Computer and Control Department

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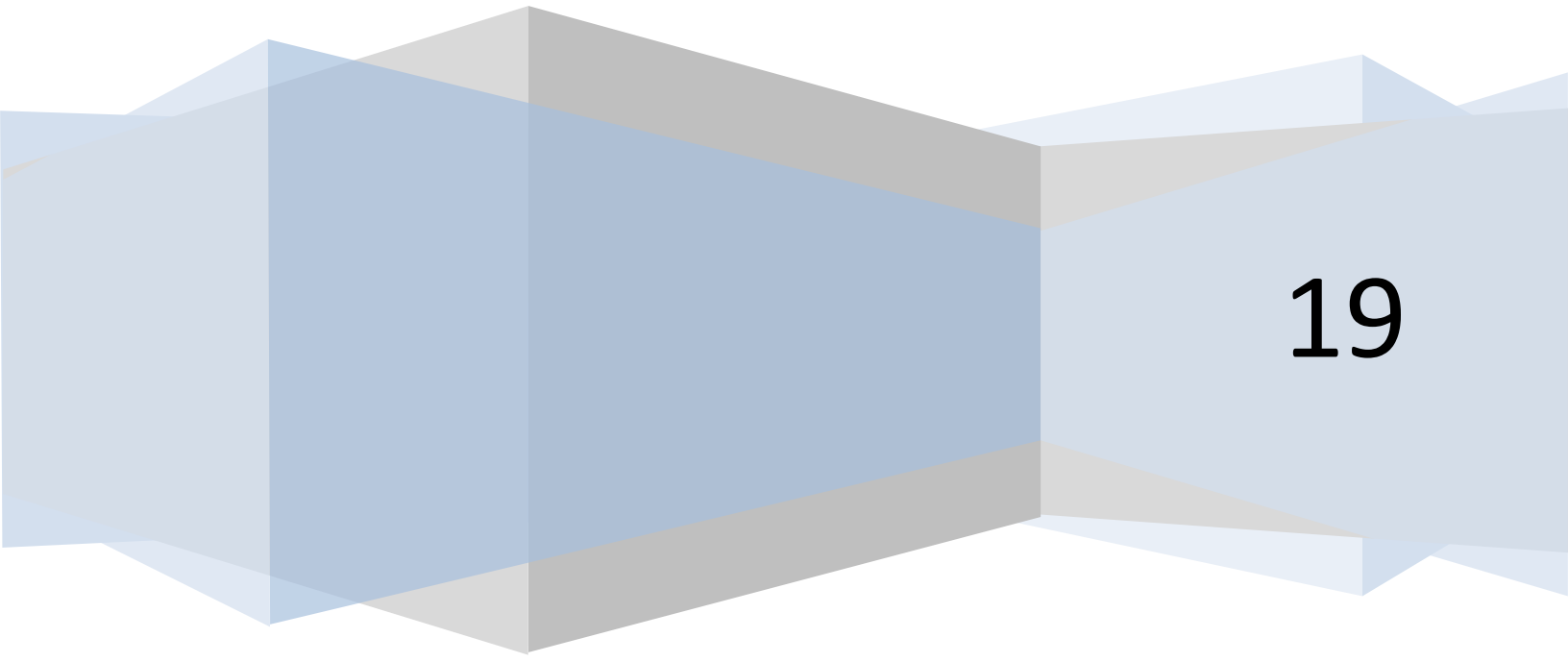

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Paper Title	**An Enhanced Differential Evolution Algorithm with Multi-mutation Strategies and Self-adapting Control Parameters**
Authors	M. A. Attia, M. Arafa, E. A. Sallam, and M. M. Fahmy
Conf. or Journal Name	International Journal of Intelligent Systems and Applications(IJISA), Vol. 11, No. 4, pp. 26-38, Apr. 2019.
Abstract	Differential evolution (DE) is a stochastic population-based optimization algorithm first introduced in 1995. It is an efficient search method that is widely used for solving global optimization problems. It has three control parameters: the scaling factor (F), the crossover rate (CR), and the population size (NP). As any evolutionary algorithm (EA), the performance of DE depends on its exploration and exploitation abilities for the search space. Tuning the control parameters and choosing a suitable mutation strategy play an important role in balancing the rate of exploration and exploitation. Many variants of the DE algorithm have been introduced to enhance its exploration and exploitation abilities. All of these DE variants try to achieve a good balance between exploration and exploitation rates. In this paper, an enhanced DE algorithm with multi-mutation strategies and self-adapting control parameters is proposed. We use three forms of mutation strategies with their associated self-adapting control parameters. Only one mutation strategy is selected to generate the trial vector. Switching between these mutation forms during the evolution process provides dynamic rates of exploration and exploitation. Having different rates of exploration and exploitation through the optimization process enhances the performance of DE in terms of accuracy and convergence rate. The proposed algorithm is evaluated over 38 benchmark functions: 13 traditional functions, 10 special functions chosen from CEC2005, and 15 special functions chosen from CEC2013. Comparison is made in terms of the mean and standard deviation of the error with the standard "DE/rand/1/bin" and five state-of-the-art DE algorithms. Furthermore, two nonparametric statistical tests are applied in the comparison: Wilcoxon signed-rank and Friedman tests. The results show that the performance of the proposed algorithm is better than other DE algorithms for the majority of the tested functions.
Keywords	***Differential evolution; Global optimization; Multi-mutation strategies; Self-adapting control parameters; Evolutionary algorithms.***

Paper Title	**An Identical String Motif Finding Algorithm Through Dynamic Programming**
Authors	Abdelmenem Elgabry, Tahani Allam, and Mahahmoud Fahmy
Conf. or Journal Name	The 13th International Conference on Practical Applications of Computational Biology & Bioinformatics, PACBB 2019, Part of the Advances in Intelligent Systems and Computing book series (AISC, volume 1005) pp. 78-86, June 2019.
Abstract	Gene expression regulation is a major challenge in biology. One aspect of such a challenge is the binding sites in DNA, called motifs. DNA motif finding still poses a great challenge for computer scientists and biologists. As a result, a large number of motif finding algorithms are already implemented. However, literature has proven this task to be complex. The present paper tends to find a solution for the motif finding problem through rearranging data in a manner that can help obtain the targeted motif easily by adopting the dynamic programming concept. It proposes an efficient algorithm called Pattern Position Motif Finding (PPMF), aiming at finding all identical string motifs, which appear in a single sequence or multi sequences at least twice or a specified times. The proposed algorithm is compared with the Encoded Expansion (EE) algorithm to evaluate the execution time and size of processed sequences, PPMF takes less execution time than the corresponding one and processed large size sequences than EE processed. This denotes that when the biologist needs to find the identical string motifs in a big sequence, our proposed algorithm will be the better solution than the EE algorithm.
Keywords	***Identical string motifs, Gene expression regulation, DNA motifs, Nucleotide and protein sequences, Sequence analysis.***

Paper Title	**Application of an Enhanced Self-adapting Differential Evolution Algorithm to Workload Prediction in Cloud Computing**
Authors	M. A. Attia, M. Arafa, E. A. Sallam, and M. M. Fahmy
Conf. or Journal Name	International Journal of Intelligent Systems and Applications(IJISA), Vol.11, No.8, pp. 33-40, Aug. 2019.
Abstract	The demand for workload prediction approaches has recently increased to manage the cloud resources, improve the performance of the cloud services and reduce the power consumption. The prediction accuracy of these approaches affects the cloud performance. In this application paper, we apply an enhanced variant of the differential evolution (DE) algorithm named MSaDE as a learning algorithm to the artificial neural network (ANN) model of the cloud workload prediction. The ANN prediction model based on MSaDE algorithm is evaluated over two benchmark datasets for the workload traces of NASA server and Saskatchewan server at different look-ahead times. To show the improvement in accuracy of training the ANN prediction model using MSaDE algorithm, training is performed with other two algorithms: the back propagation (BP) algorithm and the self-adaptive differential evolution (SaDE) algorithm. Comparisons are made in terms of the root mean squared error (RMSE) and the average root mean squared error (ARMSE) through all prediction intervals. The results show that the ANN prediction model based on the MSaDE algorithm predicts the cloud workloads with higher prediction accuracy than the other algorithms compared with.
Keywords	***Cloud computing; Workload prediction; Resource scaling; Artificial neural network; Differential evolution***

Paper Title	**Big Data Challenges and Opportunities in Healthcare Informatics and Smart Hospitals**
Authors	M. K. Hassan, A. I. El Desouky, S. M. Elghamrawy and A.M. Sarhan
Conf. or Journal Name	Security in Smart Cities: Models, Applications, and Challenges, Part of the Lecture Notes in Intelligent Transportation and Infrastructure book series (LNITI), Springer, pp. 3-26, 2019.
Abstract	Healthcare informatics is undergoing a revolution because of the availability of safe, wearable sensors at low cost. Smart hospitals have exploited the development of the Internet of Things (IoT) sensors to create Remote Patients monitoring (RPM) models that observe patients at their homes. RPM is one of the Ambient Assisted Living (AAL) applications. The long-term monitoring of patients using the AALs generates big data. Therefore, AALs must adopt cloud-based architectures to store, process and analyze big data. The usage of big data analytics for handling and analyzing the massive amount of big medical data will make a big shift in the healthcare field. Advanced software frameworks such as Hadoop will promote the success of medical assistive applications because it allows the storage of data in its native form not only in the form of electronic medical records that can be stored in data warehouses. Also, Spark and its machine learning libraries accelerate the analysis of big medical data ten times faster than MapReduce. The advanced cloud technologies that are capable of handling big data give great hope for developing smart healthcare systems that can provide innovative medical services. Building smart Remote patient monitoring models using cloud-based technologies will preserve the lives of patients, especially the elderly who live alone. A case study for monitoring patients suffering from chronic diseases (blood pressure disorders) for 24 h with a reading every 15 min using a cloud-based monitoring model shows its effectiveness in predicting the health status of the patients.
Keywords	***Smart hospitals, Big data, Cloud computing, Smart remote patient monitoring (RPM), Ambient assisted living (AAL), Hadoop Spark, Healthcare informatics, Elderly Chronic diseases.***

