FBSU Publications

Publications in 2018

Ergodic Capacity and SNR Analysis for Dual Hop Amplify and forward Cooperative communication systems Over α-η-μ Channels

Authors: **Amer M. Magableh**, T Aldalgamouni, S Mater, O Badarneh

Journal Name: IEEE Transactions on Vehicular Technology

Abstract: Dual-hop communication systems are known to extend coverage and reduce transmit power in scenarios where one-hop communication is not possible. The α - η - μ fading distribution is a general fading distribution that can be reduced to other fading distributions like Rayleigh, Nakagami-m, α-μ, and η-μ. In this paper, we study the statistics of the end-to-end signal to noise ratio (SNR) of a dual-hop amplify and forward system with semi-blind relay over independent but not necessarily identical α - η - μ fading channels. Specifically, we derive an expression for the nth moment of the end-to-end SNR. The derived expression is then utilized to find the average value, the amount of fading, and the ergodic capacity of the end-to-end SNR. Numerical results are provided and compared to simulations to validate the derived expressions

Error analysis of TAS/MRC in Rayleigh fading channel with non-Gaussian noise

Authors: **Amer M Magableh**, Osamah S Badarneh, Imran Shafique Ansari, Taimour Aldalgamouni

Journal Name: Journal of the Franklin Institute

Abstract: Transmit antenna selection with maximal ratio combining at the receiver (TAS/MRC) is a promising technique that can be used to avoid the hardware complexity of multiple input multiple output (MIMO) system without jeopardizing the diversity gain. The generalized Gaussian distribution (GGD) is used to model different kinds of additive noise including Gaussian, Laplacian, uniform, and impulsive. In this paper, we study the bit error performance of TAS/MRC system assuming flat Rayleigh fading channels perturbed by additive white generalized Gaussian noise (AWGGN). To this end, we provide a closed form expression for the average bit error rate of coherent modulation techniques in terms of Mejier's G function that is readily available in many commercial mathematical software packages like MATLAB and Mathematica. Moreover, we study the asymptotic behavior of the BER at high signal to noise ratio (SNR). Analytical results are verified by simulation.

Compensation of filter cascading effects and non-linearities in flexible multi-carrier-based optical networks using a complex-kernel-based support vector machine

Authors: **Mutsam Jarajreh**

Journal Name: IET on Communications

Abstract: Filter cascading effects are identified and compensated in flexible coherent multi-carrier optical networks using, for the first time, a complex-valued support vector machine (C-SVM) non-linear equalizer which is compared to phase-conjugated subcarrier-coding (PC-SC)-based non-linearity compensation. The transmission performance of super-channel-based dual polarization coherent multi-band optical OFDM (DP-MB-OFDM) is analyzed in a flexible network with two-stage wavelength selective-switch reconfigurable optical add-drop multiplexer for coarse and fine switching granularity. It is shown that filter cascading effects have significant impact only on edge OFDM sub-bands. On the other hand, C-SVM outperforms PC-SC resulting in an extension of the transmission-reach, for instance, by 420 km when employing 32-quadrature amplitude modulation at a targeted bit-error-rate of 10−3. This occurs since C-SVM can compensate more effectively stochastic-induced nonlinear cross-talk effects. Moreover, the interplay between polarization-mode dispersion (PMD) and fiber non-linearity is also investigated in DP-MB-OFDM, revealing that a high PMD causes time fluctuation on the non-linear interaction affecting the balance of the 'twin-subcarriers' in PS-SC.

Wireless Sensor Networks Performance Measurement Approach

Authors: **Nazar Elfadil**

Journal: International Journal of Scientific Engineering and Science

Abstract: The successful of Wireless Sensor Network application monitoring relies on the accuracy and reliability of its nodes operation. Unfortunately, operation deviations of these nodes are regular occurrences not isolated events as in traditional networks. This is due to their special characteristics that reduce network manufacturing and deployment costs and maintains the nodes immunity against internal and external conditions. The goal of this paper is to propose a real-time, distributed, passive, and low resources usage performance-monitoring algorithm that monitors Wireless Sensor Network functionality and isolates the detected deviated nodes from norm operation. Simulation and empirical experiments showed that the proposed algorithm has a slight processing and storage overhead. It is important to mention that these experiments showed that the proposed algorithm has a high reliability in tracking and isolating network nodes problems.

Exact Expressions for the Bit Error Rate and Channel Capacity of a Dual-hop Cooperative Communication Systems Over Nakagami-m Fading Channels

Authors: **Amer M Magableh**, Neamah Jaafreh

Journal Name: Journal of the Franklin Institute

Abstract: Cooperative diversity has been widely used in wireless communication systems since they greatly improves and enhances the quality of service as being virtual antennas without physically placing multiple antennas at the transmitter or the receiver sides. In this paper, we consider the amplify and forward (AF) relay-based communication systems under the influence of Nakagami-m multipath fading channels in both channel links. Several performance metrics are considered in this study, including, the bit error rate (BER), the ergodic channel capacity, and the outage capacity. The obtained expressions are in closed-form and can reduce to the Rayleigh channel model, as a special case. Numerical results are also provided for the obtained expressions and some conclusions are drawn

A unified performance analysis of decode-and-forward dual-hop relaying-based wireless energy harvesting with space modulation

Authors: Osamah S Badarneh, Saud Althunibat, Raed Mesleh, **Amer M Magableh**

Research Type: Applied

Journal Name: Transactions on Emerging Telecommunications Technologies

Abstract: Space modulation techniques (SMTs) are a group of multiple-input–multiple-output wireless systems in which the spatial indexes of transmit antennas are utilized to convey additional information bits. The SMTs promise significant enhancements in terms of spectral and energy efficiencies and attract significant research interest in literature. Several SMTs have been proposed including spatial modulation (SM) and quadrature SM. In this study, the performance of dual-hop decode-and-forward relaying SM and quadrature SM in the presence of wireless power transfer is analyzed and thoroughly discussed. Specifically, we derive exact closed-form expressions for the pairwise error probability (PEP). In addition, we derive simple and accurate asymptotic expressions for the PEP at high signal-to-noise ratio, which provides insight into the influence of different system parameters. The obtained PEP expressions are then employed to evaluate the overall average bit error rate (BER). It is worth highlighting that the derived expressions are unified in the sense that they are valid for the aforementioned SMTs and for two well-known practical energy harvesting protocols, namely, power-splitting receiver and time-switching receiver. In addition, we derive a unified closed-form expressions for the outage probability and achievable throughput at the destination node. The impact of diverse system parameters, such as the power-splitting factor, the energy-harvesting time factor, and the distance between the source and the relay nodes, on the overall system performance is studied. The accuracy of the analytical derivations is validated through Monte Carlo simulations results.

The Relationship Between Fundamental Analysis and Stock Returns Based on the Panel Data Analysis; Evidence from Karachi Stock exchange (KSE)

Authors: Shakeel Muhammad, **Ali Gohar**

Journal: Research Journal of Finance & Accounting

Abstract: Fundamental analysis has gained huge popularity among capital markets researchers in last decades. It uses current and past financial reports (Piotroski 2000, 2004; Fama and French, 2004; Elleuch 2009, Seng 2012), along with political and economic data in order to assign intrinsic value to firms and help to identify mispriced securities (Kothari, 2001). Both fundamental and technical analyses are used to forecast stock returns with the aim to buy stock when they are under-priced and sell when they are over-priced.Our study aimed to investigate the ability of the historical accounting data in predicting future stock returns using fundamental analysis especially in emerging economy i.e. Pakistan. Data were collected for the eleven-year period from 2007 to 2017 for 115 non-financial companies listed on Karachi stock exchange (KSE) with available ten years consecutive data. This paper utilizes five indicators from multiple areas i.e. profitability ratios, liquidity ratios, leverage ratios, and market-based ratios. For analysis, this study used penal data analysis (common effect model, fixed effect model, and random effect model). The results indicates that the fundamental analysis can predict future stock returns in Pakistani listed companies and end up with the implications and future directions.

The Relationship Between Strategic Leadership and Organization Performance In Jordan Industrial Estates Company

Authors: **Alhyasat Waleed**, Zainon Sharif

Conference: AIP Conference Proceedings

Abstract: The purpose of this study is to examine the relationship between strategic leadership and organization performance in Jordan Industrial Estates Company. Self-administration questionnaire was used as a quantitative instrument to collect the data. The simple random sample of 30 employees from Jordan industrial estate company (JIEC)was the sample for this study. Statistical Package for the Social Sciences (SPSS) was used to determine the relationship between variables. The results of this study show a positive relationship between strategic leadership and organization performance.

The Effect of Eco- Innovation on Organization Performance in Jordan Industrial Estates Corporation.

Authors: **Alhyasat Waleed**, Zainon Sharif

Conference: AIP Conference Proceedings.

Abstract: This study aims to determine the effects of eco- innovation on organization performance in Jordan. A questionnaire is used as a quantitative instrument to collect the data. The simple random sample of 381 employees from Jordan industrial estate corporation (JTEC) is the targeted sample for this study. Structural Equation Modeling (SEM) is employed to determine the relationship between the variables. The results of this study reveal if there is an influence of eco-innovation on organization performance and if the influence is positive.

The Mediating Effect of Eco-Innovation Between Motivation and Organization Performance in Jordan Industrial Estate Company.

Authors: **Alhyasat Waleed**, Zainon Sharif

Journal: International Journal of Engineering & Technology

Abstract: The main aim of this paper is to evaluate the effect of motivation on organization performance in Jordan Industrial Estate Company (JIEC) in Jordan, the mediating role of eco-innovation. Resource Based View theory (RBV) highlighted the role of Motivation in achieving the high organization performance. A quantitative approach and simple random sampling were used to obtain data via questionnaire from 381 employees from different level of JIEC, the response rate was 74.8%. SEM was employed to analyses the study variables. The results shows that the direct effect of motivation and eco-innovation on organization performance are significant at a p-value 0.050 and 0.000 for motivation and eco-innovation respectively and eco-innovation mediates the relationship between motivation and organization performance, with a partial mediating effect. This paper contributes to theory by filling the gap of eco-innovation literature in developing countries, validate eco-innovation as a mediator variable between motivation and organization performance. This study recommended for further studies about eco-innovation in developing countries particularly in Jordan and repeat the same study to ensure the validate the study model.

Flyash as a Resource Material in Construction Industry: A Clean Approach to Environment Management

Authors: **Mohammad Nadeem Akhtar** and Nazia Tarannum

Journal: Sustainable Construction and Building Materials

Abstract: The maximum amount of electricity is produced by most of the thermal power plants by burning coal at their operating facilities. Due to this activity, various types of secondary materials are

generated. Any material resulting from coal-combustion processes may be called as a coal-combustion product (CCP). Among different CCPs reported worldwide by coal-burning power plants, flyash is the most common one. As per the characterization report, flyash is considered as a powdery material being collected by dust collectors installed in the thermal power plants with the use of coal as fuel. There are different problems related to flyash like requirement of large area of land for disposal and toxicity caused by flyash which leach to groundwater. The study has established flyash as air and water pollution source. It is considered as waste that may act as a resource material in construction industry, thereby acting as a resource for waste and environment management. Till a decade back, flyash was treated as waste material worldwide, but now it is developed as an environment savior.

