predicted model can be further used in upcoming self- driving cars, prototypes and various driving applications in KSA to predict the aggressive nature of the driver and traffic.

Track: Intelligent Systems

Paper Title: Movies Reviews Sentiment Analysis and Classification

Authors: Mais Yasen (Princess Sumaya University for Technology, Jordan); Sara Tedmori (Princess Sumaya University For Technology, Jordan)

Abstract: As humans' opinions help enhance products efficiency, and since the success or the failure of a movie depends on its reviews, there is an increase in the demand and need to build a good sentiment analysis model that classifies movies reviews. In this research, tokenization is employed to transfer the input string into a word vector, stemming is utilized to extract the root of the words, feature selection is conducted to extract the essential words, and finally classification is performed to label reviews as being either positive or negative. A model that makes use of all of the previously mentioned methods is presented. The model is evaluated and compared on eight different classifiers. The model is evaluated on a real-world dataset. In order to compare the eight different classifiers, five different evaluation metrics are utilized. The results show that Random Forest outperforms the other classifiers. Furthermore, Ripper Rule Learning performed the worst on the dataset according to the results attained from the evaluation metrics.

Track: Intelligent Systems

Paper Title: Kinect-Based Virtual Try-on System: A Case Study

Authors: Khalil M. Ahmad Yousef, Bassam Jamil Mohd and Malak AL-Omari (Hashemite University, Jordan)

Abstract: Virtual fitting rooms are a very important tool in online shopping, which can save time, promote products, increase sales, and reduce number of returns. The main objective of this paper is to design an interactive virtual clothes try-on system that would make the online shopping process much easier, and affordable at the lowest cost possible in the local country of Jordan, which we consider as a case study of this work. The novelty of our work is that we use a cost effective RGB-D sensor, simple 3D cloth textures, and alignment/fusion procedure to build robust and interactive virtual fitting room targeted for the local market. Microsoft Kinect V2 sensor what was used in implementing the proposed system. Experimentation's supported by real data from the Kinect sensor demonstrate its effectiveness and robustness. A user study was conducted among 65 Jordanian university students to evaluate the effectiveness and attitude toward using the proposed system. The study results indicate the importance and usefulness of the proposed system.

Track: Intelligent Systems

Paper Title: The Impact of Artificial Intelligence on Software Testing

Authors: Hussam Hourani and Ahmad Hammad (Alzaytoonah University of Jordan, Jordan); Mohammed Lafi (Al-Zaytoonah University of Jordan, Jordan)

Abstract: Artificial Intelligence (AI) plays an important role in our life and touch base most of our surrounding applications and systems. A huge amounts of data are created every day from many different sources that need to be monitored and analyzed properly and report results and take actions. A more complex software applications have been built, time is becoming a critical factor to release applications that must be fully tested and comply with Business Requirements. AI plays a key role in Software Testing and can get more accurate results and saves time. This paper discuss the Artificial Intelligence key pillars that can be used in Software Testing. It also open a window on how the future will look like in terms of Artificial Intelligence and the Software Testing. The results shows that AI can achieve better results in Software Testing and AI-driven testing will lead the new era of the quality assurance (QA) work in the near future. AI Software Testing will reduce time to market and will increase the efficiency of the organization to produce more sophisticated software and will create smarter automated testing.

Track: Intelligent Systems

Paper Title: Enhancing Cuckoo Search Algorithm by Using Reinforcement Learning for Constrained Engineering Optimization Problems

Authors: Mohammad Shehab and Ahamad Khader (Universiti Sains Malaysia, Jordan); Mohammad Alia (Al Zaytoonah University of Jordan, Jordan)

Abstract: Cuckoo Search Algorithm (CSA) has been successfully applied to a range of various fields such as engineering, medical, and image processing. However, it typically suffers from a lack of effective exploration, loose diversity, and premature convergence. This paper aspires to develop a new version of CSA that is based on the features of Reinforcement Learning (RL) to enhance the research technique of CSA, which will be called CSARL. The performance of CSARL is evaluated by applying set of unimodal and multimodal benchmark functions. The results demonstrate that the CSARL outperforms the basic CSA, genetic, harmony search and krill herd algorithms, in terms of convergence speed, the diversity, and exploration search.

Track: Intelligent Systems

Paper Title: Automated Keyword Extraction Using Support Vector Machine from Arabic News Documents

Authors: Batool Armouty (Princess Sumaya University for Technology, Jordan); Sara Tedmori (Princess Sumaya University For Technology, Jordan)

Abstract: Keyword extraction is an indispensable step for many natural language processing and information retrieval applications such as text summarization and search engine optimization. Keywords hold the most important information describing the content of a document. With the increasing volume and variety of unlabeled documents on the Internet, the need for automatic keyword extraction methods increases. In this paper, a supervised learning technique that uses statistical features and a Support Vector Machine classifier to extract the keywords from Arabic news documents is introduced. The proposed supervised learning approach achieved a precision and recall of 0.77 and 0.58 respectively.

Track: Intelligent Systems

Paper Title: Robotic Arm Representation Using Image-Based Feedback for Deep Reinforcement Learning

Authors: Abdullah Al-Zabt and Tarek A. Tutunji (Philadelphia University, Jordan)

Abstract: This paper presents a technique to help with implementing a robotic task using Deep Reinforcement Learning (DRL). The technique requires the use of images as feedback. The agent(controller) type is Actor-Critic, which uses both Temporal-Difference (TD) and Monte Carlo (MC) methods to gain knowledge about the environment (plant). The representation of the robot is implemented in the V-Rep simulator.

Track: Intelligent Systems

Paper Title: The Development of Usability Heuristics for Arabic M-Commerce Applications

Authors: Mohammad S. Salah and Shaidah Jusoh (Princess Sumaya University for Technology, Jordan); Muhanna Muhanna (Luminus Technical University College, Jordan)

Abstract: Mobile Commerce (M-Commerce) applications are becoming popular among Arab population. The applications have been considered as a necessity in their life for performing online transactions such as buying goods. For these reasons, it is necessary to build M-Commerce applications that are similar to online websites in terms of its usability and to avoid usability problems which may lead to frustration. In addition, users expect these applications to support their native language; Arabic language adds extra challenges when it comes to designing a usable User Interface (UI). Having a set of heuristics to evaluate Arabic M-Commerce is crucial to these goals. The current heuristics for M-Commerce were developed without considering UI for Arabic M-Commerce applications. This paper presents a set of heuristics for evaluating the UI of Arabic M-Commerce. The presented heuristics are divided into six categories, including: Search and Findability, Visual Design, Translatability, Consistency, User Control and Freedom, and Adaptability. The process of developing the proposed heuristics includes three stages; firstly, generating draft heuristics based on the literature review study, and then the draft was reviewed by three HCI experts, and finally the modified heuristics after expert review were sent out for a final evaluation by a usability expert community. An online survey has been used to collect data from the community. The obtained comments and suggestions from the community were used to finalize the proposed set of heuristics, which are presented in this paper.