Paper Title	**Cloud-Based IoT Platform: Challenges and Applied Solutions**
Authors	Amany Sarhan
Conf. or Journal Name	Book chapter in Harnessing the Internet of Everything (IoE) for Accelerated Innovation Opportunities, IGI Global, pp. 116-147, 2019.
Abstract	Developing IoT projects from scratch requires a lot of knowledge and expertise; moreover, it takes a very long time to be developed. It can be hard for starters and even senior developers to perfect every aspect of an IoT project in a timely manner. These aspects include hardware, communication, data storage, security, integration, application, data processing, and analysis. This chapter introduces a cloud-based platform that is concerned with data storage, device management, data processing, and integration with external systems, all while providing high level of security and allowing for future scaling. This platform should accelerate and simplify the development of IoT projects by lowering the entry barrier and offloading some of the burden off developers to give them more time to focus on other aspects such as hardware and applications. The authors discuss many implementation issues in the functional and design perspective that may guide others to make their own platforms from this insight view.
Keywords	***IoT, Platform, Cloud, Concurrency Control, IoT architecture, Integration***

Paper Title	**ANFIS-based an adaptive continuous sliding-mode controller for robot manipulators in operational space**
Authors	M. F. Asar, W. M. Elawady, and A. M. Sarhan
Conf. or Journal Name	Multibody System Dynamics, vol. 47, no. 2, pp. 95-115, Oct. 2019.
Abstract	This paper addresses the task-space robust trajectory tracking control problem for robot manipulators in the presence of uncertainties and external disturbances. First, a discontinuous sliding-mode controller-based inverse dynamics control strategy (IDSMC) with discontinuous robust control action is synthesized. Second, an adaptive inverse dynamics controller based on continuous sliding-mode control (AIDCSMC) is designed, in which the adaptation laws are addressed to compensate for the unknown parameters of the dynamical model of robot manipulators. The global stability of the closed-loop control system is proven using the Lyapunov theorem and the proposed AIDCSMC controller is further proven to guarantee convergence to zero of both trajectory tracking error and error rate. Finally, a hybrid intelligent neuro-fuzzy adaptive fuzzy inference system (ANFIS)-based adaptive inverse dynamics controller with continuous sliding-mode control (ANFIS-AIDCSMC) is adopted. Numerical simulations using the dynamic model of rigid robot manipulators with uncertainties show the effectiveness of the presented approach in simple and complex trajectory tracking problems. The simulation results indicate that the control performance of the robot system is satisfactory, and the proposed approach can achieve favorable tracking performance and it is robust with regard to uncertainties
Keywords	***Robot, Continuous sliding mode control, ANFIS, Uncertaint-ies and task space***

Paper Title	**A Framework for Efficient Matching of Large-Scale Metadata Models**
Authors	Seham Moawed, Alsayed Algergawy, Amany Sarhan, and Ali Eldosouky
Conf. or Journal Name	Arabian Journal for Science and Engineering, Springer Publisher, vol. 44, no. 4, pp. 3117-3135, 2019.
Abstract	Despite the success achieved in the metadata models matching area, large-scale matching does not preserve high match quality and efficiency at the same time. To deal with these challenges, we introduce a generic matching framework, called MetMat, to identify and discover corresponding entities across XML schemas and/or ontologies (metadata models). In particular, the proposed framework is based on a parallelized clustering-based matching approach, which first splits the original matching task into smaller independent tasks. These independent tasks are then carried out in parallel exploiting desktop platform features that are equipped with parallelism enabled multi-core processors. To this end, we develop three different parallel strategies: inter-, intra-, and hybrid-matching strategies. To obtain high quality, a set of matchers are exploited. The proposed framework is validated through an extensive set of experiments over small and large data sets. We also compared the MetMat framework to top matching tools participating in the OAEI (Ontology Alignment Evaluation Initiative) (http://oaei.ontologymatching.org/) for the last three years. The results show that the MetMat framework with the intra-parallel matching strategy outperforms other matching strategies in terms of processing time while preserving the same quality. Moreover, the tool acquires a good position through OAEI for the last three years.
Keywords	***Ontology, Matching Strategy, Meta-model.***

Paper Title	**A Hybrid Real-time remote monitoring framework with NB-WOA algorithm for patients with chronic diseases**
Authors	M. K. Hassan, A. I. El Desouky, S. M. Elghamrawy and A.M. Sarhan
Conf. or Journal Name	Future Generation Computer Systems, Elsevier, vol. 93, pp. 77-95, April 2019.
Abstract	The embracing of the Internet of Things (IoT) and Cloud Computing technologies gives excellent opportunities to develop smart healthcare services that have great prediction capabilities. This paper proposes a Hybrid Real-time Remote Monitoring (HRRM) framework, which remote-monitors patients continuously. This smart framework predicts the real health statuses of the patients in real time by using context awareness. The proposed HRRM framework innovates a Patient's Local Module (PLM) that do a convergence between IoT sensors and clouds. The HRMM transfers some of the computations to the edge of the network in (PLM) such as converting the low-level data to a higher level of abstraction to speed-up the computations in the cloud portion of the HRMM. The convergence of IoT enables the HRMM to use the enormous cloud power in storing, processing, analyzing big data, building classification models for the category of patients' health status. The local portion of the HRMM uses classification models that have been trained in the cloud to predict the health status of the patient locally in the event of internet interruption or cloud disconnection to save his life in the disconnection periods. Furthermore, this paper proposes a cloud classification technique that is capable of dealing with big imbalanced dataset by minimizing errors especially in the minority class that represents the critical situations. Finally, a hybrid algorithm of Naïve Bayes (NB) and Whale Optimization Algorithm (WOA) has been proposed to select the minimal set of features that achieve the highest accuracy. The (NB-WOA) works as a safe-failure module that decides when to stop the monitoring using HRMM in the case of the failure of influential sensors. Experiments have proved that the HRMM is capable of predicting the health status of the patients suffering from blood pressure disorders accurately. Also, it proved that NB-WOA accelerates the classification process and saves storage space.
Keywords	***Smart healthcare, Internet of Things convergence (IoT), Naïve bayes (NB), Whale optimization algorithm (WOA), Big data, Imbalanced dataset.***

Paper Title	**Development of an adaptive radial basis function neural network estimator-based continuous sliding mode control for uncertain nonlinear systems**
Authors	Nada M Moawad, Wael M Elawady, and Amany M Sarhan,
Conf. or Journal Name	ISA transactions, Elsevier, vol. 87, pp. 200-216, 2019.
Abstract	In this paper an adaptive neural network (NN)-based nonlinear controller is proposed for trajectory tracking of uncertain nonlinear systems. The adopted control algorithm combines a continuous second-order sliding mode control (CSOSMC), the radial basis function neural network (RBFNN) and the adaptive control methodology. First, a second-order sliding mode control scheme (SOSMC), which is published recently in literature for linear uncertain systems, is extended for nonlinear uncertain systems. Second, an adaptive radial basis function neural network estimator-based continuous second order sliding mode control algorithm (CSOSMC-ANNE) is adopted. In CSOSMC-ANNE control methodology, a radial basis function neural network with adaptive parameters is exploited to approximate the unknown system parameters and improve performance against perturbations. Also, the discontinuous switching control of SOSMC is supplanted with a smooth continuous control action to completely eliminate the chattering phenomenon. The convergence and global stability of the closed-loop system are proved using Lyapunov stability method. Numerical computer simulations, with dynamical model of the nonlinear inverted pendulum system, are presented to demonstrate the effectiveness and advantages of the presented control scheme.
Keywords	***Continuous sliding mode control, Nonlinear uncertain systems, Lyapunov stability, Chattering elimination, Radial basis function neural network (RBFNN) and adaptive control.***

Paper Title	**World Perception of the Latest Events in Egypt Based on Sentiment Analysis of the Guardian's Related Articles**
Authors	R Elbasiony, and W Gomaa
Conf. or Journal Name	International Conference on Advanced Machine Learning Technologies and Applications, pp. 908-917, March 2019.
Abstract	In order to infer how the world has perceived the unfolding of events in Egypt during the last eight years, we take the Guardian newspaper as a sample study to extract valuable information about the world viewpoints on the big events in Egypt during this period. We perform a sentiment analysis on all the articles in the 'World' section of the newspaper from the beginning of 2010 till the end of 2017 based on just the keyword 'Egypt'. We extracted Unigram tokens from each article and used them for making inference using three lexicons dictionaries: afinn, nrc, and bing. The results show that the general trend is slightly negative over all the selected period. Many conflicting feelings were prevalent during this period such as positive, negative, trust, fear, anger and anticipation. The results show also that years 2011 and 2013, where the world witnessed the two uprisings in Egypt, have witnessed the peaks in both positive and negative emotions.
Keywords	***Sentiment analysis, Lexicon-based Guardian afinn nrc bing***