Utilization of graphitized and fluorinated carbon as platinum nanoparticles supports for application in proton exchange membrane fuel cell cathodes

Authors: José L Bott-Neto, Tristan Asset, Frédéric Maillard, Laetitia Dubau, **Yasser Ahmad**, Katia Guérin, Sandrine Berthon-Fabry, Annette Mosdale, Renaut Mosdale, Edson A Ticianelli, Marian Chatenet

Journal: Journal of Power Sources

Abstract: In this study, Pt nanoparticles are synthesized on partially graphitic carbons, fluorinated or not. They are characterized for their physicochemical properties and oxygen reduction reaction activity, and tested in membrane electrode assemblies in unit proton exchange membrane fuel cell (PEMFC) cathodes; the results are compared with those of a benchmark TEC10EA40E® commercial electrocatalyst based on a low surface area highly-graphitized carbon. The home-made membrane electrode assemblies (MEAs) show performances approaching those of the commercial standard. The effect of the surfacic fluorination of the carbon is neither positive nor negative for the "load-cycling" protocol (benchmark MEAs optimized with the commercial electrocatalyst are more durable than non-optimized MEAs prepared with the two home-made electrocatalysts). In opposition, the fluorinated carbon-based electrocatalyst is the more durable in the AST mimicking repeated "start/stop" operation, at least in terms of electrochemical area loses. This demonstrates that carbon corrosion can be (at least partially) mitigated/slowed-down for a partially-fluorinated carbon versus the non-fluorinated substrate, leaving hope to enhance the durability of PEMFC cathodes for automotive applications. This study further demonstrates that the fate of (fluorinated) carbon-supported Pt nanoparticles may differ when the materials are operated in polymer versus liquid electrolyte.

Tin dioxide coated carbon materials as an alternative catalyst support for PEMFCs: Impacts of the intrinsic carbon properties and the synthesis parameters on the coating

Authors: Fabien Labbé, Elodie Disa, **Yasser Ahmad**, Katia Guérin, Tristan Asset, Frédéric Maillard, Marian Chatenet, Rudolf Metkemeijer, Sandrine Berthon-Fabry

Journal: Microporous and Mesoporous Materials

Abstract: Several carbon materials (one carbon nanotubes, two carbon blacks and one home-made carbon aerogel) were covered by thin tin dioxide (SnO2) nanoparticles coatings to improve their resistance against oxidation under the working conditions of Proton Exchange Membrane Fuel Cells. A pretreatment for the nanotubes in acidic media was also performed to improve their dispersion in the reactive medium. The coating was done by a chemical route. Samples were analysed by Scanning Electronic Microscopy (SEM), nitrogen sorption, X-ray diffraction (XRD), Raman spectroscopy, Fourier Transformed InfraRed (FTIR) and X-ray Photoelectron Spectroscopy (XPS). Their electrical conductivities were also measured. Using a reactive medium with a pH value exceeding the point of zero charge of the carbon materials is mandatory to favour electrostatic attractions, and to obtain covering and homogeneous coatings. In this condition, it is possible to reduce the quantity of precursor and to optimise the coating. The intrinsic properties of the carbon materials also influence the characteristics of the coatings. In fact, the least organised carbon materials with high specific surface area and porosity values exhibit homogeneous and covering coatings. On the contrary, organised carbon materials, with few oxygen-containing groups, lead to a smaller quantity and heterogeneous coatings (with some areas of carbon surface uncovered). The pretreatment performed on the nanotubes improves the characteristics of the coatings, even if using significant amounts of precursor remains necessary to obtain a covering and a homogeneous coating. The transformation mechanisms of the precursor into tin dioxide, depending on the pH, value are also discussed.

Activity and durability of platinum-based electrocatalysts supported on bare or fluorinated nanostructured carbon substrates

Authors: Tristan Asset, Raphaël Chattot, Frédéric Maillard, Laetitia Dubau, **Yasser Ahmad**, Nicolas Batisse, Marc Dubois, Katia Guérin, Fabien Labbé, Rudolf Metkemeijer, Sandrine Berthon-Fabry, Marian Chatenet

Journal: Journal of The Electrochemical Society

Abstract: Nanostructured carbons were fluorinated and used as supports for Pt nanoparticles deposition using a modified polyol route. The resulting materials exhibited similar Pt nanoparticles sizes, but different agglomeration rates. The electrocatalysts were tested toward the oxygen reduction reaction, and their stability was investigated in simulated load cycling ($0.6 < E < 1.0$ V vs. RHE) or start-up/shutdown ($1.0 < E < 1.5$ V vs. RHE) protocols. Irrespective the support material, the former protocol caused Pt nanocrystallites dissolution/redeposition via Ostwald ripening, mildly decreasing

the electrochemically-active surface area and ORR activity. In contrast, the carbon supports were strongly corroded after the start-up/shutdown protocol, resulting in pronounced detachment/agglomeration of Pt nanocrystallites, albeit in absence of significant particle-size growth. Fluorination had different effects on the stability of structurally-ordered and structurally-disordered carbons: beneficial effects were observed for the latter whereas the former was affected negatively. "Free" dangling groups present in structurally-disordered carbon, known to be prone to preferential oxidation in PEMFC environment, combine with the fluorine precursors upon fluorination, leading to formation of more robust C-F bonds versus oxidation than original C-O bonds. In contrast, fluorination of structurally-ordered carbon creates structural disorder (C-C bonds are broken), leading to promotion of electrochemical corrosion.

Electrochemical Stability of Pt Nanoparticles Supported on a Wide Library of Carbon Supports, Either Used Bare, or Modified By Fluorination or Tin Oxide Deposits

Authors: Tristan Asset, **Yasser Ahmad**, Fabien Labbé, Nicolas Batisse, Marc Dubois, Katia Guerin, Sandrine Berthon-Fabry, Rudolf Metkemeijer, Laetitia Dubau, Frederic Maillard, Marian Chatenet

Journal: ECS Meeting Abstracts

Abstract: Throughout the years, a lot of effort has been devoted to improve the electrochemical activity and stability of Pt-based electrocatalysts for the oxygen reduction reaction (ORR), moving from Pt nanoparticles (NPs, diameter ~ 2 – 3 nm) to complex nanostructured materials (i.e. Pt-based hollow, nanoframes or core@shell nanoparticles 1–3). Most of these nanostructures remain more efficient when supported onto a support, as this results in an enhanced specific surface area and, thus, an enhanced mass activity. As such, the nature and the intrinsic stability of the carbon support cannot be ignored, in particular in terms of durability. Here, we investigated (i) the activity of Pt NPs on different carbon supports (with various degrees of graphitization, specific surface area and surface treatments) and (ii) their stability during load (15,000 step cycles between E = 0.6 V vs. RHE and E = 1.0 V vs. RHE) or start-stop (1,000 step cycles between E = 1.0 V vs. RHE and E = 1.5 V vs. RHE) protocols. To that goal, a combination of complementary experiments (electrochemistry, transmission electron microscopy and Raman spectroscopy) were used. As an example, Figure 1 shows the evolution of the specific activity for the ORR measured at E = 0.95 V vs. RHE before and after the load-cycle ageing procedure

Ferry–Based Directional Forwarding Mechanism for Improved Network Life-Time in Cluster-Based Wireless Sensor Network

Authors: Ali A. Eyadeh, Mohammad Bani Amera

Journal: International Journal of Communications

Abstract: Considerable energy saving can be achieved with mobility-based wireless sensor networks (WSN's), where a mobile node (ferry) visits sensing nodes in a network to collect sensed data.

However, the critical issues of such WSN's are limited networks lifetime and high data latency, these critical issues are due to the slow mobility and relatively long route distance for ferries to collect and forward data to the sink. Incorporating ferries in WSNs eliminates the need for multi-hop forwarding of data, and as a result, reduce energy consumption at sensing nodes. In this paper, we introduce the One Hop Cluster-Head Algorithm (OHCH), where a subset of ferries serves as cluster heads (CH), travel between nodes with short distance mobility, collect data originated from sources, and transfer it to the sink with minimum hop count possible, this approach can achieve more balance between network energy saving and data collection delay, also, it is an efficient design to combine between ferries and noise.

A Collocation-Based Algorithm For Analyzing Bifurcations in Phase Locked Loops with Tanlock and Sawtooth Phase Detectors

Authors: Bassam Harb, Ahmad Al-Ajluni and Ali Eyadeh

Journal: Mathematical Problems in Engineering

Abstract: Analysis of bifurcation of second-order analog phase locked loop (PLL) with tanlock and sawtooth phase detectors is investigated. Both qualitative and quantitative analyses are carried out. Qualitatively, the basin boundaries of the attractors were constructed by plotting the stable and the unstable manifolds of the system. The basin boundaries show that the PLL under consideration for certain loop parameters has a separatrix cycle which terminates the limit cycle (out-of-lock state) and the loop pulls-in. This behavior is known in literature as homoclinic bifurcation and the value of the bifurcation parameter where this process occurs is called the pull-in range. Quantitatively, we propose a collocation-based algorithm to compute the separatrix cycle and the pull-in range. The separatrix cycle is approximated by a finite set of harmonics N with unknown amplitudes and by utilizing the fact that this limit cycle bifurcates from a separatrix cycle, a system of nonlinear algebraic equations is derived. For given values of filter parameters and gain, the algorithm numerically solves for the unknown amplitude of the harmonics and the value of the pull-in range simultaneously by evaluating the system at the collocation points. Results demonstrate that phase locked loop with sawtooth phase detector characteristics has the wider pull-in range followed by tanlock and sinusoidal, respectively.

Performance Study of OFDM and WPOFDM Systems in Different Wireless Multipath Channels

Authors: Ali A. Eyadeh, F. M. Al Salami

Journal: Engineering, Technology & Applied Science Research

Abstract: In this paper, the performance analysis for orthogonal frequency division multiplexing (OFDM) and wavelet packet based OFDM (WPOFDM) systems over different wireless multipath channels has been investigated. The bit error rate (BER) performance for both systems is shown to

be comparable and even at times better for OFDM especially in frequency selective fading channel at high values of S/N. Simulation results also show a significant enhancement for WPOFDM in terms of spectral efficiency and side-lobes suppression comparing to OFDM.

A Rectenna System With Power Combining Topology for Improved Power Handling Capabilities

Authors: M. Abdallah, J. Costantine, **A. H. Ramadan** and Y. Tawk

Journal: IEEE sensors letters

Abstract: This article proposes a new rectenna system that is based on a radio frequency (RF) rectifying circuit with enhanced power handling capabilities. The rectenna consists of an antenna that receives the RF signal and a rectifying circuit that converts it into a direct current (dc) output. The rectifier's power handling capability is improved by delaying the breakdown effect of a Schottky diode, resulting in higher maximum dc output power. The power handling capability enhancement is attained by splitting the received RF signal and directing it to feed multiple rectifying branches. The dc outputs from all branches are then combined across an optimized load. This topology results in a single-input single-output rectifier. The designed rectenna is fabricated and tested. The results indicate a 1.9 times increase in input power at which breakdown occurs. The rectenna system is proposed for use in wireless energy transfer applications, where dedicated power is transmitted towards the rectifier. This rectifier can be integrated into nodes of a wireless sensor network, where the enhanced power handling capabilities contribute to enhance the breakdown characteristics.