Track: Intelligent Systems

Paper Title: Intelligent Traffic Light Based on Genetic Algorithm

Authors: Abdelfattah A. Tamimi and Maha AbuNaser (Al-Zaytoonah University of Jordan, Jordan); Ayat Tawalbeh (Princess Sumaya University For Technology, Jordan); Kholoud Saleh (Al-Zaytoonah University of Jordan, Jordan)

Abstract: The genetic algorithm is used in many applications and the one of these applications is the traffic signal system. The traditional traffic light suffers from several problems such as long waiting period and thus increasing the number of vehicles. Genetic algorithms a type of optimization algorithm, meaning they are used to find the optimal solution based on the theory of natural selection and evolutionary biology so they have several steps starts from the initial population, calculate the fitness function for each solution (Chromosome) and ends with selections, crossover and mutation. The result of the genetic algorithm is increasing the total number of vehicles passing through the traffic signal system.

Track: Intelligent Systems

Paper Title: Comparison of Machine Learning Algorithms for Predicting Traffic Accident Severity

Authors: Rabia Emhamed Almamlook (Western Michigan University & WMU, USA); Keneth M Kwayu (WMU, USA); Maha Alkasisbeh (University Al-Zarqa, Jordan); Abdulbaset Frefer (University of Tripoli, USA)

Abstract: Traffic accidents are among the most critical issues facing the world as they cause many deaths, injuries, and fatalities as well as economic losses every year. Accurate models to predict the traffic accident severity is a critical task for transportation systems. This investigation effort establishes models to select a set of influential factors and to build up a model for classifying the severity of injuries. These models are formulated by various machine learning techniques. Supervised machine learning algorithms such as AdaBoost, Logistic Regression (LR), Naive Bayes (NB) and Random Forests (RF) are implemented on traffic accident data. SMOTE algorithm is used to handle data imbalance. The findings of this study indicate that the RF model can be a promising tool for predicting the injury severity of traffic accidents. RF algorithm has shown better performance with 75.5% accuracy than LR with 74.5%, NB with 73.1% and AdaBoost with 74.5% accuracy

Track: Intelligent Systems

Paper Title: Generate Use Case from the Requirements Written in a Natural Language Using Machine Learning

Authors: Mohamed Saadeldine Osman (AlZaytoonah University of Jordan, Jordan); Nour Alabwaini (Al-Zaytoonah University of Jordan, Jordan); Tamara Jaber (AlZaytoonah University of Jordan, Jordan); Thamer Alrawashdeh (Alzaytoonah University Of Jordan, Jordan)

Abstract: Recently it has become important to focus on the requirements of the system and how to take them and analyze them to determine the system infrastructure through which they will be relied upon in the rest of the system building. Some difficulties have been encountered in the process of understanding and analyzing the data taken from the user to convert it to UML diagrams. In this paper, we create a new approach that focuses mainly on increasing accuracy for this technique, reducing time in the systems of generating the use case of text written in natural language and finding solutions to some problems in current technologies because people need a smart and accurate system to meet their needs and save their time and increase the reliability of the reliance on software.

Track: Intelligent Systems

Paper Title: Classifying Arabic Tweets Based on Credibility Using Content and User Features

Authors: Ghaith Jardaneh, Hamed Abdelhaq and Momen Buzz (An-Najah National University, Palestine); Douglas Johnson (University of Colorado, Boulder, USA)

Abstract: Social Media services, such as Facebook and Twitter, have recently become a huge and continuous source of daily news. People all around the world rely heavily on news published via social media to know more about current events and activities. As a result, many users have started to exploit social media by broadcasting deceiving and misleading news for financial and political purposes which has a serious and adverse impact on society. In this paper, we utilize machine learning to automatically identify fake news from Twitter content based

on a supervised classification model.

Twitter content is very noisy with a high level of uncertainty. To mitigate this, we utilize content- and user-related features, and employ sentiment analysis to generate new features. Sentiment analysis led to improving the accuracy of the prediction process. Among a number of machine learning algorithms used to train the classification models, four algorithms are chosen, namely random forest, decision tree, Ada boost, and linear regression. The model hyperparameters are tuned and optimized using a grid search strategy. The experimental evaluation shows that our system can filter out fake news with an accuracy of 76\%.

Track: Intelligent Systems

Paper Title: What I Have in My Cup? A Liquid Identification Mechanism Based on Electrical Connectivity

Authors: Mohammad Masoud, Yousef Jaradat and Ahmad Manasrah (Al-Zaytoonah University of Jordan, Jordan)

Abstract: Designing and Developing of Sensors to assess and evaluate the presents of different physical phenomena in the environments has heavily introduced in the past decade. Different methods and techniques have been studied to develop a direct micro-sensors. With the introduction of microcontrollers and machine learning, sensors data may be used to predict other indirect phenomena in the environment. In this work, the electrical connectivity is utilized to predict the type of a solution or liquid in a cup. A simple sensor electric circuit based on ATmega328 micrcontroller has been designed to detect the electrical connectivity values in different liquids. Subsequently, these values have been utilized to train an artificial neural network model (ANN) to predict the liquids commercial names. The designed circuit and the ANN model have been tested with different 15 liquids diluted with water. eleven liquids are drinkable, the other 4 are chemical cleaning liquids. Our simple ANN model with this tiny dataset and two features only can detect the liquid type with an accuracy of more than 80% and a MSE value of less than 1%.

Track: Intelligent Systems

Paper Title: Towards Adaptive Multimedia System for Assisting Children with Arabic Learning Difficulties

Authors: Moutaz Saleh Saleh (Qatar University, Qatar)

Abstract: Children with learning difficulties (LD) are increasing dramatically in the Arab world. Such children require quick intervention especially during the early childhood years. Despite the potential benefit of the usage of assistive computer technology for children with LD, most of the software applications, tools, and web sites that those children interact with are designed without consideration of their special needs, making these elements less effective or completely inaccessible for them. This paper presents a dynamic multimedia system for helping children with LD overcome their learning problems. The aim of this research work is to propose and evaluate theoretical models and practical strategies for automatically converting Arabic language text into an appropriate personalized multimedia contents that would significantly enhance understanding, communications, and thinking skills for children with LD in elementary schools and special education centers. Furthermore, our proposed system can be used to teach Arabic to non-native individuals willing to learn Arabic as a second language.