Paper Title	**Efficient and Robust Skeleton-Based Quality Assessment and Abnormality Detection in Human Action Performance**
Authors	A Elkholy, M Hussein, W Gomaa, D Damen, and E Saba
Conf. or Journal Name	IEEE journal of biomedical and health informatics, March 2019.
Abstract	Elderly people can be provided with safer and more independent living by the early detection of abnormalities in their performing actions and the frequent assessment of the quality of their motion. Low-cost depth sensing is one of the emerging technologies that can be used for unobtrusive and inexpensive motion abnormality detection and quality assessment. In this study, we develop and evaluate vision-based methods to detect and assess neuromusculoskeletal disorders manifested in common daily activities using three-dimensional skeletal data provided by the SDK of a depth camera (e.g., MS Kinect and Asus Xtion PRO). The proposed methods are based on extracting medically -justified features to compose a simple descriptor. Thereafter, a probabilistic normalcy model is trained on normal motion patterns. For abnormality detection, a test sequence is classified as either normal or abnormal based on its likelihood, which is calculated from the trained normalcy model. For motion quality assessment, a linear regression model is built using the proposed descriptor in order to quantitatively assess the motion quality. The proposed methods were evaluated on four common daily actions—sit to stand, stand to sit, flat walk, and gait on stairs—from two datasets, a publicly released dataset and our dataset that was collected in a clinic from 32 patients suffering from different neuromusculoskeletal disorders and 11 healthy individuals. Experimental results demonstrate promising results, which is a step toward having convenient in-home automatic health care services.
Keywords	***Motion abnormality detection, motion quality assessment, computer-aided diagnosis.***

Paper Title	**WiDeep: WiFi-based Accurate and Robust Indoor Localization System using Deep Learning**
Authors	M Abbas, M Elhamshary, H Rizk, M Torki, and M Youssef
Conf. or Journal Name	Proceedings of the International Conference on Pervasive Computing and Communications (PerCom), 2019.
Abstract	Robust and accurate indoor localization has been the goal of several research efforts over the past decade. Due to the ubiquitous availability of WiFi indoors, many indoor localization systems have been proposed relying on WiFi fingerprinting. However, due to the inherent noise and instability of the wireless signals, the localization accuracy usually degrades and is not robust to dynamic changes in the environment. We present WiDeep, a deep learning-based indoor localization system that achieves a fine-grained and robust accuracy in the presence of noise. Specifically, WiDeep combines a stacked denoising autoencoders deep learning model and a probabilistic framework to handle the noise in the received WiFi signal and capture the complex relationship between the WiFi APs signals heard by the mobile phone and its location. WiDeep also introduces a number of modules to address practical challenges such as avoiding over-training and handling heterogeneous devices. We evaluate WiDeep in two testbeds of different sizes and densities of access points. The results show that it can achieve a mean localization accuracy of 2.64m and 1.21m for the larger and the smaller testbeds, respectively. This accuracy outperforms the state-of-the-art techniques in all test scenarios and is robust to heterogeneous devices.
Keywords	***WiFi, Deep learning, indoor, localization, fingerprinting.***

Paper Title	**CellinDeep: Robust and Accurate Cellular-based Indoor Localization via Deep Learning**
Authors	H Rizk, M Torki, M Youssef
Conf. or Journal Name	IEEE Sensors Journal, vol. 19, issue 6., pp. 2305 – 2312, March 2019.
Abstract	The demand for a ubiquitous and accurate indoor localization service is continuously growing. Current solutions for indoor localization usually depend on using the embedded sensors on high-end phones or provide coarse-grained accuracy. We present CellinDeep: a deep learning-based localization system that achieves fine-grained accuracy using the ubiquitous cellular technology. Specifically, CellinDeep captures the non-linear relation between the cellular signal heard by a mobile phone and its location. To do that, it leverages a deep network to model the inherent dependency between the signals of the different cell towers in the area of interest, allowing it achieve high localization accuracy. As part of the design of CellinDeep, we introduce modules to address a number of practical challenges such as handling the noise in the input wireless signal, reducing the amount of data required for the deep learning model, as avoiding over-training. Implementation of CellinDeep on different Android phones shows that it can achieve a median localization accuracy of 0.78m. This accuracy is better than the state-of-the-art indoor cellular-based systems by at least 350%. In addition, CellinDeep provides at least 93.45% savings in power compared to the WiFi-based techniques.
Keywords	***Cellular, indoor, localization, deep learning, fingerprinting.***

Paper Title	**NeuroMask: Explaining Predictions of Deep Neural Networks through Mask Learning**
Authors	M Alzantot, A Widdicombe, S Julier, and M Srivastava,
Conf. or Journal Name	IEEE International Conference on Smart Computing (SMARTCOMP), pp. 81-86, June 2019.
Abstract	Deep Neural Networks (DNNs) deliver state-of-the-art performance in many image recognition and understanding applications. However, despite their outstanding performance, these models are black-boxes and it is hard to understand how they make their decisions. Over the past few years, researchers have studied the problem of providing explanations of why DNNs predicted their results. However, existing techniques are either obtrusive, requiring changes in model training, or suffer from low output quality. In this paper, we present a novel method, NeuroMask, for generating an interpretable explanation of classification model results. When applied to image classification models, NeuroMask identifies the image parts that are most important to classifier results by applying a mask that hides/reveals different parts of the image, before feeding it back into the model. The mask values are tuned by minimizing a properly designed cost function that preserves the classification result and encourages producing an interpretable mask. Experiments using state-of-the-art Convolutional Neural Networks for image recognition on different datasets (CIFAR-10 and ImageNet) show that NeuroMask successfully localizes the parts of the input image which are most relevant to the DNN decision. By showing a visual quality comparison between NeuroMask explanations and those of other methods, we find NeuroMask to be both accurate and interpretable.
Keywords	***Neural Networks, Deep Learning, Image Recognition, Interpretability***

Paper Title	**SpyCon: Adaptation Based Spyware in Human-in-the-Loop IoT**
Authors	S Elmalaki, BJ Ho, M Alzantot, Y Shoukry, and M Srivastava
Conf. or Journal Name	IEEE Workshop on the Internet of Safe Things (SafeThings 2019), Jan. 2019.
Abstract	Personalized IoT adapt their behavior based on contextual information, such as user behavior and location. Unfortunately, the fact that personalized IoT adapt to user context opens a side-channel that leaks private information about the user. To that end, we start by studying the extent to which a malicious eavesdropper can monitor the actions taken by an IoT system and extract user's private information. In particular, we show two concrete instantiations (in the context of mobile phones and smart homes) of a new category of spyware which we refer to as Context-Aware Adaptation Based Spyware (SpyCon). Experimental evaluations show that the developed SpyCon can predict users' daily behavior with an accuracy of 90.3%. Being a new spyware with no known prior signature or behavior, traditional spyware detection that is based on code signature or system behavior are not adequate to detect SpyCon. We discuss possible detection and mitigation mechanisms that can hinder the effect of SpyCon.
Keywords	***Spyware, Privacy, IoT, Human-in-the-loop.***

Paper Title	**Value-based Information Flow Tracking for Mobile, Wearable, and IOT Sensor Devices**
Authors	SA Zonouz, G Salles-Loustau, M Srivastava, and M Alzantot
Conf. or Journal Name	Invention at Rutgers ID: 2018-012, Category: Information Technology Software, Jan. 2019.
Abstract	Mobile devices have a variety of sensors that enable a wide range of useful applications from step tracking to point of care medical services. In addition, sensors are now in automobiles, IoT and other devices. As the use of devices with sensors increase, it becomes important that information from theses sensors does not leak to outside parties. Researchers at Rutgers university and UCLA have designed a novel Information Flow Tracking (IFT) technique and software, called METRON, that implements a value-based tracking solution to detect potential data leaks from apps on mobile devices and prevent loss of information. METRON tracks data flows from a set of sources (e.g. accelerometer, GPS, or heart-rate sensor) to a set of sinks (e.g. network sockets, IPC messages, and files). When data reaches a sink, METRON detects the information flows involving tainted values. The innovative way in which METRON detects data leaks allows it to maintain the same accuracy as state of the art IFT techniques while overcoming problems that they currently face.
Keywords	

Paper Title	QoS for SDN-Based Fat-Tree Networks
Authors	H Ghalwash and CH Huang
Conf. or Journal Name	Future of Information and Communication Conference, pp. 691-705, 2019.
Abstract	Software-defined Networks (SDNs) are the new network paradigm providing, programmability, agility, and centralized management. In this paper, we show how to leverage the SDN centralized controller to improve the network utilization and the traffic performance. On top of the SDN controller, new modules are added to help finding single and multi-path routes between communicating devices. Flow rules are automatically installed into the designated switches to provide the required paths. The behavior and performance of different types of traffic, namely, UDP, TCP, VOIP, and a Big-data application traffic are investigated. The traffic forwarding is based on either the controller built in layer 2 switching "odl-l2switch" feature or single/multi-path selection based on the supplemented modules. Experimental results based on metrics such as delay, jitter and packet drops are presented for each forwarding option. The results disclosed the advantage of having the developed modules on top of the controller for all traffic types. The OpenDaylight controller for OpenFlow switches, in a fat-tree network, is used for experiments. For a fair comparison of different traffic types, a monitoring module is built on top of the controller for collecting ports statistics, analyzing and monitoring.
Keywords	***QoS, SDN, Fat-Tree, Docker, Hadoop.***