Rules or Constraints? A Cross Methodological Comparison of Approaches to 'Syncope' and 'Vowel Shortening' in Cairene Arabic

Author: Mousa A. Btoosh

Journal: SKASE Journal of Theoretical Linguistics

Abstract: This study cross-compares three basic phonological approaches to syncope and vowel shortening in Cairene Arabic. The phenomena addressed have been examined within the rule-based, autosegmental and Optimality Theory frameworks with the aim of assessing the effectiveness and shortcomings of using inviolable rules vis-à-vis universal violable constraints. Findings show that the strict application of the general rules and principles within the rule-based and autosegmental approaches often results in some ill-formed output. This, therefore, rationalizes the frequent resort to language-specific rules to account for particular grammatical constructions. Optimality Theory, on the other hand, compels no language-specific restrictions on the input as the optimal form is not emanated by principles or parameters. Rather, it is derived by satisfying the maximum number or ncurring the least violations of the relevant universal constraints. Accordingly, principles and generalizations are

expressed more straightforwardly and economically with the constraint-based approach of Optimality Theory.

Some Observations on Microsyntactic Units and Discourse Grammar of Kam

Author: Mousa A. Btoosh

Journal: Open Journal of Modern Linguistics

Abstract: This study aims to shed light on the microsyntactic units and discourse grammar of Kam, a language spoken in Guizhou, Hunan and Guangxi Provinces in China. To this end, the paper explores the use and functions of particles and classifiers, and how the discourse grammar elements operate across sentences to create texture, cohesion and convey the sender's communicative intent. The corpus of this study consists of two short stories in addition to some other illustrative examples. Findings show that particles in Kam are used to mark unity and serve pragmatic presuppositions and assertions. Results also indicate that Kam, which features neither wh-movement nor subject-verb inversion in questions, uses particles to express interrogation, aspect and modality. Additionally, the findings reveal that nominal classifiers have less semantic limitations than the verbal ones. Finally, it has been observed that predicates don't require the phonological appearance of their subjects as long as they are understood contextually.

Notes on some bounds for the zeros of polynomials

Authors: Amer Abu Omar

Journal: Math. Inequal. Appl

Abstract: We apply some spectral radius and norm inequalities to the Frobenius companion matrix to present a simple proof of Kuniyeda's bound for the zeros of polynomials. We then use Kuniyeda's bound to derive a new bound for the zeros of polynomials. A partial comparison between the two bounds is given. Our new bound generalizes and refines classical bounds due to Guggenheimer and Walsh.

Scalar approximants of quadratic operators with applications

Authors: Amer Abu Omar and Pei Yuan Wu

Journal: Operators and Matrices

Abstract: Among other results, we find the best scalar approximant of a quadratic operator with respect to the numerical radius and the operator norm. We use these results to give estimates for the numerical radii of products and commutators of quadratic operators.

Spectral radius inequalities for sums of operators with an application to the problem of bounding the zeros of polynomials

Authors: Amer Abu Omar

Journal: Linear Algebra and its Applications

Abstract: We prove spectral radius inequalities for sums of operators. Our results are employed to establish a new bound for the zeros of polynomials.

ELLIPTIC PROBLEMS INVOLVING NATURAL GROWTH IN THE GRADIENT AND GENERAL ABSORPTION TERMS

Authors: HAYDAR ABDELHAMID

Abstract: In this paper, we treat the existence of solutions for a class of general elliptic problems whose prototype is the following:

$$\begin{cases} -\Delta_p u + h(x)|u|^{q-1}u = \beta\,|\nabla u|^p + \lambda f(x) & \text{in } \Omega, \\ u = 0 & \text{on } \partial\Omega, \end{cases}$$

where Ω is a bounded open subset of R^N with $N > 1, 1 < p < N, q \geq 1, \lambda \in R, \beta \in R, h \in L^1(\Omega)$ with $h \geq 0$ and $f \in L^1(\Omega)$. Assuming that the source term f satisfies

$$\lambda_1(f) = inf\,\{\frac{\int_\Omega |\nabla w|^p\,dx}{\int_\Omega |f||w|^p\,dx} : w \in W_0^{1,p}(\Omega) \setminus \{0\}\} > 0,$$

we obtain the existence of a solution u $\in W_0^{1,p}(\Omega)$ when $|\lambda|$ is sufficiently small.

RENORMALIZED SOLUTION OF ELLIPTIC EQUATIONS WITH SINGULAR MEASURE IN THE SOURCE TERM

Authors: MOHAMMED KBIRI ALAOUI, **HAYDAR ABDEL HAMID**, WAAD AL SAYED

Abstract: The article deals with the existence of renormalized solutions of some problems with singular data in the Orlicz-Sobolev spaces.

On the Existence of Solutions of a Perturbed Functional Integral Equation in the Space of Lebesgue Integrable Functions on R

Authors: Waad Al Sayed, Mohamed Abdalla Darwish

Journal: Publishing House of Rzeszów University of Technology

Abstract: In this paper, we investigate and study the existence of solutions for perturbed functional integral equations of convolution type using Darbo's fixed point theorem, which is associated with the measure of noncompactness in the space of Lebesgue integrable functions on R+. Finally, we offer an example to demonstrate that our abstract result is applicable.

RENORMALIZED SOLUTION OF ELLIPTIC EQUATIONS WITH SINGULAR MEASURE IN THE SOURCE TERM

Authors: Mohammed Kbiri Alaoui, Haydar Abdel Hamid, **Waad Al Sayed**

Journal: JOURNAL OF NONLINEAR AND CONVEX ANALYSIS

Abstract: The article deals with the existence of renormalized solutions of some problems with singular data in the Orlicz-Sobolev spaces.

Radiation shielding parameters of BaO–Nb2O5–P2O5 glass system using MCNP5 code and XCOM software

Authors: M I Sayyed, Z Y Khattari, Ashok Kumar, J Al-Jundi, M G Dong, and **M Y AlZaatreh**

Abstract: The radiation shielding properties (mass attenuation coefficient, effective atomic number, half value layer, mean free path and exposure buildup factor) of xBaO–20Nb2O5–(80−x)P2O5, (x = 20, 30, 40, 50 and 60 mol%) glass system has been evaluated. The mass attenuation coefficient was calculated at 31, 59.5, 80, 356 and 662 keV photon energies using XCOM program and MCNP5 code. The obtained results are found to be in good agreement. The values of mass attenuation coefficient and effective atomic number of the present glass system are found to be increasing with increasing the BaO content at all energies. The mean free paths of the present samples are found to be smaller than the mean free path of some standard shielding glasses and concretes. This establishes that the present glasses possess better radiation shielding competence. The effect of the penetration depth on exposure buildup factor has also been discussed to through more light on their gamma ray interaction behavior. The 60BaO–20Nb2O5–20P2O5 sample was found to be the best gamma shield.

Publications in 2019

A Blind Nonlinearity Compensator Using DBSCAN Clustering for Coherent Optical Transmission Systems

Authors: E Giacoumidis, Y Lin, **Moutasem Jarajreh**, S O'Duill, K McGuinness, PF Whelan,

Journal: Journal of Applied Science

Abstract: Coherent fiber-optic communication systems are limited by the Kerr-induced nonlinearity. Benchmark optical and digital nonlinearity compensation techniques are typically complex and tackle deterministic-induced nonlinearities. However, these techniques ignore the impact of stochastic nonlinear distortions in the network, such as the interaction of fiber nonlinearity with amplified spontaneous emission from optical amplification. Unsupervised machine learning clustering (e.g. K-means) has recently been proposed as a practical approach to the blind compensation of stochastic and deterministic nonlinear distortions. In this work, the Density-Based Spatial Clustering of Applications with Noise (DBSCAN) algorithm is employed, for the first time, for blind nonlinearity compensation. DBSCAN is tested experimentally in a 40 Gb/s 16 quadrature amplitude-modulated system at 50 km of standard single-mode fiber transmission. It is shown that at high launched optical powers, DBSCAN can offer up to 0.83 and 8.84 dB enhancement in Q-factor when compared to conventional K-means clustering and linear equalization, respectively.

Reduced-Complexity Artificial Neural Network Equalization for Ultra-High-Spectral-Efficient Optical Fast-OFDM Signals

Authors: Mutsam Jarajreh

Journal Name: Journal of Applied Science

Abstract: Digital-based artificial neural network (ANN) machine learning is harnessed to reduce fiber nonlinearities, for the first time in ultra-spectrally-efficient optical fast orthogonal frequency division multiplexed (Fast-OFDM) signals. The proposed ANN design is of low computational load and is compared to the benchmark inverse Volterra-series transfer function (IVSTF)-based nonlinearity compensator. The two aforementioned schemes are compared for long-haul single-mode-fiber-based links at 9.69 Gb/s direct-detected optical Fast-OFDM signals. It is shown that an 80 km extension in transmission-reach is feasible when using ANN compared to IVSTF. This occurs because ANN can tackle stochastic nonlinear impairments, such as parametric noise amplification. Using ANN, the dynamic parameters requirements of the sub-ranging quantizers can also be relaxed compared to linear equalization, such as the reduction of the optimum clipping ratio and quantization bits by 2 dB and 2-bits, respectively, and by 2 dB and 2 bits when compared to the IVTSF equalizer.

Physiochemical Characterization and Dematerialization of Coal Class F Flyash Residues from Thermal Power Plant

Authors: **Mohammad Nadeem Akhtar**, Janisaar Akhtar, Nazia Tarannum

Journal: Civil Engineering Journal

Abstract: Class F flyash has a low percentage content of lime and is considered as a leading category of flyash generated in India with an average utilization of nearly 55% of flyash produced by the coal-burning power plant. The coal Class F flyash residue sample has been collected from Harduaganj, Thermal Power Station India. The paper illustrates the outcome of the study carried out to examine all the relevant features of the chemical and physical properties of Class F flyash sample. Elementary quantitative results from point analysis, SEM/EDS, FTIR, and pH analysis have been done in the chemical analysis of the study. The physical characterization of the sample is done by several experimental approaches to compare all the relevant features of Class F flyash sample and common soil. The main objective of this study is to evaluate whether the locally available Class F flyash from Harduaganj Thermal Power Station India, will provide satisfactory performance in fully or partially replacement of common soil. The performance evaluation of flyash and soil in different test results included bulk density, specific gravity, plasticity, maximum dry density, optimum moisture content, and permeability in accordance with the relevant IS or ASTM standards. Finally, the reported research recommended the selection of Class F flyash sample with low-lime content that provided the close correlation of its physical properties to the common soil.

Utilization of demolished waste as coarse aggregate in concrete

Authors: **Abdulsamee M Halahla**, **Mohammad Akhtar, Amin H Almasri**

Journal: Civil Engineering Journal

Abstract: Demolishing concrete building usually produces huge amounts of remains and wastes worldwide that have promising possibilities to be utilized as coarse aggregate for new mixes of concrete. High numbers of structures around the world currently need to be removed for several reasons, such as reaching the end of the expected life, to be replaced by new investments, or were not built by the local and international standards. Maintaining or removal of such structures leads to large quantities of concrete ruins. Reusing these concrete wastes will help in saving landfill spaces in addition to more sustainability in natural resources. The objective of this study is to investigate the possibility of using old recycled concrete as coarse aggregate to make new concrete mixes, and its effect on the evolution of the compressive strength of the new concrete mixes. Core samples for demolished concrete were tested to determine its compressive strength. The core test results can be thought of as aggregate properties for the new concrete. Then, the compressive strength and splitting tensile strength of the new recycled aggregate concrete (RAC) were determined experimentally by casting a cubes and cylinders, respectively. It was found that the evolution of compressive strength of recycled aggregate concrete is similar in behavior to the concrete with natural aggregate, except that it is about

10% lower in values. It was also seen that water absorption for recycled aggregate is noticeably higher than that for natural aggregate, and should be substituted for in the mix design.