Track: Intelligent Systems

Paper Title: Evaluation of the Naturalness of Chatbot Applications

Authors: Ayah Adnan Atiyah, Shaidah Jusoh and Firas L. Alghanim (Princess Sumaya University for Technology, Jordan)

Abstract: Chatbots are intelligent machine-to-human conversation systems. The main benefit of developing and deploying a chatbot in any business domain is that it can behave as a personal assistant. A chatbot is expected to be close in efficiency of interaction to a human personnel in responding to customers' questions. The aim of this study is to evaluate the performance and naturalness of interaction of chatbot applications. The performance of a personal chatbot has been compared to a human personal in order to evaluate the naturalness. The evaluation was made by conducting an experiment on two expert users using cognitive walkthrough method. Findings of the experiment suggests that the human-machine chatbot is able to be close to the human performance in terms of

interaction, although in some minor cases, the human-human chat applications perform better.

Track: Intelligent Systems

Paper Title: Detecting DDI Using Ontology: Drug Mechanism of Action

Authors: Heba Al. Harahsheh (The University of Jordan, Jordan); Fatima Alhaj (University of Jordan, Jordan); Duha Moh'd Basam Qutishat (Hashemite University, Jordan); Nadim Obeid and Bassam H Hammo (University of Jordan, Jordan)

Abstract: Drug-drug interactions are generally harmful. This is usually manifested when the patient suffers from more than one disease for which drugs are prescribed and/or more than one drug is needed to be prescribed. The problem is made worse by the wide range of available drugs and the complexity which characterizes the variety of possible interactions or adverse effects. Determining potential drug-drug interactions (DDIs) is essential in any drug prescription. However, this process is not easy taking into consideration that medical and clinical data is continually increasing. Formal representation of the underlying knowledge is needed to provide comprehensive study of potential DDI. The ultimate aim of this work is to develop and use an ontology for identifying DDI. DDI effects were classified into three types: toxic reaction, reduction effect or synergism effect. In this paper, the mechanism of action of drugs was considered to describe the proven general properties and action of drugs. Three scenarios were created to show the ability of description Logic (DL) reasoner of the proposed ontology to provide a proper classification of the DDI effects. In another words, describing the characteristics of any class will enable the DL reasoner to automatically recognize any individual that is an instance of this class. The study shows an efficient classification based on the defined ontology. The study relies on five drug families Angiotensin-converting enzyme (ACE) inhibitors, Angiotensin II receptor blockers (ARBs), Beta Blocker (BBs), broad-spectrum penicillin's and Non-Steroidal Anti-Inflammatory Drugs (NSAIDs).

Track: Intelligent Systems

Paper Title: A Machine Vision Fuzzy-Based Technique for Detection of Defected Pores in AFM Images

Authors: Amjed Al-Mousa (Princess Sumaya University of Technology, Jordan); Oday Al-Dweik (Princess Sumaya University for Technology, Jordan)

Abstract: This paper presents an expanded technique to automatically characterize pores in Atomic Force Microscopy (AFM) images and consequently detect defects. The technique deploys a statistical approach to identify the base surface of the AFM image. Then utilize an existing fuzzy-based engine to characterize both pores and surface structures. It treats the above-surface and below-surface parts of the image as two separate images, and then it combines the characterization results from these two images. The technique was tested on porous AFM images and was able to characterize pores successfully and identify defects in the AFM images.

Track: Intelligent Systems

Paper Title: Discovering the Applicability of Classification Algorithms with Arabic Poetry

Authors: Mohammad Gharbat, Heba Saadeh and Reem Q. Al Fayez (University of Jordan, Jordan)

Abstract: The classification of poems according to the era they were written in helps in matching any new poem to a potential era it might belong to. This process can be automated by studying the linguistic changes that happened to the Arabic poetry in terms of words used (in the hemistichs structure) and style of writing. In this paper, we studied such differences between poems written in the Abbasid and Andalusian periods of ruling. Data have been collected and a classifier has been trained on 15,887 words from both eras, the overall dataset contains 30,058 words (10,895 poetic hemistichs) [1] from both eras. The experiments obtained 70.5% accuracy rate using the support vector machine classifier when tested with a sample of random poem lines. The study proved that it is possible to discover the changes happened to the Arabic poetry in these two distinct eras through discovering the use of different words despite the change in poetic rhyme, which was not considered in this experiment. The problem discussed in this paper is important since the process of classifying a line of poetry to a certain era can be overwhelming when it is performed by an inexperienced person in the field of poetry and can be considered costly when it is performed by an expert. The result shown from this initial experiment is encouraging and it paves the

road for developing new algorithms for using machine learning in dealing with Arabic language and Arabic poetry in specific.

Track: Mathematical Modeling and Analysis

Paper Title: An Active Set Method for Solving Certain Support Vector Machine Problems

Authors: Amal Al-Saket (Al-Zaytoonah University of Jordan, Jordan); Dua' Arman (Jordanian Engineers Association, Jordan)

Abstract: We propose an active set method to solve the dual of the convex quadratic programming problem which is the core of the support vector machine (SVM) training. The method stems from the more general method developed by the first author. By using the special handling of certain quadratic programming problems where the Hessian matrix in the objective function is given as a product of a matrix and its transpose, and by simplifying the solution of the linear system arising at each iteration of the method, we were able to produce an implementation for certain SVMs. The results of an experiment using MATLAB are reported.

Track: Mathematical Modeling and Analysis

Paper Title: Surfaces of Finite Type with Respect to the Third Fundamental Form

Authors: Hassan Al-zoubi (ZUJ, Jordan); Waseem Almashaelh (Al-Zaytoonah University of Jordan, Jordan)

Abstract: In this article, we consider surfaces in the 3-dimensional Euclidean space E^3 without parabolic points which are of finite III-type, that is, they are of finite type, in the sense of B.-Y. Chen, with respect to the third fundamental form. We present an important family of surfaces, namely, surfaces of revolution in E^3 . We study a special case of this family, namely, surfaces of revolution where the sum of the radii of the principal curvature R is constant.