Paper Title	**Semantic Web Annotation using Deep Learning with Arabic Morphology**
Authors	S Albukhitan, A Alnazer, and T Helmy
Conf. or Journal Name	Procedia Computer Science, vol. 151, pp. 385-392, Jan. 2019.
Abstract	In order to realize the vision of Semantic Web, which is a Web of things instead of Web of documents, there is a need to convert existing Web of documents into Semantic content that could be processed by machines. Semantic annotation tool could be used to perform this task through using common and public ontologies. Due to exponential growth and the huge size of Web sources, there is a need to have a fast and automatic Semantic annotation of Web documents. The aim of this paper is to investigate the use of word embeddings from deep learning algorithms to semantically annotate the Arabic Web documents. To enhance the performance of the Semantic annotation, we utilized the complex morphological structure of Arabic words. Moreover, evaluating the performance of the proposed framework requires selecting a set of domain ontologies with relevant and annotated related documents. The proposed framework produces Semantic annotations for these documents by using different standard output formats. The initial results show a promising performance that will support the research in the Semantic Web with respect to Arabic language.
Keywords	***Deep Learning, Semantic Annotation, Arabic Language, Ontology.***

Paper Title	**Blockchain in IoT: a necessity framework for security, reliability, transparency, immutability and liability**
Authors	U Tariq, A Ibrahim, T Ahanger, Y Bouteraa, and A Elmogy
Conf. or Journal Name	IET Communications, Aug. 2019.
Abstract	Blockchain is a distributed operation and information supervision technology programmed initially for Bitcoin cryptocurrency. The awareness in Blockchain technology is rapidly growing since the notion was invented in the year 2008. The motivation for the concentration in Blockchain is its significant characteristics that deliver security, privacy, and information reliability devoid of any additional system regulating the communications, and consequently it generates fascinating research domains, specifically from the viewpoint of methodological difficulties and restrictions. This study discovers the wide-ranging Blockchain technology and studies it's perspective with respect to 'internet-of-things ' controlled nodes. A resilient prototype method has been programmed that reveals a basic system exhausting Blockchain. The outcome illustrates that the established method is functional in test-bed environment.
Keywords	***Cryptography; Data Privacy; Electronic Money; Internet; Financial Data Processing***

Paper Title	**Efficient Parallel Semi-Systolic Array Structure for Multiplication and Squaring in GF (2m)**
Authors	A Ibrahim, U Tariq, T Ahmad, A Elmogy, Y Bouteraa, and F Gebali
Conf. or Journal Name	IEICE Electronics Express, 2019.
Abstract	In this paper, we develop an efficient parallel semi-systolic array structure to concurrently compute multiplication and squaring operations in the binary extension field, GF(2m), for efficient modular exponentiations. The proposed array is well suited to VLSI implementation that it has a regular structure as well as local communications between its processing elements. The obtained results show that the proposed array structure achieves a significant reduction in area-time (AT) complexity by at least 95.9% over the corresponding existing structures.
Keywords	***Semi-Systolic Arrays, Modular Multiplication, Modular Squaring, Hardware Security, Parallel Processing.***

Paper Title	**Training of Hand Rehabilitation Using Low Cost Exoskeleton and Vision-Based Game Interface**
Authors	Y Bouteraa, IB Abdallah, and AM Elmogy
Conf. or Journal Name	Journal of Intelligent & Robotic Systems, pp. 1-17, 2019.
Abstract	Motivating game-based training have the potential to improve therapy for people with neurological impairments. In recent years, the serious games have become extremely useful tools in rehabilitation field. They aim to stimulate the mobility of the body through an immersive experience that puts the user in interactive virtual environment. This paper is concerned about developing a customized augmented reality system for stroke rehabilitation. This will be done through integrating an interactive serious game interface with a hand exoskeleton device. This game-based rehabilitation system allows users to carry out physical rehabilitation therapies using a natural user interface based on Kinect's skeletal tracking features and the electromyography (EMG) sensor. During game playing, the interactive user interface provides useful real-time feedback information such as the time required to grasp a desired dynamic virtual object, and the assigned score and thus the ability of the proposed system to provide a compensatory action regarding the dynamic behavior of the virtual target. The main goal of the developed virtual environment is to create positive influences on the rehabilitation process. Patient movement information and signals obtained from the developed exoskeleton device are used together to monitor the rehabilitation progress. The developed exoskeleton hand is a 3D printed low cost device suitable for grasping tasks that can be used even for domestic stroke patients. The developed exoskeleton device is not only a mechanical system able to perform the rehabilitation act but also it presents an effective tracking and traceability software solution. The EMG signals measured during hand motion are used to detect the intention of hand opening or closing which in turn will actuate the mechanical structure to accomplish the desired task. Parameters and results of patients' exercises are stored and analyzed when needed to evaluate patients' progress. The developed system is tested experimentally and it is able to restore the functions of the upper limb and mainly give patients more motivation to undergo the rehabilitation exercises.
Keywords	***Stroke rehabilitation, Robotic exoskeleton, 3D printing, EMG control, Kinect sensor.***

Paper Title	**Neural Network Based Brain Tumor Detection Using Wireless Infrared Imaging Sensor**
Authors	Mohamed Shakeel, Tarek E. El. Tobely, Haytham Al-Feel, Gunasekaran Manogaran, and S. Baskar
Conf. or Journal Name	IEEE Access, vol. 7, pp. 5577-5588, 2019.
Abstract	Now-a-days image processing placed an important role for recognizing various diseases such as breast, lung, and brain tumors in earlier stage for giving the appropriate treatment. Presently, most cancer diagnosis worked according to the visual examination process with effectively. Human visual reviewing of infinitesimal biopsy pictures is exceptionally tedious, subjective, and conflicting due to between and intra-onlooker varieties. In this manner, the malignancy and it's compose will be distinguished in a beginning time for finish treatment and fix. This brain tumor classification system using machine learning-based back propagation neural networks (MLBPNN) causes pathologists to enhance the exactness and proficiency in location of threat and to limit the entomb onlooker variety. Moreover, the technique may assist doctors with analyzing the picture cell by utilizing order and bunching calculations by recoloring qualities of the phones. The different picture preparing steps required for disease location from biopsy pictures incorporate procurement, upgrade, and division; include extraction, picture portrayal, characterization, and basic leadership. In this paper, MLBPNN is analyzed with the help of infra-red sensor imaging technology. Then, the computational multifaceted nature of neural distinguishing proof incredibly diminished when the entire framework is deteriorated into a few subsystems. The features are extracted using fractal dimension algorithm and then the most significant features are selected using multi fractal detection technique to reduce the complexity. This imaging sensor is integrated via wireless infrared imaging sensor which is produced to transmit the tumor warm data to a specialist clinician to screen the wellbeing condition and for helpful control of ultrasound measurements level, especially if there should arise an occurrence of elderly patients living in remote zones.
Keywords	***Wireless infrared imaging sensor, infra-red sensor, principal component analysis gray level covariance matrix, machine learning based neural networks***

Paper Title	A Green energy-efficient scheduler for cloud data centers
Authors	Mohammed Amoon, and Tarek E. El. Tobely
Conf. or Journal Name	Cluster Computing, vol. 22, pp. 3247–3259, 2019.
Abstract	Green technology or Green computing is a modern computer science field which emphasizes on reducing or improving the consumption of energy in platforms of distributed computing systems such as grid and cloud computing systems. Scheduling policy can play an essential role in reducing energy consumed in executing applications on these platforms. Most current scheduling techniques seek out to reduce response time without considering the amount of energy cost. Scheduling policy should select resources that impact over response time and energy consumed for performing tasks of customers' applications. In this publication, a scheduler to assign applications of customers to resources of data centers (DCs) in cloud computing systems with considering energy consumed and response time is proposed and evaluated. The scheduler has a scheduling algorithm that initially assigns applications to virtual resources of the DC. It also implements an algorithm for rescheduling time non-critical applications and another algorithm to deal with time critical applications. The results of simulation reveal that the proposed scheduler can considerably improve the performance in terms of energy consumption, efficiency, monetary cost, productivity and capacity.
Keywords	***Green computing, Scheduling algorithm, Energy consumed, cloud computing.***

Paper Title	**Time-varying multiplicative/additive faults compensation in both actuators and sensors simultaneously for nonlinear systems via robust sliding mode control scheme**
Authors	A. H. Tahoun
Conf. or Journal Name	Journal of the Franklin Institute, vol. 356, no. 1, pp. 103-128, 019.
Abstract	In industrial processes, faults may occur in any part of the system, such as actuators, sensors, and system components. Consideration of these uncertainties in control applications is important in research and practice. In this paper, the compensation of time-varying multiplicative/additive faults in both actuator and sensor for nonlinear systems with unknown nonlinear dynamics and disturbances is proposed. Actuator faults may result from one or more physical phenomena such as freezing or lock-in-place, float, hard-over-failure and loss of effectiveness. Also, sensor faults may result from one or more physical phenomena such as bias, drift, loss of accuracy, loss of effective-ness, and freezing. By the online estimation of upper bounds of the unknown disturbances, nonlinear dynamics, actuators and sensors faults, a descriptor-based sliding mode observer is implemented to estimate the states of the given system. The overall system stability is ensured using a robust fault tolerant with sliding mode control scheme. Two examples are studied, and simulation results are given to show the effectiveness of the proposed design method.
Keywords	***Time-Varying Multiplicative/Additive Faults, Actuator Faults, Descriptor-Based Sliding Mode Observer.***