Activity and Durability of Platinum-Based Electrocatalysts with Tin Oxide–Coated Carbon Aerogel Materials as Catalyst Supports

Authors: Fabien Labbé, Tristan Asset, Marian Chatenet, **Yasser Ahmad**, Katia Guérin, Rudolf Metkemeijer, Sandrine Berthon-Fabry

Journal: Electrocatalysis

Abstract: Abstract Platinum nanoparticles were deposited onto carbon aerogel with three different tin coatings. The coatings were synthesized at pH = 0.7 or 11.5 and with various masses of SnCl2.H2O precursor: 1, 2, and 10 g. The nanoparticles dispersion was found dependent on the morphological properties of the support, i.e., its specific surface, porosity, and coverage by tin oxide. The material electrochemical activity for the oxygen reduction reaction (ORR) and stability was investigated: two accelerated stress tests (ASTs), mimicking either a base-load cycle procedure (P1) or a start-stop procedure (P2), were performed at T = 80 °C. The sample coated at pH = 0.7 and the sample with the lowest loading, deposited at pH = 11.5, exhibited interesting performances, both in term of stability (under P1) and activity. On the contrary, samples with highly covering tin oxide coating displayed unsatisfactory initial performances, owing to the low electrical conductivity of their catalytic support. In any case, the aging under P2 leads in a dramatic decrease of the electrocatalyst activity. This either resulted from (i) the low degree of organization of the carbon aerogel, the latter being prone to harsh corrosion when non-covered by the tin oxide, or (ii) by the chemical changes undergone by the tin oxide during the AST, leading to the formation of an amorphous, low electrical conductivity support.

Keywords Carbon aerogel . Tin oxide . Composite . Electrocatalyst . Durability . PEMFC.

Discrete OFDM-Based Channel Assignment Scheme for Agile Networks

Authors: Ali A. Eyadeh, Mohammad al-Nairat

Journal: International Journal on Electrical Engineering and Informatics

Abstract: The main goals of all new technologies nowadays are utilizing the available spectrum, increasing spectrum efficiency, and increasing the throughput. Cognitive radio (CR) technology can provide efficient spectrum utilization and maximize the throughput using dynamic spectrum access technique. A new medium access control (MAC) protocol is needed for CR users to access the spectrum dynamically and to maintain fairness between users. In this paper, our objective is to enhance the overall network throughput, by enhancing SMART-V MAC protocol to support D-OFDM technology. A new channel assignment scheme called SMART-O based on these two technologies is proposed. The proposed algorithm greatly increased the overall throughput of the network and solved

the channel assignment and rate optimization problems. Simulation results exposed the improvement of our work compared to previous algorithms.

Performance Study of Switch and Stay Combining Diversity over $\alpha - \eta - \mu$ Fading Channels

Authors: Ali A. Eyadeh, Mohammad Al-Taani

Journal: Engineering, Technology & Applied Science Research

Abstract: In this paper, we consider a Switch and Stay Combiner (SSC) diversity scheme operating over $\alpha-\eta-\mu$ fading channel. New and closed-form expressions for the average output SNR (ASNR), the moment-generating function (MGF), the outage probability (P_out), and the average symbol error rate (ASER) for M-ary quadrature amplitude modulation (QAM) signaling are derived. The expressions are obtained in terms of the well-known bivariate Fox's H-function (BFHF). It is worth pointing out that the BFHF and the bivariate Meijer's G-function (BMGF) have recently been used extensively in wireless communications literature to study the system's performance. The evaluated results are plotted for channel parameters of interest, and the effect of fading severity on the combiner performance is studied. Moreover, the results are shown to match those previously reported in the literature for other channel models such as $\eta-\mu$ as a special case, which confirms the validity of the obtained expressions. Also, insights on the optimal choice of the switching threshold are provided.

Modeling and Simulation of Performance Limits in IEEE 802.11 Point Coordination Function

Authors: Ali Eyadeh, Mohammad Jarrah, Ahmad Aljumaili

Journal: International Journal of Recent Technology and Engineering

Abstract: The IEEE 802.11 standard is based on prevalence of Wireless Local Area Network (WLAN) technology. The performance of Wireless network depends mainly on the network throughput and average delay. Network requirements change according to applications deployed. Thus, the performance limits of IEEE 802.11 WLAN system should be evaluated and analyzed under the fundamental access mechanism for medium access control (MAC) called point coordination function (PCF). In this paper, we study the performance limits of IEEE 802.11n standard in PCF MAC layer through calculating theoretical maximum throughput (TMT) and delay time using an analytical model. Moreover, we develop a simulation model to study the performance limits using OPNET modeler. In the simulation, we examine the effects of packet size and number of stations on

the TMT and delay time. Results show that the Delay time and TMT increase as the packet size increases, and as the number of stations increases, the Delay time increases and the TMT decreases.

Enhanced radio frequency rectifier with a power splitting/combining topology for wireless energy transfer and harvesting

Authors: M. Abdallah, J. Costantine, **A. H. Ramadan** and Y. Tawk

Journal : IET Microwaves, Antennas & Propagation

Abstract: Power splitting of the input radio frequency (RF) signal is used to improve the efficient power range of a RF rectifier. Direct current (dc) power at the output of every rectifying branch is then combined over a resistive load and thus resulting in a single dc output. The enhancement in efficient power range, over which the power conversion efficiency (PCE) remains ≥ 50%, is determined to be 2.8 dB. The article starts by a theoretical analysis that addresses the negative effects of the diode's breakdown voltage, formulates an equation that predicts the maximum output dc voltage at saturation, and introduces a method that can improve the PCE of a typical shunt-type diode rectifier at low power levels. As a result, a rectifying system is designed and tested as a proof of concept. The proposed circuit, with the enhanced power range, is designed to operate within the power span from −10 dBm up until 10 dBm. Such system is suitable for operation in RF wireless energy transfer and energy harvesting applications.

A Compact Source–Load Agnostic Flexible Rectenna Topology for IoT Devices

Authors: A. Eid, J. G. D. Hester, J. Costantine, Y. Tawk, **A. H. Ramadan** and M. M. Tentzeris

Journal: IEEE Transactions on Antennas and Propagation

Abstract: This article presents a new compact lightweight radio frequency (RF) energy harvesting system. The system relies on a dual-tapered transmission line-based matching network that stretches the rectification capability of an integrated Schottky diode. This topology is demonstrated on a 2.4 GHz rigid harvesting system with a resulting power conversion efficiency that reaches up to 58% over 0 dBm input RF power. Its performance is compared with a reference rectifier that relies on a typical open circuit shunt-stub matching network. The rectifier along with a miniaturized monopole antenna is then tailored for a flexible substrate with a resulting efficiency around 50% at 0 dBm input power. The rectifier exhibits an almost flat efficiency over the 2.3-2.5 GHz frequency span despite wide load variations. The system is characterized in multiple bent configurations featuring high and stable performance. It is demonstrated that for different bent states, the proposed flexible harvester does not display large variations in harvested power. Thus, the presented rectenna demonstrates the remarkable combination of compactness, flexibility, and stability. Equipped with these features, such

rectifier can be plugged into a variety of sensors, even on wearable surfaces, which makes it ideal for Internet of Things (IoT) applications.

Experimental investigations and FE simulation of exterior BCJs retrofitted with CFRP fabric

Authors: Abdulsamee M Halahla, Muhammad K Rahman, Ali H Al-Gadhib, Mohammed A Al-Osta, Mohammed H Baluch

Journal: Earthquakes and Structures

Abstract: This paper presents the results of experimental and numerical studies conducted to investigate the behavior of exterior reinforced concrete beam column joints (BCJ) strengthened by using carbon fiber reinforced polymer (CFRP) sheets. Twelve reinforced concrete beam-column joints (BCJ) were tested in an experimental program by simulating the joints in seismically deficient old buildings. One group of BCJs was designed to fail in flexure at the BCJ interface, and the second group was designed to ensure joint shear failure. One specimen in each set was-retrofitted with CFRP sheet wrapped diagonally around the joint. The specimens were subjected to both monotonic and cyclic loading up to failure. 3D finite element simulation of the BCJs tested in the experimental program was carried out using the software ABAQUS, adopting the damage plasticity model (CDP) for concrete. The experimental results showed that retrofitting of the shear deficient, BCJs by CFRP sheets enhanced the strength and ductility and the failure mode changed from shear failure in the joints to the desired flexural failure in the beam segment. The FE simulation of BCJs showed a good agreement with the experimental results, which indicated that the CDP model could be used to model the problems of the monotonic and cyclic loading of beam-column reinforced concrete joints.

Utilization of demolished waste as coarse aggregate in concrete

Authors: Abdulsamee M Halahla, Mohammad Akhtar, Amin H Almasri

Journal: Civil Engineering Journal

Abstract: Demolishing concrete building usually produces huge amounts of remains and wastes worldwide that have promising possibilities to be utilized as coarse aggregate for new mixes of concrete. High numbers of structures around the world currently need to be removed for several reasons, such as reaching the end of the expected life, to be replaced by new investments, or were not built by the local and international standards. Maintaining or removal of such structures leads to large quantities of concrete ruins. Reusing these concrete wastes will help in saving landfill spaces in addition to more sustainability in natural resources. The objective of this study is to investigate the possibility of using old recycled concrete as coarse aggregate to make new concrete mixes, and its effect on the evolution of the compressive strength of the new concrete mixes. Core samples for demolished

concrete were tested to determine its compressive strength. The core test results can be thought of as aggregate properties for the new concrete. Then, the compressive strength and splitting tensile strength of the new recycled aggregate concrete (RAC) were determined experimentally by casting a cubes and cylinders, respectively. It was found that the evolution of compressive strength of recycled aggregate concrete is similar in behavior to the concrete with natural aggregate, except that it is about 10% lower in values. It was also seen that water absorption for recycled aggregate is noticeably higher than that for natural aggregate, and should be substituted for in the mix design.

Effect of Tension Stiffening on the Deflection of a Tapered Reinforced Concrete Cantilever Under a Concentrated Load

Authors: Abdulsamee Halahla and Amin Almasri

Journal : International Review of Civil Engineering

Abstract: Tapered cantilever concrete beams are widely used in various types of applications. However, deflections for these types of beams are usually estimated using numerical techniques. In this research, an analytical solution is obtained for a non-prismatic tapered cantilever concrete beam that has a varying depth along the length when subjected to a concentrated load at its end. The dependence of the solution on the steel reinforcement ratio is simplified in order to obtain the solution. An effective moment of inertia model with tension stiffening is used in the formulation to obtain a better prediction for deflection. The obtained equation of deflection has the advantage of practicality and ease of use for designers and engineers. The finite element method is used to verify the analytical solution. A smeared cracking model with a tension softening effect was incorporated in the finite element model in order to obtain better simulation results. Despite the fact that the model predicted deflection well, the model lacks the ability to accurately predict the location of the neutral axis.

Identification of Crack in Reinforced Concrete Beam Subjected to Static Load Using Non-linear Finite Element Analysis

Authors: Abdulsamee Halahla

Journal: Civil Engineering Journal

Abstract: Experimental testing was used widely as a means to investigate the behavior of these individual elements and the effects of concrete strength under different loading types. While this method represents real life responses, it is very time consuming and the use of materials can be quite costly. Recently, the use of finite element analysis (FEA) has increased due to advances in knowledge and the capabilities of computer hardware and software. The utilization of computer software to model the structural elements has become much faster and extremely cost-effective. The finite element software ANSYS 11.0 is used for modeling and analysis by conducting non-linear static analysis. This research work used nonlinear finite element analysis for a reinforced concrete beam in order to show the potential of the FEA for studying the behavior of reinforced concrete elements, and to understand

their load-deflection response along with the crack evolution. For concrete a solid 65 element was used, while for the reinforcement steel bar link 8 elements were used. For the material constitutive model linear and multi-linear behavior for concrete were considered, while linear and bilinear behavior were considered for the reinforcement bar. A reinforced concrete beam model is studied and compared with experimental data from the literature. The characteristic points on the load-deflection response curve predicted using finite element analysis, were compared to the theoretical limit (hand-calculated) results. Conclusions were then drawn as to the accuracy of using finite element modeling for the analysis of reinforced concrete elements. The results showed a good match to experimental and hand calculations.