Track: Mathematical Modeling and Analysis

Paper Title: The Role of Benchmarking on Sustainability Performance in Food and Beverage Companies of Malaysia

Authors: Mohamad Ghozali Hassan, Muslim Diekola Akanmu, Amdan Mohamed, Nor Hazlyna Harun and Maslinda Mohd Nadzir (Universiti Utara Malaysia, Malaysia)

Abstract: There have been inconsistent findings in the literature concerning the relationships between benchmarking and sustainable performance. Hence this research has prompted further investigation on the effect of other variables that may better explain the nature of these links. In the related literatures, many theories have suggested that the compatibility between strategies, resources, and capabilities are the keys for organizational sustainability. The main purpose of this study is to investigate critical factors of benchmarking being one of the elements of total quality management (TQM) while desiring sustainable performance. Best practice identification, best practice comparison, and implementation and improvement are the benchmarking steps considered in this study. Questionnaires were distributed to 250 Malaysian food and beverages companies while SPSSV23 shall be used as analysis technique. The study found that best practice identification, best practice comparison, and implementation and improvement all have positive and significant effect on sustainable performance

Track: Mathematical Modeling and Analysis

Paper Title: Conformable Fractional Bernoulli Differential Equation with Applications

Authors: Amer Dababneh (Alzaytoonah University of Jordan, Jordan); Bilal Albarmawi and Ma'mon Abu hammad (Al-Zaytoonah University of Jordan, Jordan); Amjed Zraiqat (Al Zaytoonah University of Jordan, Jordan)

Abstract: In this paper we study the Fractional Abell's $y'=P(x)+Q_1(x)y+Q_2(x)y^2+Q_3(x)y^3$ cases: either $Q_2=0$ or $Q_3=0$.

Track: Mathematical Modeling and Analysis

Paper Title: Some Properties of Fuzzy D-Coimplication

Authors: Iqbal Jebri (Al-Zaytoonah University of Jordan, Jordan)

Abstract: In this paper, we will introduce the definition of fuzzy D-Coimplications, then study the equivalences between D-coimplication and other fuzzy coimplication classes. Also, some examples are also discussed as well.

Track: Mathematical Modeling and Analysis

Paper Title: Minimization and Positivity of the Tensorial Rational Bernstein Form

Authors: Tareq Hamadneh (Al-Zaytoonah University of Jordan, Jordan); Nikolaos Athanasopoulos (Queen's University Belfast, United Kingdom (Great Britain)); Mohammad Hamadneh (JUST, Jordan)

Abstract: Polynomials and rational functions of total degree $\$l\$$ defined on $\$n\$$ dimensional box have a representation in the Bernstein form. The range of these functions is bounded by the smallest and the largest Bernstein coefficients. In this paper, bounding properties of the range of monomials are extended to the multivariate rational Bernstein case. First, algebraic identities certifying the positivity of a given rational function over a box are addressed. Subsequently, we investigate certificates of positivity by minimization, and bounding functions which are independent of the given dimension.

Track: Mathematical Modeling and Analysis

Paper Title: NavAS: Navigation Approaches for Answer Sets

Authors: Asmaa Afeefi (An-Najah National University, Palestine)

Abstract: Answer set programming (ASP) is one of the most popular modeling languages in knowledge representation. In recent years, many integrated development environments (IDE) for ASP programs including editors and debuggers are developed. However, none of them focuses on analyzing the answer sets. With the availability of a huge number of answer sets, it is increasingly important to provide a solution to navigate them. In this paper, we study and analyze the answer sets to perform user access to specific answers. To this end, we aim at conducting and exploring different navigation approaches, such as, filtering, sorting, finding diverse/similar solutions, and faceted browsing. Afterward, we implement a tool performing the above approaches in order to simplify the search task. We conclude by testing the performance of the proposed tool into a real-world example of ASP programs.

Track: Mathematical Modeling and Analysis

Paper Title: Solving Fuzzy Fractional IVPs of Order 2β by Residual Power Series Algorithm

Authors: Ma'mon Abu hammad (Al-Zaytoonah University of Jordan, Jordan); Mohammad Alaroud (Universiti Kebangsaan Malaysia, Jordan); Omar Abu Arqub (The University of Jordan, Jordan); Reem Edwan (Taibah University, Jordan); Mohammed Al-Smadi (Al-Balqa Applied University, Jordan); Shaher Momani (University of Jordan, Jordan)

Abstract: In this paper, an efficient numeric-analytic algorithm has been applied based on the residual power series approach to solve fuzzy fractional initial value problems of order 2β , $0 < \beta \leq 1$, under the strongly generalized differentiability. The present method relies basically upon the concept of the residual functions and generalized Taylor formula that constructs analytical and approximate solutions in the form of rapidly convergent series according to their parametric form. To validate the efficiency, reliability, and applicability of the proposed approach, the experimental data has been presented.

Track: Mathematical Modeling and Analysis

Paper Title: Application of Power Series Method for Solving Obstacle Problem of Fractional Order

Authors: Shatha Hasan and Asad Freihet (Al-Balqa Applied University, Jordan); Omar Abu Arqub (The University of Jordan, Jordan); Mohammed Al-Smadi (Al-Balqa Applied University, Jordan); Ma'mon Abu hammad (Al-Zaytoonah

University of Jordan, Jordan); Shafer Momani (University of Jordan, Jordan)

Abstract: An effective numerical method depends on the fractional power series is applied to solve a class of boundary value problems associated with obstacle, unilateral, and contact problems of fractional order $2\alpha, 0 < \alpha \leq 1$. The fractional derivative is considered in the Caputo sense. This method constructs a convergent sequence of approximate solutions for the obstacle problem. A numerical example is given to illustrate the higher accuracy of this technique.

Track: Mathematical Modeling and Analysis

Paper Title: A Mathematical Approach Using a Thoracic Temperature Sensor for Detecting Human Circadian Rhythms

Authors: Aly Chkeir (University of Technology of Troyes, France)

Abstract: The 24-hour biological rhythms known as circadian rhythms have been a fast-growing field of research for decades. Recently, the study of circadian rhythms has become important and promising for medical research, especially in the field of cancer treatment. This is due to the fact that perturbations in circadian rhythms have been associated with the progression of cancer and wrongly timed chemotherapy sessions. In addition, the study of the myriad circadian rhythms can be implicated in many areas of research in both biology and medicine. Analysis of circadian rhythms has relied on mathematical methods such as Fourier analysis and Cosinor analysis for the purpose of rhythm detection and parameter estimation. Yet many researchers in biology and medicine are not experts in the implementation and computerization of these mathematical approaches. In this context, this study aims at developing graphical user interface software that comprise Fourier analysis and Cosinor analysis in a clear and systematic manner that, with a click of a button, aids researchers in studying a set of rhythms including biological rhythms

Track: Nano-technology and Electronics

Paper Title: Power-Aware Adaptive Encryption

Authors: Bassam Jamil Mohd and Khalil M. Ahmad Yousef (Hashemite University, Jordan); Anas AlMajali (The Hashemite University, Jordan); Thaier Hayajneh (Fordham University, USA)

Abstract: Recently, there has been a significant increase in number of resource-constrained devices, which are typically battery-powered. Encryption schemes are employed to protect privacy of exchanged data. In such devices, balancing data security and devices resources is a critical design challenge. For resource constrained devices, energy is the most crucial resource. The research motivation is to adapt cipher energy based to predefined power levels using a single cipher with multiple implementation options.