Paper Title	**Application of fuzzy modelling and Particle Swarm Optimization to enhance lipid extraction from microalgae**
Authors	AM Nassef, H Rezk, MA Abdelkareem, A Alaswad, and A Olabi
Conf. or Journal Name	Sustainable Energy Technologies and Assessments 35, pp. 73-79, 2019.
Abstract	Lipid extraction from microalgae is maximized by defining the optimal operating conditions of the microwave pretreatment method. Using the experimental data, a robust model that describes the lipid extraction is generated using fuzzy logic. Then, the optimal extraction conditions of the lipid are determined using Particle Swarm Optimization (PSO) algorithm. Three different operating parameters influence on the recovered lipid from Microalgae. These parameters are power (W), heating time (min), and extraction time (h). Accordingly, during the optimization process, these parameters are used as a decision variables for PSO optimizer in order to maximize the recovered lipid that used as a cost function. The resulting plots demonstrated a well-fitting between the fuzzy model and the experimental data. Based on the built model, the optimization process achieved a significant increase in the lipid extraction by 22% compared to that obtained experimentally and using the ANOVA.
Keywords	***Fuzzy-modeling, Particle Swarm Optimization, Biodiesel, Microalga, Lipid extraction.***

Paper Title	**Fuzzy-modeling with Particle Swarm Optimization for enhancing the production of biodiesel from Microalga**
Authors	A. M Nassef, ET Sayed, H Rezk, MA Abdelkareem, C Rodriguez, and AG Olabi
Conf. or Journal Name	Energy Sources, Part A: Recovery, Utilization, and Environmental Effects 41 …2019
Abstract	Biodiesel is one of the promising energy sources that could replace petroleum oil in the near future. Microalgae is occupying a distinguished position among the promising sources for biodiesel production. Enhancement of the lipids production during the pretreatment is a key factor for the biodiesel production. High-pressure homogenizer is a better pretreatment procedure to enhance the lipid extraction from microalgae. In this research, a robust model of biodiesel system using fuzzy logic is built based on the experimental data for biodiesel system. Then, Particle Swarm Optimization (PSO) optimizer is applied for determining the best operating parameters of biodiesel system. The decision variables used in the optimization process are; pressure, number of passes, and reaction time that maximizes the percentage of recovery lipids of biodiesel. A comparison study was carried out between the optimized results thought PSO algorithm and those obtained by the experimental results and the optimized results through the Response Surface Methodology (RMS). Results demonstrated that using the proposed optimization methodology is significantly better than RSM, a nearly 78.7% increase in lipids extraction could be achieved according to the current model.
Keywords	***Fuzzy-modeling, modern optimization, biodiesel, Microalga, high-pressure homogenizer.***

Paper Title	**Robust hydrogen-consumption-minimization strategy based salp swarm algorithm for energy management of fuel cell/supercapacitor/batteries in highly fluctuated load condition**
Authors	A Fathy, H Rezk, AM Nassef
Conf. or Journal Name	Renewable Energy 139, 147-160, 2019
Abstract	This paper presents a hybrid power system suitable for powering electric cars, trains and aircraft especially under high fluctuated load demand. The hybrid system includes fuel cells (FC), batteries and supercapacitors (SCs). The energy management strategy (EMS) is a key factor to reduce the total hydrogen consumption and slow down the FC performance degradation. A new EMS based on a recent optimization technique named Salp Swarm Algorithm (SSA) is proposed taking into consideration that the load demand is fully satisfied within the constraints of each energy source. The main objective of the proposed strategy is to minimize the total hydrogen consumption of the system. To minimize the energy obtained from the FC, the energy supplied by the batteries and supercapacitors is maximized. The SSA is an efficient and simple optimizer that needs few numbers of control parameters to be adjusted compared to other optimization algorithms. In order to show the validity of the proposed approach, a comparative study with other conventional approaches such as classical proportional-integral control strategy, frequency decoupling, and state machine (FDSM) control approach, equivalent consumption minimization strategy (ECMS), external energy maximization strategy (EEMS), and genetic algorithm (GA) is presented. In this study, the capstones of the comparison are the total H2 consumption of the FC and the efficiency of the algorithm. The obtained results confirmed that the proposed SSA approach is superior and efficient than the other strategies.
Keywords	***Energy management strategy, Energy efficiency, Fuel cell, Hybrid system.***

Paper Title	**Maximizing SOFC performance through optimal parameters identification by modern optimization algorithms**
Authors	AM Nassef, A Fathy, ET Sayed, MA Abdelkareem, H Rezk, and WH Tanveer
Conf. or Journal Name	Renewable Energy 138, 458-464, 2019
Abstract	A modern optimization algorithm is used for maximizing the performance of solid oxide fuel cell. At first, the cell is modeled using Artificial Neural Networks based on the experimental data sets. Then, a robust, simple, and quick optimization algorithm named radial movement optimizer is used for determining the optimal operating parameters of the cell. The cell parameters used in the optimization process are anode support layer thickness, anode porosity, electrolyte thickness, and cathode interlayer thickness. The optimization obtained results are compared with the previous optimized experimental results and those obtained using genetic algorithm. Two sets of the parameters' constraints are considered during the optimization process. In the first set, the resulting optimal cell parameters are 0.5 mm, 76%, 20 μm, and 62.26 μm for anode thickness, anode porosity, electrolyte thickness, and cathode thickness respectively. Under this condition, the cell maximum power density is 1.8 W/cm2, 2.25 W/cm2 and 2.72 W/cm2 for experimentally, genetic algorithm and the proposed strategy, respectively. This implies that using the proposed method increases the power density by 33.8% and 17.28% over the experimental and genetic, respectively. In the second set, the proposed optimizer increases the maximum power by 28.85% compared with genetic optimizer.
Keywords	***SOFC, Parameter identification, Radial movement optimizer Energy efficiency*.**

Paper Title	**Fuzzy logic based-modeling and parameter optimization for improving the corrosion protection of stainless steel 304 by epoxy-graphene composite**
Authors	H Alhumade, H Rezk, AM Nassef, and M Al-Dhaifallah
Conf. or Journal Name	IEEE Access, 2019.
Abstract	Epoxy-graphene composites were fabricated and evaluated as corrosion resistance coatings on stainless steel 304 (SS304). Graphene-based composites coatings were synthesized using in situ approach at various levels of synthesis parameters, such as load of graphene, thickness of coating and mixing time between filler, and polymer resin. Corrosion resistance properties of the prepared coatings were examined using potentiodynamic polarization, where the variation in corrosion current represents the influences of synthesis parameters. Furthermore, the collected dataset was utilized to create an accurate model that simulates the corrosion resistance properties of the coatings using a fuzzy logic approach. Moreover, an optimization process was carried out to determine the optimal levels of synthesis parameters that may deliver supreme corrosion protection property. The resulting plots from fuzzy modeling demonstrated a well-fitting between the fuzzy model and the experimental data. The root-mean-squared errors (RMSEs) of the model prediction are found to be 8.1146e - 08 and 0.0084724 for training and testing, respectively. The coefficient of determination (R-squared) of the fuzzy output is found 0.99758. The application of the PSO optimizer based on the fuzzy modeling leads to a significant drop in the current density by 7.52 % over that obtained experimentally without changing the system design or the materials used.
Keywords	***Fuzzy Modeling, Optimization, Graphene, Coatings, Corrosion.***

Paper Title	**Fuzzy modeling and optimization for experimental thermophysical properties of water and ethylene glycol mixture for Al2O3 and TiO2 based nanofluids**
Authors	Z Said, MA Abdelkareem, H Rezk, and AM Nassef
Conf. or Journal Name	Powder Technology 353, 345-358, 2019
Abstract	The current study aims to enhance the performance of nanofluid mixture by determining the optimal operating parameters using particle swarm optimization. More specifically, the use of aluminum oxide (Al2O3) and titanium dioxide (TiO2) nanoparticles dispersed in distilled water and ethylene glycol with 50:50 volumetric proportions are investigated to enhance the thermophysical properties. The nanofluid properties were measured using different volume fractions (0.05 & 0.3 vol%) and a temperature ranging from (25–70 °C). The effect of surfactant on the stability and thermophysical properties of the metal oxide based nanofluids were also investigated. With the help of the experimental data sets, the nanofluid model was constructed using fuzzy logic, and then the optimal operating parameters are identified using particle swarm optimization. In the optimization procedure, three parameters; temperature, and the volume fractions of both Al2O3 and different operating parameters are used as decision variables. TiO2. The effect of these three operating parameters on the mixtures density, viscosity, and thermal conductivity is studied. Applying the proposed methodology resulted in obtaining the best condition that produces the optimal output that can minimize both the density and viscosity and at the same time maximizes the thermal conductivity.
Keywords	***Modern optimization, Nanofluid, Fuzzy logic, Thermophysical properties, Thermal conductivity.***

Paper Title	**On the modeling of dispersive transient photocurrent response of organic solar cells**
Authors	D Zhang, A Allagui, AS Elwakil, AM Nassef, H Rezk, J Cheng, and WCH Choy
Conf. or Journal Name	Organic Electronics 70, 42-47, 2019
Abstract	The current methods used for estimating the electrical parameters of organic solar cells (OSC) from time-domain measurements are based on integer-order impedance models. Meanwhile, in the frequency-domain, the adopted circuit models usually contain a constant phase element which is known to capture effectively the fractional-order dispersive behavior of these devices. Therefore, inconsistency arises between the two analyses. In this work, we derive the time-domain relaxation response of an OSC, found to follow a Mittag-Leffler function, using the same fractional-order impedance model. The classical integer-order model that results into the exponential decay of the photocurrent can be easily recovered and should be used as a valid approximation only when the dispersion coefficient is close to unity.
Keywords	***Organic solar cells, Transient photocurrent, Fractional-order modeling, Impedance spectroscopy.***