The effect of shape memory alloys on the ductility of exterior reinforced concrete beam-column joints using the damage plasticity model

Authors: Abdulsamee M Halahla, Yazan B Abu Tahnat, Amin H Almasri, George Z Voyiadjis

Journal : Engineering Structures

Abstract: Using shape memory alloys (SMA) bars can significantly enhance the ductility of exterior reinforced concrete joints, where they can replace the conventional steel reinforcement. This research focuses on studying the effect of using SMA on the ductility capacity of exterior reinforced concrete beam-column joints at different column axial load levels. Finite element analysis was carried out and compared with the experimental results from the literature for verification purposes, and both were compared with theoretical solutions. The results show that the use of SMA bars can improve the ductility of reinforced concrete joints noticeably, without losing load capacity. The finite element method was successful in capturing the large strain and superelastic behavior of SMA bars.

Tense and Aspect in the Academic Writing of Arab L2 Learners of English: A Corpus-Based Approach

Author: Mousa A. Btoosh

Journal: Journal of Language and Education

Abstract: This study aimed at explicating the use of tense and aspect in the academic writing of Arab L2 learners of English. The scope was restricted to two absolute tenses (simple present and simple past), perfective and imperfective aspects, and verb-form errors arising from the deletion or addition of the third person singular-s besides the omission of copula and auxiliary verbs. The study was conducted on the basis of a comparative, quantitative analysis of the target forms between a learner corpus and a similar-sized native one. In pursuing and achieving the stated objectives, it also concentrated on the types and sources of the tense, aspect and verb form errors in learners' performance. In addition to the significant disparity between the two corpora in terms of the frequency

count and percentage of most of the target forms, the findings confirmed learners' tendency to use more verbs than native speakers. Results also showed that learners' use of the preterit (simple past), and perfective and imperfective aspects were largely constrained by their L1 grammar and semantic interpretation of verbs (independent of the target language norm). Moreover, the findings revealed some common inconsistent erroneous forms attributed to the omission or addition of the third person singular-s and the omission of copula and auxiliary verbs. Several main factors were identified as potentially responsible for learners' errors, that is, inconsistency inherent in L2 rules, learners' limited exposure to (authentic) L2, overgeneralization, redundancy reduction, and language transfer. The findings suggest the need to introduce appropriate pedagogical methods to best present the target language rules.

Modals in Arab EFL Learners' Composition: A Corpus-based Approach

Author: Mousa A. Btoosh

Abstract: This study presents a corpus-based investigation of how Arab students of English use modality in academic writing. Although the primary focus of the study is on the writing of Arab L2 learners, regular comparisons have been conducted with native-speakers' writing with the aim of delineating the areas of similarities and differences between the two groups (leaners and native speakers). Furthermore, in an attempt to check whether the features characterizing the use of modality in Arab L2 academic writing is part of a general tendency or an idiosyncratic creation that exclusively applies to Arab students of English, results have been frequently checked against some other relevant studies. The study reveals a gap between native speakers and learners in terms of the frequency count of the modals used. Findings also show that many of the modality features used in the learner corpus reflect a general tendency on the part of most L2 learners. Yet, some other features, including the overuse of 'must', 'can' and 'should' and the underuse of the epistemic modals 'may', 'might', 'would', and 'could', are likely to be attributed to both learners' general tendency and L1 rhetoric, where certainty-oriented and collectivistic-oriented styles prevail.

Resyllabification in Standard Arabic: A Constraint-Based Approach

Author: Mousa A. Btoosh

Journal SKASE Journal of Theoretical Linguistics

Abstract: This study provides data-driven insights and analyses on lexical and post-lexical resyllabification in Standard Arabic within the framework of Optimality Theory. More particularly, the study is devoted to examining the impact of prosthesis, voweled letters, affixation, and vowel epenthesis and shortening on resyllabification processes within words and across word boundaries. Results show that Standard Arabic typically makes use of prothesized non-phonemic segments, voweled letters and epenthesis to avoid inadmissible clusters. Findings also reveal that in certain cases

this variety shortens long vowels to avoid lexical and post-lexical trimoraic syllables. Moreover, the data provided have well proven that complex codas resulting from the deletion of word-final short vowels or nunation utterance finally do not often adhere to the Sonority Sequencing Principle.

A generalization of the numerical radius

Authors: Amer Abu Omar and Fuad Kittaneh

Journal: Linear Algebra and its Applications

Abstract: We define a norm on the space of bounded linear operators on a Hilbert space, which generalizes the numerical radius norm. We investigate basic properties of this norm and prove inequalities involving it. A concrete example of this norm is also given.

Numerical Radius Inequalities for Products of Hilbert Space Operators II

Authors: Amer Abu Omar

Journal: Linear Algebra and its Applications

Abstract: New estimates for the numerical radius of the product AX are given. These estimates refine the known estimate $w(AX) \leq 2\|A\|w(X)$ when $0 \notin w(A)$ or $0 \notin w(X)$.

Tests of normality: new test and comparative study

Authors: Husam Awni Bayoud

Journal: Communications in Statistics-Simulation and Computation

Abstract: This paper proposes a goodness of fit test of normality based on the common area under the empirical and theoretical distribution curves. Critical values of the proposed test are obtained via Monte Carlo simulations. The null distribution of the proposed test is approximated by Beta distribution. Power of the proposed test is studied and compared with that of the most familiar tests proposed in the literature, including: Kolmogrov-Smirnov, Anderson-Darling, Shapiro-Wilk, Shapiro-Francia, Cramer-von Mises, Watson, Kuiper, Vasicek's, Park-Park test based on Vasicek's estimator, Jarque-Bera, and Robust Jarque-Bera. Simulation results show that the proposed test is consistent and outperforms, in terms of power, the underlying tests in various scenarios.

GFLIB: an Open Source Library for Genetic Folding Solving Optimization Problems

Authors: Mohammad A Mezher

Journal: Artificial Intelligence Advances

Abstract: This paper aims at presenting GFLIB, a Genetic Folding MATLAB toolbox for supervised learning problems. In essence, the goal of GFLIB is to build a concise model of supervised learning, and a free open-source MATLAB toolbox for performing classification and regression. The GFLIB is specifically designed for most of the traditionally used features, to evolve in applications of mathematical models. The toolbox suits all kinds of users; from the users who implemented GFLIB as "black box", to advanced researchers who want to generate and test new functionalities and parameters of GF algorithm. The toolbox and its documentation are freely available for download at: https://github.com/mohabedalgani/gflib.git

Publications in 2020

Capacity Analysis of Non-Orthogonal Multiple Access Systems over N-Nakagami Fading Channels for 5G and Beyond

Authors: **Amer Magableh**, Taimour Aldalagamouni, Sami Muhaidat, Osamah Badarneh

Conference Name: 7th International Conference on Electrical and Electronics Engineering (ICEEE), April 2020

Abstract: Non-Orthogonal multiple access (NOMA) provides massive connectivity with high spectral efficiency. This makes it very appealing for fifth generation (5G) networks and beyond. In this paper, we derive the statistics in terms of probability density function (pdf) of the signal to noise ratio of every user assuming independent but not necessarily identical N-Nakagami- fading channels. Moreover, we derive analytical expressions for the capacity of each user. Numerical results are also provided to show the effects of different fading scenarios as well as different number of users on the capacity

Compensation of nonlinear distortion in coherent optical OFDM systems using a MIMO deep neural network-based equalizer

Authors: Ivan Aldaya, Elias Giacoumidis, Athanasios Tsokanos, **Mutsam Jarajreh**, Yannuo Wen, Jinlong Wei , Gabriel Campuzano, Marcelo Abbade, and Liam p. Barry

Journal: Optical Letter

Abstract: A novel nonlinear equalizer based on a multiple-input multiple-output (MIMO) deep neural network (DNN) is proposed and experimentally demonstrated for compensation of inter-subcarrier nonlinearities in a 40-Gb/s coherent optical orthogonal frequency division multiplexing (CO-OFDM) system. Experimental results reveal that MIMO-DNN can extend the power margin by 4 dB at 2000 km of standard single-mode fiber transmission when compared to linear compensation or conventional single-input single-output (SISO)-DNN. It is also found that MIMO-DNN outperforms Digital Back Propagation by increasing up to 1 dB the effective Q-factor and reducing by a factor of 3 the computational cost.

Face Recognition System Approach Based on Neural Networks and Discrete Wavelet Transform

Authors: Ibtisam Mousa Alatawi; **Nazar Elfadil**

Journal: International Journal of Computer Science and Mobile Computing

Abstract: The technology of face recognition is attractive and full of technology research challenges; it is used for recognizing people by using digital images. Although face recognition has an important role in several areas such as security, face recognition technology still encounters many challenges that need to be solved with more scientific methods. One of These challenges lead can be the variations of the face of the same person due to lighting or pose. This project explores and investigates the use of combined hybrid algorithms based on neural networks and discreet wavelet transform for face recognition in order to enhance the recognition rate for a face from identified data set of faces. Two techniques have been used in this research; the First one is applying the discrete wavelet transformation method in order to improve and compress the images of the data set. The second one is implementing a well-known approach called Principal Component Analysis. The training and testing face images are selected from ORL database, which contains 400 images for 40 different persons and have minimum pose variation. The experimental results confirmed that the proposed methodology provides a feasible and effective solution for recognizing faces.

Measuring Cyber Security Awareness of Students: A Case Study at Fahad Bin Sultan University

Authors: Wejdan Alatwi , **Nazar Elfadil**

Journal: International Journal of Computer Science and Mobile Computing

Abstract: In this research paper authors designed questionnaire instrument to measure the current level of cyber security awareness (CSA) among Fahad Bin Sultan University (FBSU) students. The questionnaire is designed to fulfil the goals of this research project aims and objectives. The main goal of this paper aims to evaluate the level of cyber security awareness among FBSU students. Furthermore, cyber security students' awareness level questionnaire is adapted from few other cyber security awareness related questionnaires. A total of 212 students have participated in the survey. The study findings show that the students' awareness is in an average level and there is no difference in cyber security awareness level between male and female students. Furthermore, survey instrument's results indicate that the module has been effective in measuring students' awareness.

Support Vector Machine for Medical Image Classification of Tumorous

Authors: Reem Alrais; **Nazar Elfadil**

Journal: International Journal of Computer Science and Mobile Computing

Abstract: Cancer has become a leading cause of death worldwide. To deal with medical images to discover tumors and their types, Authors need a distinct experience in understanding medical images. Authors need machine learning techniques to reach great accuracy and speed to analyse these images to avoid a lack of experience or errors. In this paper, Authors will study a (SVM) of machine learning techniques used to classify brain images. SVM will be used in this paper to analyse brain images and discover Benign Tumor and Malignant tumor by using Matlab software. The results of the experiments conducted showed the accuracy of the system provided for the classification of tumor types (Benign, Malignant) found in medical brain images. Authors will adhere in this research that the images to be classified are limited by the presence of only two types of tumors. In the future, some pre-processing procedures will be added to the brain's medical images prior to the classification process.