In this paper we propose a scheme to adjust power and energy consumption of single lightweight cipher based on current device power level. The scheme adjusts cipher energy by varying design options and operation complexity of the cipher. This includes varying number of implemented rounds in hardware, key scheduling and number of algorithm iterations. While altering number of algorithm iteration reduces security, it is better than inhibiting encryption or shutting down the device.

Our proposed scheme allows adjustable encryption for low power level. Results from Field-programmable gate array (FPGA) implementations show energy savings of 35%-39% compared with implementations of existing designs.

Track: Nano-technology and Electronics

Paper Title: Design of a Low-Power 10-Bit DAC in 130 nm CMOS Technology

Authors: Mamun Bin Ibne Reaz and Md Torikul Islam Badal (Universiti Kebangsaan Malaysia, Malaysia)

Abstract: Developing an accurate and fast digital to analog converter (DAC) to deal with varieties of readout tasks in the new era of wireless communication. This paper reports the model design and measurements of common function DAC readout systems useful RF devices. Primary aim of the newly proposed DAC is to achieve low power

utilization. The developed system consists of a 10-bit DAC depending on a current routing design in the presence of an amplifier AB output of high-swing class. The proposed DAC is designed in 130 nm which consume only less than 0.6 mW power.

Track: Nano-technology and Electronics

Paper Title: A Non-Return-to-Zero Charge-Steering Flip-Flop for High-Speed Wireline Transceivers

Authors: Khaled M. Hassan (Faculty of Engineering Ain-Shams University, Egypt); Sameh Ahmed Assem Mostafa Ibrahim (Ain Shams University, Egypt)

Abstract: In the recent decade, the demand for circuits that operate at high frequency with low energy has increased. The demand is rushed by big-data and internet-of-things applications. Charge-steering circuits were shown to have superior performance over continuous-time current-steering counterparts. This paper presents a non-return-to-zero charge-steering flip-flop. The proposed flip-flop solves both known issues of charge-steering flip-flops; cascading and inter-symbol interference. Cascading two conventional charge-steering flip-flops requires the usage and the presence of in-phase and quadrature clocks. The proposed flip-flop, on the other hand, can be cascaded while using only complementary clocks widening the sampling window for the next flip-flop or comparator. This eliminates the need for generating and distributing in-phase and quadrature clocks which is usually a power-hungry task. The output for the proposed charge-steering flip-flop is valid for the entire cycle enabling potential energy saving. Implement in a 65-nm CMOS technology, the proposed charge-steering flip-flop has the ability to operate at data rates of 30 Gb/s and can thus be used in 60-Gb/s wireline transceivers employing half-rate architectures. The proposed charge steering flip-flop consumes 0.66 mW from a 1-V supply at 30 Gb/s.

Track: Nano-technology and Electronics

Paper Title: Flexible UV Sensor Based on Nanostructured ZnO Thin Film SAW Device

Authors: Sameer Ahmad Hasan and Hamdi Torun (Northumbria University, United Kingdom (Great Britain)); Des Gibson (University of West of Scotland, United Kingdom); Qiang Wu (Northumbria University, United Kingdom (Great Britain)); Michael Cooke (Durham University, United Kingdom (Great Britain)); Richard Fu (Northumbria University, United Kingdom (Great Britain))

Abstract: An ultraviolet (UV) light sensor was developed using flexible SAW device based on ZnO thin film deposited onto low cost and commercial aluminum foil. ZnO nanorods were further grown on the surface of the SAW device for enhancing the sensitivity. The zero order lamb wave modes were identified and used to obtain their frequency responses at various UV light intensities. UV Sensing performance was investigated in different flexible/bending positions and the results exhibited a very good sensitivity and great potential for flexible and wearable UV light sensing applications.

Track: Nano-technology and Electronics

Paper Title: A Digital Signal Processing Approach for the Finite Difference Time Domain Simulations of Graphene Nanomaterial

Authors: Omar Ramadan (Eastern Mediterranean University, Turkey)

Abstract: In this paper, the digital signal processing algorithms developed for digital filters are used in the finite difference time domain (FDTD) simulations of the dispersive Graphene nanomaterial. In the presented formulation, the Graphene dispersion is implemented in the FDTD algorithm by using the bilinear transformation (BT) technique. In addition, the root-locus method is used for studying the stability of the implementation and it is shown that the standard non-dispersive FDTD time step stability constraint is preserved. Numerical example is included to validate the accuracy of the presented formulation.

Track: Nano-technology and Electronics

Paper Title: Assessment of Graphene Band Gap Based on Varying the Interaction Energy Coefficients

Authors: Hasan Alrajhi Alsiraji (Umm Alqura University, Saudi Arabia)

Abstract: The high potentiality for graphene to be used in nanotechnology may lead to an augmentation of the band gap issue due to the fact that the single layer of graphene officially has a zero band gap. Therefore, the concept of bilayer and trilayer is introduced to achieve a tunable band gap via applying an external electrical field. Considering that there is a limit to increasing the band gap using the external electrical field, this paper presents a novel method that will increase the band gap based on Hummer's fabrication method. The simulation results show a significant outcome in the band gap tuning. The tests in this paper have been simulated in a MATLAB environment.

Track: Power Systems and Drives

Paper Title: Solving Dynamic Load Economic Dispatch Using GAMS Optimization Algorithm

Authors: Fouad Zaro and Salah Alqam (Palestine Polytechnic University, Palestine)

Abstract: The growing demand of electric energy, scarcity of energy resources and increasing power generation cost imposes optimal economic dispatch in power systems operation. Dynamic economic load dispatch is the short-term determination of the optimal output of a number of electricity generation facilities, to meet the system load, at the lowest possible cost, subject to transmission and operational constraint. This paper presents an effective and reliable technique for solving the economic load dispatch problem using (GAMS) software. A 20-generator electric power system case study with transmission losses and generator ramp rate limits over 10 hours of variable load was used to evaluate the (GAMS) performance.

Track: Power Systems and Drives

Paper Title: The Application of Discrete Wavelet Transform to Classification of Power Transmission System Faults

Authors: Julie Matarweh (Princess Sumaya University For Technology, Jordan); Reziq Mustaklem and Anas Saleem (Princess Sumaya University for Technology, Jordan); Omar Mohamed (Princess Sumaya University of Technology, Jordan)

Abstract: this paper presents the development of detection and classification system for the various faults in power system to enhance the selectivity of power system protection and avoid considerable damages that happen as a result of inadequate protection. The aim is to make a classification of any fault that occurs in any power system as fast as possible. This diagnosis improves the relaying speed of the digital (numerical) distance relay to isolate the faulty part and reported immediately to the system operators simultaneously with other information; to estimate and reduce the repair time. . Before the classifier design goes to the manufacturing stage, it is quite necessary to test and verify its performance through modeling and simulations. Discrete wavelet transform is adopted to transform the fault signals in such a way it can be translated to indicate the fault type. The program is prepared as MATLAB script and evaluated through simulations of the transmission line model by MATLAB/SIMULINK and the results are promising.