Paper Title	**Improving the environmental impact of palm kernel shell through maximizing its production of hydrogen and syngas using advanced artificial intelligence**
Authors	H Rezk, AM Nassef, A Inayat, ET Sayed, M Shahbaz, AG Olabi
Conf. or Journal Name	Science of The Total Environment 658, 1150-1160, 2019
Abstract	Fossil fuel depletion and the environmental concerns have been under discussion for energy production for many years and finding new and renewable energy sources became a must. Biomass is considered as a net zero CO_2 energy source. Gasification of biomass for H_2 and syngas production is an attractive process. The main target of this research is to improve the production of hydrogen and syngas from palm kernel shell (PKS) steam gasification through defining the optimal operating parameters' using a modern optimization algorithm. To predict the gaseous outputs, two PKS models were built using fuzzy logic based on the experimental data sets. A radial movement optimizer (RMO) was applied to determine the system's optimal operating parameters. During the optimization process, the decision variables were represented by four different operating parameters. These parameters include; temperature, particle size, CaO/biomass ratio and coal bottom ash (CBA) with their operating ranges of (650–750 °C), (0.5–1 mm), (0.5–2) and wt% (0.02–0.10), respectively. The individual and interactive effects of different combinations were investigated on the production of H_2 and syngas yield. The optimized results were compared with experimental data and results obtained from Response Surface Methodology (RSM) reported in literature. The obtained optimal values of the operating parameters through RMO were found 722 °C, 0.92 mm, 1.72 and 0.06 wt% for the temperature, particle size, CaO/biomass ratio and coal bottom ash, respectively. The results showed that syngas production was significantly improved as it reached 65.44 vol% which was better than that obtained in earlier studies.
Keywords	***Fuzzy logic, PKS, H2, Optimization, Biomass, Gasification.***

Paper Title	**Identifying optimal operating conditions of solar-driven silica gel based adsorption desalination cooling system via modern optimization**
Authors	H Rezk, AS Alsaman, M Al-Dhaifallah, AA Askalany, and MA Abdelkareem
Conf. or Journal Name	Solar Energy 181, 475-489, 2019
Abstract	The target of this study is to maximize the performance of solar-driven adsorption desalination cooling (SADC) system by defining the optimal operating conditions using a modern optimization algorithm. A mathematical model for the SADC system employing silica gel has been proposed. Then, a robust, simple, and quick optimization algorithm named radial movement optimizer is applied for determining the best operating parameters of the SADC system. The SADC's decision variables used in the optimization process are cycle time, hot water inlet temperature, cooling water inlet temperature, and flow rate. The performance of the SADC system is evaluated concerning the specific daily water production (SDWP), the coefficient of performance (COP) and specific cooling power (SCP). The optimization process results are compared with their corresponding experimental results. Several sets of the parameters' constraints that represent different conditions are considered during the optimization process. A 70% increase in SDWP and SCP is achieved by using the optimal operating conditions with no change in the system design or the used materials. An amount of 6.9 m3/day/ton desalinated water, 191 W/kg cooling capacity and 0.961 COP are demonstrated as the possible outputs of the proposed SADC system. This research shows the validity of this optimization technique in exploring all possibilities and showing the best-operating conditions of the SADC system.
Keywords	***Adsorption, Optimization, Water desalination, Cooling, Solar energy, Renewable energy.***

Paper Title	**Communication—Convolution-Based Estimation of Supercapacitor Parameters under Periodic Voltage Excitations**
Authors	ME Fouda, AS Elwakil, A Allagui, H Rezk, and AM Nassef
Conf. or Journal Name	Journal of The Electrochemical Society 166 (10), A2267-A2269, 2019.
Abstract	Supercapacitors are typically used in applications requiring frequent and continuous charging/discharging cycles, but most of the models available in the literature are designed to predict their behavior for a single sequence. In this letter, we show first that the electrical response and metrics of supercapacitors under periodic voltage excitations can generally be obtained using Fourier series analysis and convolution operations of functions derived based on any suitable impedance model. We verified our analysis procedure with simulations using particle swarm optimization, and experiments conducted on a commercial device subject to all-positive triangular wave excitations as a case study.
Keywords	***Supercapacitors, Constant phase element, Convolution, Fourier series.***

Paper Title	**Efficient Checkpointing with Recompute Scheme for Non-volatile Main Memory**
Authors	M Alshboul, H Elnawawy, R Elkhouly, K Kimura, J Tuck, and Y Solihin
Conf. or Journal Name	ACM Transactions on Architecture and Code Optimization (TACO), Vol. 16, No. 2, May 2019.
Abstract	Future main memory will likely include Non-Volatile Memory. Non-Volatile Main Memory (NVMM) provides an opportunity to rethink checkpointing strategies for providing failure safety to applications. While there are many checkpointing and logging schemes in the literature, their use must be revisited as they incur high execution time overheads as well as a large number of additional writes to NVMM, which may significantly impact write endurance. In this article, we propose a novel recompute-based failure safety approach and demonstrate its applicability to loop-based code. Rather than keeping a fully consistent logging state, we only log enough state to enable recomputation. Upon a failure, our approach recovers to a consistent state by determining which parts of the computation were not completed and recomputing them. Effectively, our approach removes the need to keep checkpoints or logs, thus reducing execution time overheads and improving NVMM write endurance at the expense of more complex recovery. We compare our new approach against logging and checkpointing on five scientific workloads, including tiled matrix multiplication, on a computer system model that was built on gem5 and supports Intel PMEM instruction extensions. For tiled matrix multiplication, our recompute approach incurs an execution time overhead of only 5%, in contrast to 8% overhead with logging and 207% overhead with checkpointing. Furthermore, recompute only adds 7% additional NVMM writes, compared to 111% with logging and 330% with checkpointing. We also conduct experiments on real hardware, allowing us to run our workloads to completion while varying the number of threads used for computation. These experiments substantiate our simulation-based observations and provide a sensitivity study and performance comparison between the Recompute Scheme and Naive Checkpointing.
Keywords	***Checkpointing, Recompute Scheme and Naive Checkpointing, Non-Volatile Memory.***

Paper Title	**An Energy-Efficient Sleep/Wake-up Routing Protocol for Wireless Sensor Networks**
Authors	Dina El-Feky, Nada El-shennawy, and Mahmoud Fahmy
Conf. or Journal Name	Engineering Research Journal, Tanta University, vol. 3, pp. 25-30, Sept. 2019.
Abstract	In recent years, wireless sensor networks (WSNs) have a rapid development and they take a lot of research attention because of their wide-range applications. A WSN consists of a large number of distributed sensor nodes. These nodes are often deployed in remote or hostile areas to monitor physical or environmental conditions where they send this data to a main location. The most critical parameter in WSNs is network lifetime, so an efficient routing protocol is essential to reduce the energy consumption and to increase the network lifetime. This paper proposes an energy-efficient chain-based cooperative routing protocol based on node sleep/wake-up mechanism for WSNs. We compare this protocol with two efficient protocols; LEACH and CBCCP using MATLAB. Simulation results show that the proposed algorithm achieves better performance and conserves more energy than the other two protocols. Keywords—
Keywords	***Wireless sensor networks, Clustering, Energy consumption, sensing coverage.***

Paper Title	Energy efficient scheduling in local area networks
Authors	M Hisham, A Elmogy, A Sarhan, and A Sallam
Conf. or Journal Name	Wireless Networks, Springer, pp. 1-14, Nov. 2019.
Abstract	In Wireless Local Area Networks (WLAN), portable devices such as notebooks, tabs, and smart phones are powered by batteries with limited energy. With the great increase of using such portable devices, energy efficiency becomes one of the most important issues in wireless networks that are based on IEEE 802.11b standard. Although, IEEE 802.11b standard enables devices with limited batteries' capacity to send and receive more data, it is not suitable for high load networks. In high load networks, Access Point (AP) cannot immediately deliver buffered packets to portable devices which leads to batteries' drain as devices have to stay in active state for long time. Towards solving this great issue, an energy efficient downlink scheduling algorithm for WLAN is presented in this paper. The proposed scheduler aims to reduce the probability of medium contention and waiting time during the reception of buffered data packets from the AP without affecting the quality of service performance. The presented scheduler proposes a time slotted scheme to enhance the Power Saving Mode of IEEE 802.11b standard. The proposed approach is validated analytically and experimentally. Qualnet network simulator is used for this purpose. Promising results are obtained compared to legacy IEEE 802.11 protocol, and the Shortest Job First scheduler protocol in terms of energy saving, and throughput.
Keywords	***WLAN, Downlink scheduling, IEEE 802.11 protocol, Shortest Job First, Power Save mode.***

Paper Title	**Quadratic Proportional Fair Scheduling Algorithm for LTE-A Networks**
Authors	Nada M. Elshennawy
Conf. or Journal Name	International Journal of Engineering Research and Technology, Vol. 12, No. 11, pp. 1957-1963, 2019.
Abstract	In recent years, LTE-Advanced (LTE-A) networks can be classified as the most viable wireless broadband technology. LTE-A supports Quality of Service (QoS) by using Admission Control (AC) and Packet Scheduling (PS). Quality of Service (QoS) has many requirements, such as average throughput, fairness, used energy per bit and spectral efficiency. To efficiently improve the network performance, we should pick a powerful and faired scheduling algorithm. One of the most used scheduling algorithms in LTE-A is Proportional Fair (PF). In this paper, a quadratic proportional fairness algorithm is proposed, by using the root mean square value to compute the average throughput. The proposed algorithm is implemented and evaluated using the Vienna system level simulator with various numbers of users and users speed. It is also compared with the original PF and some of its modifications. The results reveal that, the proposed algorithm exceeds the other algorithms in terms of Average UE throughput, Average cell throughput, spectral efficiency, and average used energy per bit. However, PF-Geometric Mean Method has the best average edge throughput value and the PF has the best fairness value.
Keywords	***Long Term Evolution-Advanced (LTE-A), Proportional Fair (PF), Quality of Service (QoS), Root Mean Square value, Uplink Packet Scheduler (PS)***