Biometric Authentication by Using Fingerprint Recognition System

Authors: Abdullah Saud, **Nazar Elfadil**

Journal: International Journal of Scientific Engineering and Science

Abstract: The fingerprints in the human being are unique and do not repeat. It has features that vary from person to person. There are two popular techniques for making matches between the two fingerprints to recognize them: Minute-based and correlating-based techniques. Minute Based technology is widely used but has some difficulty in extracting features if the fingerprint images are of low quality. The purpose of this project is to examine how features of fingerprint can be derived. In addition, the two main techniques for matching (Minute-based and correlating-based) will be studied

Development of Arduino Based Real Time Bus Tracking and Monitoring System

Authors: Izzeldin I. Mohd , Chong Yew Kent , **Nazar Elfadil**

Journal: International Journal of Computer Trends and Technology

Abstract: Recently the urban population growth and increase rapidly. Currently, more than half of the world's population live in cities and projected that by the year of 2050 more than 2.5 billion will added to them mostly in Asia and Africa. This growth required efficient public transportation system such as buses where the users need sufficient and accurate information of the arrival time of the particular bus to particular station to enable them to plan their journey from and to their home. However, company provides bus schedule but unfortunately, the bus schedule is not that accurate for the users to follow. To address this issue, this paper aims to develop an IOT Arduino based a real time bus tracking and monitoring speed system using a GPS module, which functions informed the users the current location of the buses via the pre-installed Android Apps called Blynk. Blynk apps showed the

user the estimated the buses distance and their arrival times to the station, which facilitated them in the process where they can monitor the buses locations across the world via internet connection. The developed system is capable to monitor the bus location, speed, estimated distance and time as well as provide real tome information to the bus company and to the passengers. The system performance is evaluated experimentally and showed excellent results indicating its ability for tracking and monitoring.

- **Design and Development of Microcontroller Based Automatic Fish Feeder System**

Authors: Izzeldin Mohd, NHB Azizan, **Nazar Elfadil**

Journal: International Journal of Engineering Science and Computing

Abstract: Fish farming has growth fast in capacity and became a main provider of seafood. This rapid development has emerged due application of present technologies applications as well as the transform in the fish farming community structure. Therefore, monitoring and controlling the feeding activities of these farms playing a vital role as overfeeding and starvation risk the fish health, which leads to a poor water quality in indoor fish tanks. This paper describes the development of fish feeder implemented on a NodeMCU microcontroller, which contains built-in Wi-Fi module. The developed system enabled the fish owners to monitor their fish tanks for correct functioning of the fish feeder as well as to set schedules for feeding the fish and monitoring of water quality by utilizing pH sensor and turbidity sensor. A real time monitoring system is implemented and tested successfully, via Blynk-app mobile application that reliable to all android and IOS fish feeder users.

An Embedded Autonomous Search and Rescue Mobile Robotic System for Alive Human Detection

Authors: Izzeldin Mohd, LL Kun, **Nazar Elfadil**

Journal: International Journal of Modern Trends in Engineering and Research

Abstract: Natural disasters such as earthquakes, wildfires, hurricane, and flooding affect millions of people in the globe yearly. Nowadays, high-rise and skyscraper buildings are becoming prominent due to advanced structural technologies, which increase risks of losing life during natural and manmade disasters. In such disasters, many people lose their life by trapping under debris, as their presence cannot detect by the rescue team. Sometimes, it is impossible to reach in certain points of the disasters in such calamity hit zones. In this paper, a rescuing mobile robot system capable to autonomously perform the rescue mission is developed to detect human victims trapped in collapse buildings in an unreachable point of the disaster area. Camera-based target detection, thermal and ultrasonic sensors are used to build the systems. Signals from the sensors and images captured by the camera are

displayed on PC at command center through Wireless Sensor Network (WSN). Ultrasonic sensor is used for obstacle avoidance detection to enable the mobile robot to navigate its path while the camera is integrated for observation and analyzing the condition of the disaster area. The performance of the propose system is evaluated by simulation and our result show that proposed system is capable to reduce the impact and the losses of human life in disaster areas.

Identifying the Entrepreneurial Success Factors and the Performance of Women-Owned Businesses in Pakistan: The Moderating Role of National Culture

Authors: Muhammad Shakeel, **Ali Gohar** and Li Yaokuang

Journal: SAGE Journal

Abstract: Women's entrepreneurship in Pakistan has been booming in recent years, and it has made a significant impact on social and economic expansion. However, it is notable that these businesses are smaller in size and considered less profitable when compared with men's entrepreneurial efforts. This dilemma encourages the investigation of the success factors that contribute to the performance of women-owned businesses (WOBs) within this understudied region. Factors that may determine the success of WOB in Pakistan are divided into four broad headings: the entrepreneur's characteristics, internal business environment, external business environments, and supportive factors. This study also explores the direct and moderating role of perceived national culture within the framework. The results demonstrate that the entrepreneur's characteristics, external business environments, and supportive factors are positively related to the performance of WOB, while the internal business environment is of little significance. Furthermore, while perceived national culture does not influence the performance of WOB, it weakens the relationship between the entrepreneur's characteristics and performance but strengthens the impact of supportive factors on the performance of the WOB. This study leads to a solid awareness about the critical success factors, the perceived national culture, and their association with the performances of WOB within Pakistan.

Is Amman Stock Exchange an Indicator of Jordan's Economic Performance?

Authors: Ahmed Alrefai

Journal: International Journal of Economics and Financial

Abstract: There have been great debate in the literature on the impact of stock market on the economic performance, as some believe that higher stock prices increase the wealth of people and stimulate further investment leading to higher consumption and investment, consequently higher GDP. Others cast doubts on the robustness of that view. In Jordan, an emerging market, the Amman Stock Exchange plays a crucial role in the economy as the share of market capitalization to GDP was more than 200% until 2008 but dropped drastically during the economic turbulences after the Arab

Spring to reach only 57% in 2018. This study aims to test whether the stock prices in Jordan are to be used as a leading economic indicator. The Correlation between the former and the latter is measured through the statistical method used by Granger (1969). We used quarterly data for real GDP for the period 2000-Q1 till 2018-Q1 as a proxy for economic growth and the weighted average of Amman Stock exchange index as a proxy for stock prices. We found that the optimum time lag to be used was 4 lags and further the null hypothesis of no Granger-causality between lagged stock prices and GDP was rejected at 5%. This means that lagged stock prices in Jordan can cause economic performance. Such findings offer indication on the plausible use of Jordan lagged stock prices as causal factors to economic performance. As such, in an effort to revive the economy, Jordanian government should incentivize investment and stimulus policies targeting Amman's Stock Exchange.

The Coronavirus economic Crisis: Lessons from the Great Depression.

Author: **Ahmed Alrefai**

Journal: International Journal of Current research

Abstract: The Coronavirus, known as COVID-19, grievously impacted the US economy. In response to economic turmoil the US administration implemented rigorous stimulus packages to revitalize the economy and prevent another Great Depression. The objective of this study is to look at the efficacy of macroeconomic policies implemented during the Great Depression and to compare it with those policies undertaken by the US government during the current COVID-19 crisis. Further, the study investigates the number of length lags it takes for the implementation of the macroeconomic policies to be reflected in economic recovery. This will entail the use of U.S. real GDP, narrow definition of money and budget deficit obtained for the years 1926-1945. The study estimated the US monetary and fiscal multipliers during the Great Depression and found that the implemented monetary policy proved effective in economic recovery whereas the fiscal policy was not. However, this result might not hold true during the current disruption. This is because the stimulus packages undertaken are the highest in the US history and the fear of crowding out of the government spending is not applicable as the interest rates are kept at a zero bound. Further, the current government spending share stands at 38% of US GDP, unlike the 5% recorded during the 1930s. Moreover, the study found that the optimum lag length for recovery during the Great Depression was two years. However, if the US contains the current crisis with proper measures and tools, then the pace of economic recovery should be faster.

Is the Saudi Gender Gap Narrowing?

Author: **Ahmed H. Alrefai**.

Journal: Middle East Quarterly

Abstract: Saudi Arabia has enthusiastically endorsed the United Nations' "2030 Agenda for Sustainable Development," adopted by the General Assembly in September 2015, but in general, the agenda's ambitious goals have not been met in the kingdom. In particular, the goals for gender equality

lag behind, and Saudi women's rights are still severely limited. In the World Economic Forum's Global Gender Gap Report 2020, Riyadh ranked 146th of 153 countries in overall gender equality, 148th in gender economic participation and opportunity, and 136th in political empowerment. And while a recent survey reveals that Saudi men are amenable to their wives entering the labor market, they are reluctant to voice openly this view for fear of social stigmatization given Saudi society's highly conservative perception of male-female relations in general, and women's role in the public space in particular. In the words of analyst Daniel Pipes, anxiety has long existed in Muslim society "that women would break loose of their restrictions and bring perdition to the community.

Electronic Human Resource Management Perceived Usefulness, Perceived Ease of Use and Continuance Usage Intention: The Mediating Role of User Satisfaction in Jordanian Hotel Sector.

Authors: Adnan M. Rawashdeh, Malek BakhetElayan, **Waleed Alhyasat**, Mohamed DaoodShmout

Journal: International Journal for quality Research

Abstract: The main aim of this paper is to investigate the relationship of e-HRM Perceived Ease of Use (PEOU), e-HRM Perceived Usefulness (PU) and e-HRM Continuance Usage Intention (CUI) in the context of the Jordanian Manufacturing Sector (JMS), and identify the mediating role of User Satisfaction (SAT) towards e-HRM between e-HRM PEOU, PU and CUI. A survey study was carried out where the JMS companies, the survey was targeted to (123) respondents in HRM departments. The primary data were collected using a questionnaire and examined using the 'Structural Equation Modeling' (SEM) methodology to test the relationship and effects among the variables, and for analysis, SPSS and Amos were applied. The results of the SEM analyses indicate that the proposed measurement model and structural model satisfy the necessary fit conditions. The results indicated e-HRM PEOU, and PU have both a direct and indirect significant impact on e-HRM CUI in JMS. The SAT showed a direct and positive influence on CUI. As for the indirect effect, e-HRM PEOU and PU were positively related to SAT, which, in turn, was positively related to CUI. Thus, SAT was shown to play a mediating role between e-HRM PEOU and PU and e-HRM CUI.

Compensation Practices on Job Satisfaction of Faculty Members in Private HEI in Saudi Arabia: Mediating Role of Talent Management.

Authors: Bello and Alhyasat Waleed

Journal: International Journal of Human Resource Studies

Abstract: Purpose-The paper examined the role of compensation practices on job satisfaction of faculty members in private institutions of higher learning in Saudi Arabia. The paper also examined the mediating role of talent management in the relationship between compensation practices and job performance. Methodology/Approach-A descriptive research design method was applied in the study. The paper is focused on review of previous studies from online data bases and periodicals on the paper variables and resultant relationships. Literature acknowledged the effect of compensation

practices on job satisfaction. The paper explained the importance of compensation practices on job satisfaction and the mediating role of talent management. Equity theory was used as the underpinning theory of this paper. Findings-The paper found that compensation practice mediated by talent management is important to increase job satisfaction of faculty members of newly established private institutions of higher learning particularly in Saudi Arabia.