Track: Power Systems and Drives

Paper Title: An Application of Barnacles Mating Optimizer for Solving Economic Dispatch Problems

Authors: Mohd Herwan Sulaiman and Zuriani Mustaffa (Universiti Malaysia Pahang, Malaysia); Omar Aliman (UMP, Malaysia)

Abstract: This paper presents an application of a new nature-based optimization algorithm namely Barnacles Mating Optimizer (BMO) to solve the well-known economic dispatch (ED) problem in power system operation. ED is one of the classical optimization problems which draws a lot of attention of power engineers as well as researchers globally in order to obtain the minimum cost of power generation by fulfilling all the constraints and demand. The practical constraints will be considered in this paper such as prohibited operating zones, ramp rate limits and generation operating limits. BMO on the other hand is the new algorithm based on behavior of barnacles seeking for mating. BMO will be adopted in finding the optimal combination of power generation so that the minimum cost can be achieved without violating any constraints. 6-units and 15-units case systems will be utilized

to show the effectiveness of BMO compared with other recent algorithms.

Track: Power Systems and Drives

Paper Title: Multiobjective Design Optimization of Axial Flux Permanent Magnet Brushless DC Micromotor Using Response Surface Methodology and Multi-Verse Optimization Algorithm

Authors: Ahmed Abd-Rabou (Faculty of Engineering, Ain Shams University, Egypt); Mostafa I. Marei (Ain Shams University & Faculty of Engineering, Egypt); Ahmed El-Sattar (Faculty of Engineering, Ain Shams University, Egypt); Mohamed Basha (University of Waterloo, Egypt)

Abstract: This paper presents a multiobjective design optimization technique of Axial Flux Permanent Magnet (AFPM) Brushless DC (BLDC) micromotor. The two objectives of the optimization process are to minimize the micromotor volume and improve Joules efficiency with the constraints of minimum required torque and maximum required back EMF using response surface modeling and a novel Multi-Objective Multi-Verse optimization algorithm (MOMVO). Finite element computations are used for numerical experiments on geometrical design variables in order to evaluate the coefficients of a second-order empirical model for the response surface representation. The optimization results were compared with efficient multiobjective algorithm, the Non-Dominated Sorting Genetic Algorithm Version II (NSGA-II). The MOMVO algorithm shows a potential competitive against NSGA-II.

Track: Power Systems and Drives

Paper Title: Impact of Photovoltaic Penetration on the Distribution System Protection: A Case Study of 5-MW Plants of Mu'tah University and Kempinski Hotel

Authors: Mahmoud Alhalalmeh (Tafila University, Jordan); Saleh Al-Jufout (Tafila Technical University, Jordan)

Abstract: this paper investigates the impact of photovoltaic (PV) penetration on the distribution system protection. Al-Karak medium voltage network has been considered as a case study to analyze this impact and propose recommendations for better operation of the network. A New Thaniyah 132/33-kV based substation and its four 33-kV feeders have been selected for this study. The planned 5-MW PV plant of Mu'tah University, the planned and existing 5-MW PV plants of Kempinski Hotel in Al-Karak city in Jordan have been considered in this case study. Different scenarios with different levels of PV penetration have been assumed and investigated during different faults. The assumed levels of PV penetration have been based on the actual existing and planned PV plants connected to Al-Karak medium voltage distribution system. CYMDIST/CYME simulation software has been used to simulate and model the network of the case study, the integrated PV plants and the used protective devices. The obtained results show no significant impact is observed if the protection schemes are properly coordinated, PV projects locations and their capacities are properly selected. However, new modes and settings of the existing protection schemes have been recommended to enhance the performance of the studied protection system.

Track: Power Systems and Drives

Paper Title: Power Distribution Networks Load Forecasting Using Deep Belief Networks: The South African Case

Authors: Ali Hasan and Sibonelo Cobry Motepe (University of Johannesburg, South Africa); Bhekisipho Twala (University of South Africa, South Africa); Riaan Stopforth (University of KwaZulu - Natal, South Africa)

Abstract: Load forecasting is considered a time series problem, whose accuracy is important in operations and planning of micro and large power systems. South Africa is a developing country that is in its 25th year of democracy. The study of load forecasting using artificial intelligence techniques in South Africa is limited. The application of deep learning techniques in South African load forecasting is non-existent. This paper overcomes these shortfalls by introducing deep learning techniques in South African load forecasting. This was conducted using a real South African distribution sub-stations loading data and a sophisticated deep learning technique, deep belief networks. The substation is an 80 MVA, 88/11 kV distribution substation. Weather parameters, and more specifically temperature, have been seen to improve the accuracy of load forecasts. It has, however, been shown that this is not always the case. This paper investigated the impact of temperature on the load forecasting error

when using a sophisticated deep learning technique, deep belief networks. The impact of using cleaned data and uncleaned data was also investigated. The lowest error was obtained with non-cleaned data with temperature as an input parameter. The obtained errors were around 4%. Hence, deep learning techniques can be applied in South African distribution networks for load forecasting, and therefore cost reduction through improved planning.

Track: Power Systems and Drives

Paper Title: Lightning Impulse Parameter Estimation Using Nonlinear Least Squares Algorithm

Authors: Mohammad I. Al Saaideh and Eyad A. Feilat (The University of Jordan, Jordan); Dia I. Abu-Al-Nadi (The University of Jordan); Amer S. Al-Hinai (Sultan Qaboos University & Institute Center for Energy, Oman)

Abstract: This paper presents a new technique based on nonlinear least square (NLSQ) algorithm for estimating the mean curve and parameters of the standard lightning impulse (LI) waveform as required by IEC 60 and IEEE Std. 4. The proposed NLSQ technique is applied to analytical LI waveforms to estimate the mean curve of the impulse using a bi-exponential model after removing high frequency components from the simulated (measured) impulse. The effectiveness of the proposed technique is assessed by conducting several cases of LI impulse waveforms with front and tail oscillations and LI waveform with overshoot. The results of the NLSQ technique are compared with those obtained by the particle swarm optimization (PSO) algorithm. The simulation results show that the proposed NLSQ technique is robust and effective in estimating the peak value, front and tail times of the impulse waveform accurately

Track: Power Systems and Drives

Paper Title: A Real Case Study for Solving Reactive Power Dispatch Problem Using Whale Optimization Algorithm

Authors: Asma Meddeb (ENSIT & ENSIT, Tunisia); Nesrine Amor (Lattice Lab, University of Tunis, Tunisia); Souad Chebbi (Higher School of Sciences and Technologies of Tunis & University of Tunis, Tunisia)

Abstract: This paper presents a recent meta-heuristic approach named, Whale Optimization Algorithm (WOA), to solve complex and constrained optimal reactive power dispatch (ORPD) problem. WOA algorithm mimics the intelligent foraging behavior of the humpback whales. In this paper, WOA is addressed to minimize the real power losses in the power system. Therefore, the settings of control variables such as generator terminal voltage, tap changer positions, and capacitor banks are determined to achieve the minimum total power loss while satisfying a set of nonlinear constraints. The accuracy and the performance of the proposed algorithm were performed and compared to other meta-heuristic optimization algorithms applied on the standard test system IEEE 30-bus as well as on the Tunisian power transmission system. We demonstrate that the proposed WOA provides a supremacy results and statistically significant in solving ORPD problems.