Paper Title	**A Survey on Human Activity Recognition Based on Temporal Signals of Portable Inertial Sensors**
Authors	R Elbasiony, and W Gomaa
Conf. or Journal Name	A Survey on Human Activity Recognition Based on Temporal Signals of Portable Inertial Sensors," International Conference on Advanced Machine Learning Technologies and Applications, pp. 734-745, Springer, 2019.
Abstract	In recent years, automatic human activity recognition has drawn much attention. On one hand, this is due to the rapid proliferation and cost degradation of a wide variety of sensing hardware, which resulted in the tremendous explosion of activity data. On the other hand there are urgent growing and pressing demands from many application areas such as: in-home health monitoring especially for the elderly, smart cities, safe driving by monitoring and predicting driver's behavior, healthcare applications, entertainment, assessment of therapy, performance evaluation in sports, etc. In this paper, we introduce a detailed survey on multiple human activity recognition (HAR) systems which use portable inertial sensors (Accelerometer, Magnetometer, and Gyro), where the sensor's produced temporal signals are used for modeling and recognition of different human activities based on various machine learning techniques.
Keywords	***Human activity recognition, Machine learning, Inertial measurement unit, Accelerometer, Gyroscope.***

Paper Title	**Unsupervised GEI-Based Gait Disorders Detection from Different Views**
Authors	Amr Elkholy, Yasushi Makihara, Walid Gomaa, Md Atiqur Rahman Ahad, and Yasushi Yagi
Conf. or Journal Name	41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), pp. 5423-5426, 2019.
Abstract	Early detection of gait disorders may provide a safer living for elderly people. In this paper, we propose an automatic method for detecting gait disorders using RGB or RGBD camera (e.g., MS Kinect, Asus Xtion PRO). We use Gait Energy Image (GEI) as our main feature that can be computed from different views. Our method depends on computing GEI, learning the representative features from the GEI using convolutional autoencoder, and using anomaly detection method for detecting abnormal gait. We applied the proposed method on two different public datasets that include normal and abnormal gait from different views. Experimental results show that our method achieves high accuracy in detecting different gait disorders from different views, which makes it general to be applied to home environment and adds a step towards convenient in-home automatic health care services.
Keywords	***Feature extraction, Legged locomotion, Anomaly detection, Computational modeling, Data models, Convolutional codes, Vegetation***

Paper Title	**Effectiveness of Data Augmentation in Cellular-based Localization Using Deep Learning**
Authors	H Rizk, A Shokry, and M Youssef
Conf. or Journal Name	IEEE Wireless Communications and Networking Conference, 2019.
Abstract	Recently, deep learning-based positioning systems have gained attention due to their higher performance relative to traditional methods. However, obtaining the expected performance of deep learning-based systems requires large amounts of data to train model. Obtaining this data is usually a tedious process which hinders the utilization of such deep learning approaches. In this paper, we introduce a number of techniques for addressing the data collection problem for deep learning-based cellular localization systems. The basic idea is to generate synthetic data that reflects the typical pattern of the wireless data as observed from a small collected dataset. Evaluation of the proposed data augmentation techniques using different Android phones in a cellular localization case study shows that we can enhance the performance of the localization systems in both indoor and outdoor scenarios by 157% and 50.5%, respectively. This highlights the promise of the proposed techniques for enabling deep learning-based localization systems.
Keywords	

Paper Title	**Increasing Coverage of Indoor Localization Systems for EEE112 Support**
Authors	H Rizk, and M Youssef
Conf. or Journal Name	2nd MENA Regional International Telecommunication Society Conference (ITS'2019), 2019.
Abstract	Among many techniques for indoor localization, fingerprinting has been shown to provide a higher accuracy compared to the alternative techniques. Fingerprinting techniques require an initial calibration phase during which site surveyors visit virtually every location in the area of interest to manually collect the fingerprint data. However, this process is labour intensive, tedious, and needs to be repeated with any change in the environment. In this work, we propose a technique for enhancing cellular-based indoor localization fingerprinting systems by automatically increasing the spatial density of the reference points. This can be achieved by generating synthetic measurements for virtually all points in the environment to cover inaccessible places.
Keywords	

Paper Title	**Device-Invariant Cellular-Based Indoor Localization System Using Deep Learning**
Authors	H Rizk
Conf. or Journal Name	17th ACM International Conference on Mobile Systems, Applications, and Services (MobiSys'19), 2019.
Abstract	The demand for a ubiquitous and accurate indoor localization service is continuously growing. Cellular-based systems, by definition, have been shown to be a perfect selection to provide a ubiquitous localization service. The main barrier towards achieving this goal is the heterogeneity of the many different types and models of cell phones which result in variations of the measured received signal strength (RSS) even from the same location at the same time. This is particular to fingerprinting-based localization where different types of phones may be used between the system training and tracking times. The performance of the current cellular-based solutions drops significantly. In this paper, we propose a deep learning-based system that leverages cellular measurements from training devices to provide consistent, fine-grained performance across unseen tracking phones with milliwatts of power consumption. The proposed system incorporates different components to extract the device-invariant features and improve the deep model's generalization and robustness, achieving device-transparent operation. Evaluation of the proposed system in a realistic testbed using three different Android phones with different form factors and sensing capability shows that it can achieve a consistent localization accuracy. This is better than the state-of-the-art indoor cellularbased systems by at least 65%. Our experiments show the promise of this method, yielding maximum median error typically within only 0.39 meter of training and testing with the same phone.
Keywords	

Paper Title	**SoloCell: Efficient Indoor Localization Based on Limited Cell Network Information And Minimal Fingerprinting**
Authors	H Rizk
Conf. or Journal Name	27th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL 2019), 2019.
Abstract	The demand for a ubiquitous and accurate indoor localization service is continuously growing. Despite the pervasive nature of cellular-based solutions, their localization quality depends on the number of cell towers provided by the phone. According to the standard, any cell phone can receive signal strength information from up to seven cell towers. However, the majority of cell phones usually return only the associated cell tower information, significantly limiting the amount of information available to the location determination algorithm. In this paper, we present SoloCell: a novel deep learning-based indoor localization system that utilizes the signal strength history from only the associated cell tower to achieve a fine-grained localization. SoloCell incorporates different modules that lessen the data collection effort and improve the deep model's robustness against noise. Evaluation using different Android phones shows that SoloCell can track the user with a median localization error of 0.95m This accuracy demonstrates the superiority of SoloCell compared to the state-of-the-art systems by at least 210%.
Keywords	

Paper Title	**MonoDCell: A Ubiquitous and Low-Overhead Deep Learning-based Indoor Localization with Limited Cellular Information**
Authors	H Rizk, and M Youssef
Conf. or Journal Name	27th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL 2019), 2019.
Abstract	The demand for a ubiquitous and accurate indoor localization service is continuously growing. Despite the pervasive nature of cellular-based solutions, their localization quality depends on the number of cell towers provided by the phone, which is typically limited. Specifically, according to the standard, any cell phone can receive signal strength information from up to seven cell towers. However, the majority of cell phones usually return only the associated cell tower information, significantly limiting the amount of information available to the location determination algorithm, degrading its performance. In this paper, we present MonoDCell: a novel cellular-based indoor localization system based on a deep long short-term memory (LSTM) network. The system utilizes the signal strength history from only the associated cell tower to achieve a fine-grained localization. MonoDCell incorporates different modules that lessen the data collection effort and improve the deep model's generalization and robustness against noise. We deployed MonoDCell using different Android devices in two realistic testbeds of different sizes. Evaluation results show that it can track the user with median location error of 0.95m and 1.42m in the smaller and the larger testbeds, respectively. This accuracy demonstrates the superiority of MonoDCell compared to the state-of-the-art systems by at least 202% in both testbeds considered. This highlights the promise of MonoDCell as an accurate and ubiquitous localization system.
Keywords	

Paper Title	**Genattack: Practical black-box attacks with gradient-free optimization**
Authors	M Alzantot, Y Sharma, S Chakraborty, H Zhang, CJ Hsieh, and MB Srivastava
Conf. or Journal Name	Proceedings of the Genetic and Evolutionary Computation Conference, 1pp. 111-1119, 2019.
Abstract	Deep neural networks are vulnerable to adversarial examples, even in the black-box setting, where the attacker is restricted solely to query access. Existing black-box approaches to generating adversarial examples typically require a significant number of queries, either for training a substitute network or performing gradient estimation. We introduce GenAttack, a gradient-free optimization technique that uses genetic algorithms for synthesizing adversarial examples in the black-box setting. Our experiments on different datasets (MNIST, CIFAR-10, and ImageNet) show that GenAttack can successfully generate visually imperceptible adversarial examples against state-of-the-art image recognition models with orders of magnitude fewer queries than previous approaches. Against MNIST and CIFAR-10 models, GenAttack required roughly 2,126 and 2,568 times fewer queries respectively, than ZOO, the prior state-of-the-art black-box attack. In order to scale up the attack to large-scale high-dimensional ImageNet models, we perform a series of optimizations that further improve the query efficiency of our attack leading to 237 times fewer queries against the Inception-v3 model than ZOO. Furthermore, we show that GenAttack can successfully attack some state-of-the-art ImageNet defenses, including ensemble adversarial training and non-differentiable or randomized input transformations. Our results suggest that evolutionary algorithms open up a promising area of research into effective black-box attacks.
Keywords	***Deep neural networks, black-box setting, genetic algorithms.***