Journal of Critical Reviews Heritage Waste Hollow Block a Replacement of Clay Bricks a Case Study

Authors: J N Akhtar Dr M Farhan Fazli, Mohammad Nadeem Akhtar

Journal: Journal of Critical Reviews

Abstract: Heritage waste (HW) or the waste produced from heritage buildings has a key concern these days. HW a heterogeneous mixture of buildings generated from the removal of existing structures either by manmade process or by natural disasters such as earthquake, flood, hurricanes etc. As per records the quantities of demolition wastes 1.3-1.6 tons/m2 has been produced by residential buildings, 1.5-2.0 tons/m2 generated through industrial structures and 1.0-2.0 tons/m2 have been produced in general. Clay has the primary raw material of the conventional brick, which obtains from the top soil of the earth's surface. However, due to the fast production of bricks, the fertile top soil has being diminished and thus reduces the availability of agricultural land. In the manufacturing of bricks the harmful Co2 gas has emitted which causing environmental pollution. Hence, the conventional bricks are not considered environment-friendly. Therefore, it has been important to find out a better alternative for conventional bricks, which can be less harmful to the environment and can utilize the waste obtained from various sources. Fly ash hollow blocks have proven to be good alternative and gained much popularity these days. Present experimental work has analyzing the effect of Heritage waste with hair fiber on mechanical properties of fly ash. The Heritage waste was mixed from 0 to 20% by weight of fly ash and hair fiber was mixed in fractions of 0.00, 1.00, 1.50, 2.00 & 2.50% respectively. Portland cement production has under critical review due to high amount of carbon dioxide gas release threatening the atmosphere; therefore, the studies are being conducted.

Advances in tailoring the water content in porous carbon aerogels using RT-pulsed fluorination

Authors: **Yasser Ahmad** , Sandrine Berthon-Fabry , Marian Chatenet , Guillaume Monier , Marc Dubois , Katia Guerin

Journal: Journal of Fluorine Chemistry

Abstract: The present work introduces a safe and efficient fluorination method, called RT-pulsed fluorination, proceeding under pure fluorine gas. The RT-pulsed fluorination enables to modify the surface chemistry of carbon aerogels (CAs), materials which suffer from water trapping into their porosity and their low degree of graphitization, hence limiting their application. This new fluorination route was developed to reach several goals, such as preventing the generation of structural defects,

maintaining the tailored porous texture of the aerogel, favoring covalent C–F bonding without promoting CF2 and CF3 groups, and repulsing the water trapping into the porosity. The impact of the RT-pulsed fluorination on the conductivity will be also discussed.

A Non-Invasive Flexible Glucose Monitoring Sensor using a Broadband Reject Filter

Authors: M. Bteich, J. Hanna, J. Costantine, R. Kanj, Y. Tawk, **A. H. Ramadan**, and Assaad Eid

Journal: IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology

Abstract: In this paper, a novel, highly accurate, non-invasive glucose-monitoring sensor that is based on a flexible broadband reject filter is presented. The filter topology comprises a tapered feed line at a top layer that excites four modified log-periodic open loop resonators on the bottom layer, achieving a broadband reject response. Size reduction techniques are applied on the embedded resonators that are optimized to exhibit an enhanced sensitivity to track the variations of the glucose level across a frequency span from 1.25 GHz to 2.65 GHz. The proposed flexible filter is tested pre-clinically and clinically, where a high correlation between its scattering parameters and the variations in glucose levels is attained. Regression models are also developed using experimental data obtained from healthy patients that are subjected to glucose tolerance tests. Results demonstrate less than 4% mean absolute relative difference between the reference and estimated glucose levels, and the predicted glucose levels lie 100% within the clinically acceptable zones as shown by the Clarke Error Grid analysis.

Modified Genetic Folding Algorithm for Breast Cancer Classification Dataset

Authors: **Mohammad A Mezher**

Journal: International Journal of Computer Science and Mobile Computing

Abstract: Cancer is a disease that develops in the human body due to gene mutation. Because of various factors, cells can become cancerous and grow rapidly, destroying normal cells at the same time. Support vector machines allow for accurate classification and detection of the classes. The advantage of kernel selection is to derive global learning rates for SVMs using the Genetic Folding algorithm. The developed GF algorithm outperforms traditional SVMs in the UCI Breast Cancer Wisconsin Diagnostic (BCWD) dataset under a certain comparative analysis, which is conducted under a set of conditions that describe the behavior of the compared algorithms. The observation that relates the GF performance appears to be comparable with SVM. The statistical analysis relies on a careful analysis of the ROC curve. Moreover, the GF algorithm shows that accuracy rates are obtained adaptively, that is, without knowing the parameters resulting from the margin conditions. The experimental results show that the one GF operator produces superior classification accuracy. The proposed method plays an important role in the detection of breast cancer in an efficient time frame.

Enhanced Artificial Intelligence System for Diagnosing and Predicting Breast Cancer Using Deep Learning

Authors: Mona Alfifi, Mohamad Shady Alrahhal, **Samir Bataineh, Mohammad Mezher**

Journal: (IJACSA) International Journal of Advanced Computer Science and Applications

Abstract: Breast cancer is the leading cause of death among women with cancer. Computer-aided diagnosis is an efficient method for assisting medical experts in early diagnosis, improving the chance of recovery. Employing artificial intelligence (AI) in the medical area is very crucial due to the sensitivity of this field. This means that the low accuracy of the classification methods used for cancer detection is a critical issue. This problem is accentuated when it comes to blurry mammogram images. In this paper, convolutional neural networks (CNNs) are employed to present the traditional convolutional neural network (TCNN) and supported convolutional neural network (SCNN) approaches. The TCNN and SCNN approaches contribute by overcoming the shift and scaling problems included in blurry mammogram images. In addition, the flipped rotation-based approach (FRbA) is proposed to enhance the accuracy of the prediction process (classification of the type of cancerous mass) by taking into account the different directions of the cancerous mass to extract effective features to form the map of the tumour. The proposed approaches are implemented on the MIAS medical dataset using 200 mammogram breast images. Compared to similar approaches based on KNN and RF, the proposed approaches show better performance in terms of accuracy, sensitivity, spasticity, precision, recall, time of performance, and quality of image metrics.

Characterizing the Performance of Different Learning Models for Diabetes Mellitus Dataset

Authors: Aeshah S. Alanazi, **Mohd A. Mezher**

Journal: JECET: Journal of Environmental Science, Computer Science and Engineering & Technology

Abstract: Various machine learning algorithms are applicable in the diagnosis and prediction of diabetes mellitus. Since each of the classifiers has a different implementation matrix, their prediction accuracies vary. Therefore, this study focused on comparing the accuracy of various machine learning algorithms in predicting diabetes mellitus. The algorithms include ID3, C4.5, CART, CHAID, Gradient Boosting, Random Forest, and AdaBoost. The implementation of the algorithms was done using the Chefboost decision tree-based framework in Python. The obtained results they concluded that the accuracy of prediction for all the implemented algorithms is satisfactorily high. However, tree-based classification algorithm ID3 had a higher prediction accuracy than all the others.

Current Studies of Support Vector Machine on Intrusion Detection Systems

Authors: Reem Al-Omrani, **Mohammad A. Mezher**

Journal: International Journal of Innovative Engineering and Emerging Technology (IJIEET)

Abstract: In light of the remarkable development in technology, the protection of the digital infrastructure in any institution must be accompanied. Hence, the improvement of the cyber security system for digital infrastructure will lead to the prediction and the discovery of cyber-attacks and their identification as a whole. This study aims at reviewing and demonstrating the current effective studies on Support Vector Machine (SVM) in Intrusion Detection Systems (IDS). The present study shows a comparative analysis of performance of algorithm in predicting IDS. This study is conducted on KDD cup'99 dataset, and the accuracy of using the proposed algorithm using the kernel (poly) was 100%. Finally, the paper sheds light on the hybrid approaches, which were able to reduce hacking and sabotage operations in an institution.

Performance Impact of Genetic Operators in a Hybrid GA-KNN Algorithm

Authors: Raghad Sehly, **Mohammad Mezher**

Journal: (IJACSA) International Journal of Advanced Computer Science and Applications

Abstract: Diabetes is a chronic disease caused by a deficiency of insulin that is prevalent around the world. Although doctors diagnose diabetes by testing glucose levels in the blood, they cannot determine whether a person is diabetic on this basis alone. Classification algorithms are an immensely helpful approach to accurately predicting diabetes. Merging two algorithms like the K-Nearest Neighbor (K-NN) Algorithm and the Genetic Algorithm (GA) can enhance prediction even more. Choosing an optimal ratio of crossover and mutation is one of the common obstacles faced by GA researchers. This paper proposes a model that combines K-NN and GA with Adaptive Parameter Control to help medical practitioners confirm their diagnosis of diabetes in patients. The UCI Pima Indian Diabetes Dataset is deployed on the Anaconda python platform. The mean accuracy of the proposed model is 0.84102, which is 1% better than the best result in the literature review.

A Survey Study Support Vector Machines and K-MEAN Algorithms for Diabetes Dataset

Authors: Nora Ibrahem Alghurair, **Mohammad A. Mezher**

Journal: Academic Journal of Research and Scientific Publishing

Abstract: Diabetes is actually one of the primary causes of human mortality. Diabetes is a intense disease affecting various parts of the human body. Diabetes can rise long-range complications including, renal failure and cardiac failure.. It is therefore imperative that diabetes be diagnosed in a timely manner people all over the world. In this study, a survey was conducted on data testing on SVM

technology using a different kernel as well as data test results were surveyed with a complementary algorithm between SVM and K-mean to diagnose diabetes and compare their results with previous studies. This comparison was made to UCI PIMA Indian Dataset and using Anaconda python.

A Comparative Analysis of Data Mining Techniques on Breast Cancer Diagnosis Data using WEKA Toolbox

Authors: Majdah Alshammari, **Mohammad Mezher**

Journal: (IJACSA) International Journal of Advanced Computer Science and Applications,

Abstract: Breast cancer is considered the second most common cancer in women compared to all other cancers. It is fatal in less than half of all cases and is the main cause of mortality in women. It accounts for 16% of all cancer mortalities worldwide. Early diagnosis of breast cancer increases the chance of recovery. Data mining techniques can be utilized in the early diagnosis of breast cancer. In this paper, an academic experimental breast cancer dataset is used to perform a data mining practical experiment using the Waikato Environment for Knowledge Analysis (WEKA) tool. The WEKA Java application represents a rich resource for conducting performance metrics during the execution of experiments. Pre-processing and feature extraction are used to optimize the data. The classification process used in this study was summarized through thirteen experiments. Additionally, 10 experiments using various different classification algorithms were conducted. The introduced algorithms were: Naïve Bayes, Logistic Regression, Lazy IBK (Instance-Bases learning with parameter K), Lazy Kstar, Lazy Locally Weighted Learner, Rules ZeroR, Decision Stump, Decision Trees J48, Random Forest and Random Trees. The process of producing a predictive model was automated with the use of classification accuracy. Further, several experiments on classification of Wisconsin Diagnostic Breast Cancer and Wisconsin Breast Cancer, were conducted to compare the success rates of the different methods. Results conclude that Lazy IBK classifier k-NN can achieve 98% accuracy among other classifiers. The main advantages of the study were the compactness of using 13 different data mining models and 10 different performance measurements, and plotting figures of classifications errors.