Track: Power Systems and Drives

Paper Title: Voltage Profile Improvement Using DSTATCOM Based on Artificial Intelligent Techniques

Authors: Zaher A. S. Saafin (Polytechnic Palestine University, Palestine); Fouad Zaro and Mutaz Jawadeh, Eng. (Palestine Polytechnic University, Palestine)

Abstract: Increasing power electronics technologies convert a traditional power system to be more smart and efficient. One application of these technology a distribution static compensator (DSTATCOM) related to a flexible alternating current transmission system (FACTS). Its a shunt connected on distribution system at the point of common coupling (PCC) used to manage and control the reactive power in order to improve power quality (PQ) issues such voltage profile at PCC. This paper proposed a new strategy for tuning controller gains of DSTATCOM based on hybrid particle swarm optimization and artificial neural networks (PSO-ANNs). The results of the simulation show the superiority and robustness of the proposed strategy of DSTATCOM to improve voltage profile in the distribution power system.

Track: Power Systems and Drives

Paper Title: Design and Implementation of a 12-Pulse TCR-Based SVC for Voltage Regulation

Authors: Ayman Alabduljabbar (King Abdulaziz City for Science and Technology, Saudi Arabia); Cem Gerçek (Vestas Wind Systems A/S, Denmark); Tevhid Atalik (Denatsu Elektronik Ltd. Sti., Saudi Arabia); Erkan Koç (TUBITAK, Turkey); Deniz Parlak (Gama Energy Inc, Saudi Arabia); Faisal Alsalem (King Abdulaziz City for Science & Technology, Saudi Arabia)

Abstract: Thyristor Controlled Reactor (TCR) based static VAR compensator (SVC) systems can be implemented with several optional topologies which depends on the required functions and associated costs. In this paper, the analysis and implementation of a 12-pulse TCR-based voltage regulation type SVC system is discussed. In literature, this paper represents the most detailed field implementation and discussion of a 12-pulse TCR-based SVC system that is used for voltage regulation purposes. Principles of operation and overall design assessment are described. This system has been installed to mitigate the voltage regulation problem in a village located in Durma area, Saudi Arabia. The entire installation consists of two identical (except for power transformers) SVCs with a rated power of 1.5 MVAR each. A cascaded PI control algorithm is implemented and steady and dynamic states are assessed. Test results from the field are given with a discussion of the overall performance.

Track: Power Systems and Drives

Paper Title: Estimation of Synchronizing and Damping Torque Coefficients Using Deep Learning

Authors: Ahmad Hammoudeh (Princess Sumaya University for Technology, Jordan); Mohammad I. Al Saaideh and Eyad A. Feilat (The University of Jordan, Jordan); Hamza Mubarak (University of Malaya, Malaysia)

Abstract: This paper presents a deep learning based approach for small-signal stability assessment of single-machine infinite bus. The proposed approach is based on online estimation of the synchronizing and damping torque coefficients of the synchronous generator by online measurement of the operating conditions including the voltage, real power and reactive power. The proposed approach in this paper is to train deep neural networks to estimate the synchronizing and damping torque coefficients for all examples that the power system may encounter. Hence, a large dataset of more than 310,000 examples is created to cover the full range of the possible operation conditions. The performance of Deep neural networks based approach is compared with that of other neural networks reported in the literature. Simulations results show that the proposed approach is robust and training the neural network over wide range of operating conditions yield fast, yet accurate estimation of the torque coefficients.

Track: Power Systems and Drives

Paper Title: Performance Evaluation of Different Optimal Tuned Current Controllers for Voltage-Source Converter Connected to a Weak AC Grid

Authors: Khaled Mohammad Alawasa and Hussein AL-Majali (Mutah University, Jordan); Mustafa Walid Alzahlan (Princess Sumaya University for Technology, Jordan)

Abstract: In this paper, three types of current controllers with different applied tuning criteria of the voltage-source converter (VSC) have been designed and tested; dq-frame PI, $\alpha\beta$ -frame PR, and abc-frame hysteresis controllers. The performance of aforementioned controllers is evaluated considering weak AC grid connection condition. The current controllers' gains have been optimally tuned using both analytical and evolutionary stochastic algorithms. The simulation setup is carried on Matlab/Simulink platform, and the results are assessed based on five metrics criteria; these include the rising time, the settling time, the percentage overshoot, the steady-state fluctuation and the stability during three-phase symmetrical fault.

Track: Power Systems and Drives

Paper Title: Particle Swarm Optimization of a Microgrid's Cost Function Involving Distributed Generation and Highly Fluctuating Load

Authors: Mustafa Walid Alzahlan, Fares El-Faouri, Majd Batarseh and Ahmed Tawayha (Princess Sumaya University for Technology, Jordan); Muhi Zater (PSUT, Jordan)

Abstract: This paper presents a proposed mathematical model for the cost function of a microgrid that contains distributed photovoltaic (PV) generation, wind farms, conventional fuel generation, battery storage elements, and imports from neighboring microgrids. The hybrid generation is intended for feeding a highly fluctuating industrious load (whose data is taken from a factory in Amman, Jordan) in the most cost-effective manner. This paper is an extension to a previous work of the authors that introduced the mathematical model and validated it, where in the scope of this paper a particle swarm optimization technique is implemented on the proposed cost function to minimize it, in an indirect manner, on strong optimality basis.

Track: Renewable Energy

Paper Title: Economic Dispatch of Oman's Main Interconnected System in Presence of 500MW Solar PV Plant in Ibri

Authors: Mohammed Albadi (Sultan Qaboos University, Oman); Amer S. Al-Hinai (Sultan Qaboos University & Institute Center for Energy, Oman); Musab Al Maharbi, Ahmed Al Hosni and Mohammed Al Hajri (SQU, Oman)

Abstract: Currently, the main interconnected system (MIS) in Oman is using natural gas-based power plants to meet the increasing electricity demand. In 2018, Oman Power and Water Procurement Company floated a tender for 500MW solar PV plant in Ibri. This manuscript investigates the impact of the proposed PV plant on MIS using an economic dispatch model. AC optimal power flow formulation (OPF) is used to solve the economic dispatch problem using MATPOWER power system simulation package. The network ac power flow model is verified using data from MIS system operator.