Paper Title	**NeuronInspect: Detecting Backdoors in Neural Networks via Output Explanations**
Authors	X Huang, M Alzantot, and M Srivastava
Conf. or Journal Name	Cornell University archives, Cryptography and Security, 2019.
Abstract	Deep neural networks have achieved state-of-the-art performance on various tasks. However, lack of interpretability and transparency makes it easier for malicious attackers to inject trojan backdoor into the neural networks, which will make the model behave abnormally when a backdoor sample with a specific trigger is input. In this paper, we propose NeuronInspect, a framework to detect trojan backdoors in deep neural networks via output explanation techniques. NeuronInspect first identifies the existence of backdoor attack targets by generating the explanation heatmap of the output layer. We observe that generated heatmaps from clean and backdoored models have different characteristics. Therefore we extract features that measure the attributes of explanations from an attacked model namely: sparse, smooth and persistent. We combine these features and use outlier detection to figure out the outliers, which is the set of attack targets. We demonstrate the effectiveness and efficiency of NeuronInspect on MNIST digit recognition dataset and GTSRB traffic sign recognition dataset. We extensively evaluate NeuronInspect on different attack scenarios and prove better robustness and effectiveness over state-of-the-art trojan backdoor detection techniques Neural Cleanse by a great margin.
Keywords	***Deep neural networks, backdoor attack, malicious attackers.***

Paper Title	**Semantic Web Annotation using Deep Learning with Arabic Morphology**
Authors	S Albukhitan, A Alnazer, and T Helmy
Conf. or Journal Name	Procedia Computer Science 151, 385-392, 2019.
Abstract	In order to realize the vision of Semantic Web, which is a Web of things instead of Web of documents, there is a need to convert existing Web of documents into Semantic content that could be processed by machines. Semantic annotation tool could be used to perform this task through using common and public ontologies. Due to exponential growth and the huge size of Web sources, there is a need to have a fast and automatic Semantic annotation of Web documents. The aim of this paper is to investigate the use of word embeddings from deep learning algorithms to semantically annotate the Arabic Web documents. To enhance the performance of the Semantic annotation, we utilized the complex morphological structure of Arabic words. Moreover, evaluating the performance of the proposed framework requires selecting a set of domain ontologies with relevant and annotated related documents. The proposed framework produces Semantic annotations for these documents by using different standard output formats. The initial results show a promising performance that will support the research in the Semantic Web with respect to Arabic language.
Keywords	***Deep Learning, Semantic Annotation, Arabic Language, Ontology.***

Paper Title	**Bone Cancer Detection Using Particle Swarm Extreme Learning Machine Neural Networks**
Authors	Magdy Abdelaal, and Tarek E. EL.Tobely
Conf. or Journal Name	Journal of Medical Imaging and Health Informatics, American Scientific Publishers, Vol. 9, No. 3, pp. 508-513, March 2019.
Abstract	Bone cancer is a malignant tumor that affects the healthiest tissues in the bone. Bone cancer is identified by swelling, bone weakness risk factors, lumps in the affected area, fever, chills, and night sweat symptoms. Despite the fact that bone cancer produces significant symptoms, it is difficult to predict in beginning stages because of the low priority of its symptoms. Several optimization techniques, such as medical image analysis and machine learning techniques, have been utilized to detect the initial stages of bone cancer. These methods sometimes fail to accurately predict bone cancer because of the error rate and complexity of the tissue structure. In this work, we introduce particle swarm optimized extreme learning neural networks for effectively predicting bone cancer. Initially, X-ray images are gathered from the oral cancer database, that must be examined noise to eliminate with the assistance of a non-local median filter. Then, the cancer affected region is segmented with the help of an enhanced multi-scale segmentation algorithm, and features are extracted from the identified region. The extracted features are classified using Particle Swarm based Extreme Learning Neural Networks Classifier. The introduced technique is superior to the current known classifier and could 98.2% accuracy which is obtained from MATLAB based experimental results.
Keywords	***Bone Cancer; Image Processing; Learning Machine Neural Networks; Machine Learning; Particle Swarm.***

Paper Title	**An Effective Energy Management Strategy Based on Mine-Blast Optimization Technique Applied to Hybrid PEMFC/Supercapacitor/Batteries System**
Authors	AM Nassef, A Fathy, and H Rezk
Conf. or Journal Name	Energies 12 (19), 3796, 2019.
Abstract	An effective energy management strategy based on the mine-blast optimization (MBA) technique was proposed in this paper to optimally manage the energy in a hybrid power system. The hybrid system was composed of fuel cells, batteries, and supercapacitors. Such system was employed to supply highly fluctuated load. The results of the proposed strategy were compared with previously employed strategies such as fuzzy logic control (FLC), state machine control strategy (SMCS), and equivalent fuel consumption minimization strategy (ECMS). The comparison was carried out in terms of the hydrogen fuel economy and the overall efficiency as the key factors. The resulting responses of the proposed MBA-based management strategy indicate that its performance is the best among the other strategies of SMCS, FLC, and ECMS in both the hydrogen fuel economy and overall efficiency.
Keywords	***Energy Management; Energy Efficiency; PEMFC; Supercapacitor; Mine-Blast Optimization.***

Paper Title	**Dataset on fuzzy logic based-modelling and optimization of thermophysical properties of nanofluid mixture**
Authors	Z Said, MA Abdelkareem, H Rezk, and AM Nassef
Conf. or Journal Name	Data in Brief 26, 104547, 2019.
Abstract	This article presents the dataset generated during the process of enhancing the thermophysical properties of nanofluid mixture through fuzzy logic based-modelling and particle swarm optimization (PSO) algorithm. The details of fuzzy model and optimization phases were discussed in our work entitled "Fuzzy modeling and optimization for experimental thermophysical properties of water and ethylene glycol mixture for Al2O3 and TiO2 based nanofluids" (Said et al., 2019). In (Said et al., 2019), the detail of the numerical data has not been clearly presented. However, in this article the inputs' data values for the density, viscosity, and thermal conductivity, used for training and testing of the fuzzy model, have been mentioned which is very essential if the model has to be rebuilt again. Furthermore, the resulting data variation of the cost function for the 100 runs during the optimization process that had not been presented in (Said et al., 2019) is presented in this work. These data sets can be used as references to analyze the data resulting from any other optimization technique. The datasets are provided in the supplementary materials in Tables 1–4
Keywords	***Thermophysical, Fuzzy Model, Ethylene Glycol Mixture.***

Paper Title	**Comparison among various energy management strategies for reducing hydrogen consumption in a hybrid fuel cell/supercapacitor/battery system**
Authors	H Rezk, AM Nassef, MA Abdelkareem, AH Alami, and A Fathy
Conf. or Journal Name	International Journal of Hydrogen Energy, 2019.
Abstract	These strategies are utilized to manage the energy demand response of hybrid systems, in an optimal way, under highly fluctuating load condition. Two novel strategies based on salp swarm algorithm (SSA) and mine-blast optimization are proposed. The outcomes of these strategies are compared with commonly used strategies like fuzzy logic control, classical proportional integral control, the state machine, equivalent fuel consumption minimization, maximization, external energy maximization, and equivalent consumption minimization. Hydrogen fuel economy and overall efficiency are used for the comparison of these different strategies. Results demonstrate that the proposed SSA management strategy performed best compared with all other used strategies in terms of hydrogen fuel economy and overall efficiency. The minimum consumed hydrogen and maximum efficiency are found 19.4 gm and 85.61%, respectively.
Keywords	***Energy management, Optimization, Fuel cell, Supercapacitor Battery, Hydrogen consumption***

Paper Title	Compiler-support for Critical Data Persistence in NVM
Authors	R Elkhouly, M Alshboul, A Hayashi, Y Solihin, and K Kimura
Conf. or Journal Name	ACM Transactions on Architecture and Code Optimization (TACO) 16 (Issue 4), 2019.
Abstract	Non-volatile Main Memories (NVMs) offer a promising way to preserve data persistence and enable computation recovery in case of failure. While the use of NVMs can significantly reduce the overhead of failure recovery, which is the case with High-Performance Computing (HPC) kernels, rewriting existing programs or writing new applications for NVMs is non-trivial. In this article, we present a compiler-support that automatically inserts complex instructions into kernels to achieve NVM data-persistence based on a simple programmer directive. Unlike checkpointing techniques that store the whole system state, our technique only persists user-designated objects as well as some parameters required for safe recovery such as loop induction variables. Also, our technique can reduce the number of data transfer operations, because our compiler coalesces consecutive memory-persisting operations into a single memory transaction per cache line when possible. Our compiler-support is implemented in the LLVM tool-chain and introduces the necessary modifications to loop-intensive computational kernels (e.g., TMM, LU, Gauss, and FFT) to force data persistence. The experiments show that our proposed compiler-support outperforms the most recent checkpointing techniques while its performance overheads are insignificant.
Keywords	***Non-volatile Main Memories, checkpointing, memory-persisting***