Comparative Analysis of Classification Models for Pima Dataset

Authors: Raghad Sehly; **Mohammad Mezher**

Journal: International Conference on Computing and Information Technology (ICCIT-1441)

Abstract: Nowadays the amount of data is rapidly increasing. For example, in 2019, International Telecommunication Union ITU states that the number of Internet users has become about 4.1 billion (53.6% of the global population). The big amount of data exceeds our ability to analyze and extract useful information without the help of computer techniques. Data mining is a common technique used in Machine Learning (ML) to extract useful knowledge from big data. Classification algorithms

are also widely used for achieving accurate prediction. The classification techniques compared here were K-Nearest Nearest Neighbor (K-NN), Radial Basis Function Support Vector Machine (RBF SVM), Linear SVM, Sigmoid SVM, Logistic Regression (LR), Linear Discriminant Analysis (LDA), Classification and Regression Trees (CART), and Naive Bayes (NB). This study aims at comparing the accuracy of six classification techniques using the confusion matrix evaluation model. The UCI PIMA Indian Diabetes Dataset is considered and deployed on the Anaconda python platform. The results showed that the achieved accuracy by using K-NN is 0.7265, by RBF SVM is 0.612, by Linear SVM is 0.7721, by Sigmoid SVM is 0.6510, by LR is 0.7695, by LDA is 0.7734, by CART is 0.6952, and by NB 0.7551.

Using Machine Learning Algorithms For Prediction Of Diabetes Mellitus

Authors: Aeshah Saad Alanazi, **Mohd A Mezher**

Conference: International Conference on Computing and Information Technology (ICCIT-1441)

Abstract: Diabetes is a chronic disease. The risk of diabetes is increasing so fast, destroying human health. The proposed model combines two algorithms of machine learning algorithms and these algorithms are Support Vector Machine and Random Forest to predict the diabetes. Using a real dataset collected from Security Force Primary Health Care. The proposed model achieved 98% of accuracy, ROC 99%. The result shows that Random Forest algorithm is has better accuracy score when compared to Support Vector Machine.

Publications in 2021

- **Question Answering Systems: A Systematic Literature Review**

Authors: Sarah Saad Alanazi, **Nazar Elfadil**, Mutsam Jarajreh, Saad Algarni

Journal: International Journal of Advanced Computer Science and Applications

Abstract: Question answering systems (QAS) are developed to answer questions presented in natural language by extracting the answer. The development of QAS is aimed at making the Web more suited to human use by eliminating the need to sift through a lot of search results manually to determine the correct answer to a question. Accordingly, the aim of this study was to provide an overview of the current state of QAS research. It also aimed at highlighting the key limitations and gaps in the existing body of knowledge relating to QAS. Furthermore, it intended to identify the most effective methods utilized in the design of QAS. The systematic review of literature research method was selected as the most appropriate methodology for studying the research topic. This method differs from the conventional literature review as it is more comprehensive and objective. Based on the findings, QAS is a highly active area of research, with scholars taking diverse approaches in the development of their systems. Some of the limitations observed in these studies encompass the focused nature of current QAS, weaknesses associated with models that are used as building blocks for QAS, the need for standard datasets and question formats hence limiting the applicability of the QAS in practical settings, and the failure of researchers to examine their QAS solutions comprehensively. The most effective methods for designing QAS include focusing on syntax and context, utilizing word encoding and knowledge systems, leveraging deep learning, and using elements such as machine learning and artificial intelligence. Going forward, modular designs ought to be encouraged to foster collaboration in the creation of QAS.

Cybersecurity Awareness Level: The Case of Saudi Arabia University Students

Authors: Wejdan Aljohni, **Nazar Elfadil, Mutsam Jarajreh,** Mwahib Gasmelsied

Journal: International Journal of Advanced Computer Science and Applications

Abstract: Cybersecurity plays an important role in reliance on digital equipment and programs to manage daily lives chores including the transmission and storage of personal information. Therefore, it is a global issue in our growing society, and it becomes increasingly important to measure and analyze the awareness of it. In this paper, a questionnaire has been designed to measure the current level of cybersecurity awareness (CSA) among Saudi university students. Cybersecurity students' awareness level questionnaire has been adapted from few other previous cybersecurity awareness campaigns. In this questionnaire, a total of 136 students have participated in the survey. The questionnaire was collected to measure the cybersecurity students' awareness level through their knowledge, culture, and surrounding environment or through students' behavior by thee affected factors. These are: gender,

location, and study department of the students. The study findings reveal that the students' awareness is in an average has no significant difference in cybersecurity awareness level between male and female students, but females show a bit more concern about cybersecurity. However, there is a clear and high awareness of students of computer and information technology departments compared to others. Moreover, urban students outperformed students in remote areas in awareness of cybersecurity. The survey results indicate that the study model has been effective in measuring students' awareness.

Is Refugee Influx a Cause of Economic Vulnerability: an Empirical Study of Jordan (1990-2018)

Authors: **Ahmed Hussein Alrefai**

Journal: International Journal of Economics and Business Research

Abstract: Jordan received thousands of refugees over the last thirty years. Engulfed by regional turbulence, holding limited resources and reliant on foreign aid, Jordan stands vulnerable to external shocks. Given such volatility, this study will examine how refugees affect the real per capita income, per capita government spending and unemployment. This will be done using Vector Autoregressive model (VAR). The data used accounts for a time series annual data for the period of 1990-2018, obtained from Computer and Enterprise Investigations Conference (CEIC) census and Jordan's Department of Statistics. The study found that there is no causality between refugee influx and the unemployment rate, per capita income and per capita government spending. These results indicate that refugee intake may not be a crippling element on Jordan as capital inflow from donors, humanitarian agencies and the assistance in cash and kind may compensate Jordan's public. Further, refugees usually work in informal sectors in which Jordanians are reluctant to accept.

Strength and Flexural Behavior of Steel Fiber and Silica Fume Incorporated Self-Compacting Concrete

Authors: Abdalla M Saba, Afzal Husain Khan, **Mohammad Nadeem Akhtar**, Nadeem Ahmad Khan, Seyed Saeid Rahimian Koloor, Michal Petrů, Neyara Radwan

Journal: Journal of Materials Research and Technology

Abstract: Self-Compacting Concrete (SCC) that flows by its own weights without compaction or vibration, thereby no external energy from mechanical equipment. In addition to this, cement replacement with silica fume and the introduction of steel fibers have allowed the improvements in durability and hardened properties of SCC. These materials are very important to prevent segregation, bleeding, and increase flow-ability. However, the addition of fibers to SCC may lead to a decline in the workability but in other way helps to improve hardened concrete properties. This paper discusses the results of an experimental investigation onto fresh and hardened properties of the self-compacting concrete mixes with four different percentages of steel fibers (0.25, 0.50, 0.75, and 1.0%) and 20%

cement replacement rate with silica fume was incorporated. The workability of fresh concrete was assessed using three tests (slump flow, slump flow T50, L-box, and V-funnel tests) according to EFNARC specification and one visual test (segregation resistance) as per ASTM C 1611. The results showed that using fibers layers led to reduced workability with improved hardened concrete properties, especially toughness. However, the improved tensile and flexural toughness in SCC counteract the reduction in workability. The toughness tests are compared by introducing quadruplicate patterns containing four layers (each layer is 25 mm height) and having seven combinations of fiber laying patterns to quantify the impact in prism specimens. The quadruplicate patterns of steel fibers provide good predictions of impacts of fiber orientation on hardened properties of concrete. The results of this study indicate that the use of silica fume as a replacement for cement and incorporation of steel fiber produces more economically feasible and durable SCC.

Evaluating Public Services Delivery on Promoting Inclusive Growth for Inhabitants of Industrial Cities in Developing Countries

Authors: Saniya Siddiqui, **Mohammad Nadeem Akhtar**, Jamal K Nejem, Mastour Saud Alnoumasi

Journal: Civil Engineering Journal

Abstract: It has been debated that effective essential public services delivery is crucial to inculcate inclusive growth in cities over the past decades. Cities continue to be central to the debate; however, the current study focuses on industrial towns. As industrial towns' development around cities attract investment and promote economic growth, the present research studies the impact of essential public services delivery on promoting inclusive growth for inhabitants of industrial towns in developing countries. Human Capabilities Dimension Approach and its parameters (Social and Physical Infrastructure) have been employed to explore the role of basic amenities in transferring growth levels across all population sections. The idea explored is studied through Mandideep Industrial Town's case study, where six parameters (Physical and socioeconomic status, water supply, sanitation, health care facilities, education facilities), and perceived inclusive growth have been considered for data collection and analysis. Indicators under each parameter are analyzed based on the 4A'sAvailability, Accessibility, Awareness, and Affordability. Site selection revolved around a city reconnaissance survey and Household survey for 200 households. Aggregated analysis for the city and ward-wise comparative analysis and statistical correlation tools were used to establish a relationship between basic public services delivery and perceived inclusive growth. The research aims to study and establish a correlation between public service delivery and perceived inclusive growth by the industrial town's inhabitants. Discussions following data analysis led to recommendations for city and ward-level. The importance of efficient service delivery for increased perception of inclusive growth is established. Along with the six parameters considered for the study, physical and environmental planning emerge as crucial parameters that impact other public services for enhanced inclusive growth in industrial cities.

Preparation and Applications of Fluorinated Graphenes

Authors: **Yasser Ahmad** , Nicolas Batisse , Xianjue Chen and Marc Dubois.

Publisher: Multidisciplinary Digital Publishing Institute

Abstract: The present review focuses on the numerous routes for the preparation of fluorinated graphene (FG) according to the starting materials. Two strategies are considered: (i) addition of fluorine atoms on graphenes of various nature and quality and (ii) exfoliation of graphite fluoride. Chemical bonding in fluorinated graphene, related properties and a selection of applications for lubrication, energy storage, and gas sensing will then be discussed.

Keywords: graphene; fluorination; fluorinated graphene; lubrication; energy storage; gas sensing

Non-parametric estimation of the extropy and the entropy measures based on progressive type-II censored data with testing uniformity

Authors: Raja Hazeb, Mohammad Z. Raqab, **Husam Awni Bayoud**

Journal: Journal of Statistical Computation and Simulation

Abstract: The extropy measure is a complementary dual function of Shannon entropy which was proposed by Lad et al. Extropy: complementary dual of entropy. Stat Sci. 2015;30:40–58. This measure of uncertainty have received a considerable attention in the last five years. In this paper, several methods of estimation for the extropy and entropy measures based a progressively Type-II censored data are derived. Simulation studies have been performed to see the effectiveness of the proposed methods, and two real data sets have been analysed for illustrative purposes. Extropy and entropy-based tests of uniformity are also proposed along with their simulated critical values. The power values of the proposed tests are simulated and studied under various alternatives.

Positive Discourse Analysis of the Prophet's Sayings (Hadith) from Ecolinguistics Perspectives

Authors: Hussein Abdo Rababah

Abstract: This research reviewed and analyzed a number of the Prophet's sayings (20 Hadiths) through Positive Discourse Analysis (PDA) principles from the ecolinguistics perspectives. This research has also made a connection between these sayings and the planned behavior theory. This study revealed that these sayings can be categorized into two groups; the first group include Hadiths that directly promote the positive behaviour of people towards environmental safety, the second group implies sayings that indirectly encourage people to promote and enhance their positive attitudes and behaviors towards the environment. Finally, the linguistic features of these sayings have been analyzed

and identified according to levels of language starting from the phono-morphological, to the lexical and the syntactic levels, and they have been linked with the principles of Positive Discourse Analysis. Finally, the function and objectives of the Prophet's sayings have been connected with the planned behavior theory from the psycholinguistics aspect.