Track: Renewable Energy

Paper Title: Comparison Between the Dynamic Programming and Particle Swarm Optimization for Solving Unit Commitment Problems

Authors: Venkata Silpa Borra and K Debnath (Charles Darwin University, Australia)

Abstract: This paper compares Dynamic Programming (DP) and Particle Swarm Optimization (PSO) algorithms for minimizing fuel cost and emissions and solving Unit Commitment (UC) problem in Microgrid Central Energy Management system (MCEMS). Both the algorithms will minimize fuel and CO₂ emissions for the Micro Gas Turbine. These techniques are applied to ten subsystems in MCEMS. The MCEMS will adjust themselves during operation in the generation system. The test results are compared with DP and PSO for a better solution. A MATLAB program was written to minimize the UC problem. The simulation results demonstrate that the PSO technique is more accurate than DP the technique in solving UC problems.

Track: Renewable Energy

Paper Title: Evaluation of Energy Harvest Increase by Distributed Maximum Power Point Tracking

Authors: Anas Al-rawashdeh and Saleh Al-Jufout (Tafila Technical University, Jordan)

Abstract: This paper presents an evaluation of using Distributed Maximum Power Point Tracking (DMPPT) architecture to reduce power losses caused by shadow effect. In this paper one zone of Tafila Technical University PV plant is considered as the case study. This paper presents a comparison of the simulation results of applying shadow on the existing multi string architecture system and its redesigned system by using DMPPT architecture. MATLAB/SIMULINK has been used to implement this simulation. Redesign of the system includes performing maximum power point tracking (MPPT) at string section and module levels instead of performing MPPT at string level in the existing system. Area affected by shadow has been changed by changing the number of affected modules. Results showed that the system energy harvest can be improved by using DMPPT architecture during shadow effect condition. This paper recommends to evaluate the use of DMPPT architecture at string section level before its use at a module level.

Track: Renewable Energy

Paper Title: Partial Shading Detection and Global MPPT Algorithm for PV System

Authors: Ahmad AL-Ramaden (Jordan University of Science and Technology, Jordan); Issam Smadi (JUST, Jordan)

Abstract: This paper proposed a partial shading detection and model free global maximum power point tracking (GMPPT) algorithm for a photovoltaic array system. The proposed algorithm is decomposed of three parts: searching part, tracking part, detecting and avoiding the dead points in the partial shading P-V curve if existed part. Simulation results with comparison with state of art methods are provided to highlight the fruitiness to the proposed GMPPT algorithm.

Track: Renewable Energy

Paper Title: Energy Warehouse - A New Concept for NEOM Mega Project

Authors: Hani Albalawi, Amir Eisa and El-Hadi Aggoune (University of Tabuk, Saudi Arabia)

Abstract: There is a global acknowledgment for greenhouse effect and resulting global warming. Countries around the globe are establishing plans to reduce carbon emission by adopting green sustainable forms of energy. Furthermore, there is also a parallel global race for creating free economic zones within countries to attract business and investment, namely, to diversify their economies and move away from fossil fuels. With its mega project "Neom", Saudi Arabia is planning to enter the race in a major way. Neom will be a city bordering on Saudi Arabia, Egypt, and Jordan with unparalleled capacity for sun and wind. It is envisioned that Neom will heavily rely on renewable energy, thus, it is conceivable that it will be formed of clusters of microgrids with distributed renewable energy sources. However, the stochastic nature of solar and wind energy sources impacts power production causing imbalance between generation and demand. This imbalance, will no doubt grow with time causing frequency to become even less stable and challenging to control. Recent advances in energy storage technology, however, offer a wide range of alternatives to choose from for different applications. This has motivated the development of the concept energy warehouse (EW), a controlled and managed massive modular energy storage system. Sized and located properly, EW can offer significant technical and economic benefits for Neom including buffering the difference between demand and supply within microgrids, not only to stabilize, but also to suppress frequency abnormalities, reducing losses, mitigating congestion, and increasing efficiency.

Track: Renewable Energy

Paper Title: Particle Swarm Optimization Algorithm for Power Scheduling Problem Using Smart Battery

Authors: Sharif Naser Makhadmeh (Universiti Sains Malaysia, Malaysia); Ahamad Khader (Universiti Sains Malaysia, Jordan); Mohammed Al-Betar (AL-Balqaa University, Jordan); Syibrah Naim (Universiti Sains Malaysia, Malaysia); Zaid Abdi Alkareem Alyasseri (School of Computer Sciences, University Science Malaysia, Malaysia); Ammar Abasi (Malaysia, Malaysia)

Abstract: Power Scheduling Problem (PSP) is a problem of schedule the smart home appliances at appropriate time period according to an electricity pricing scheme. The smart home appliances can be scheduled by shifting their time operations from period to another. The significant of the scheduling process is to reduce the electricity bill and Peak-to-average ratio (PAR) and improve the user comfort level. In this paper, particle swarm optimization (PSO) algorithm is adapted in order to handle the PSP and to obtain an optimal smart home appliances schedule. Smart battery (SB) is formulated and used in this work to enhance the schedule of the appliances by storing the power at low peak periods and use the stored power by the smart home appliances at peak periods. The simulation results proved the efficiency of using the proposed SB in terms of reducing electricity bill and improving the user comfort level. In addition, PSO is compared with genetic algorithm (GA) in order to evaluate its performance. PSO outperforms GA in terms of achieving the PSP objectives.

Track: Renewable Energy

Paper Title: Biomass Energy in Malaysia-A SWOT Analysis

Authors: Girma Chala (INTI International University, Malaysia); Fiseha Mekonnen Guangul (Middle East College, Oman); Rakesh Sharma (International College of Engineering and Management, Oman)

Abstract: Energy demand has increased swiftly due to a surge in world population in the last decades. The increased energy demand and emission restrictions have made alternative fuels to be potential energy sources nowadays and ahead. Biomass has become one of the main energy sources for different energy sectors. Consequently, there are wide research works taking place using different biomass resources to generate power. Malaysia has abundant biomass resources, and it is ranked second in palm oil production. The abundant biomass wastes are being used widely to produce useful fuels using biochemical and thermochemical conversion technologies, along with producing power using direct combustion. This paper presents the strength, weakness, opportunity and threats (SWOT) of biomass energy in Malaysia, which would give overview in the enhanced utilization of this abundant resources in the country in an effort to replace the high stretched energy sources from conventional fuels.