

Computer and Control Department

# Book of Abstracts

Published Papers 2017

17

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<b>Paper Title</b>	Context-based web service discovery framework with QoS considerations
<b>Authors</b>	Sara Samir, Amany Sarhan, Alsayed Algergawy
<b>Conf. or Journal Name</b>	Research Challenges in Information Science (RCIS), 2017 11th International Conference on IEEE
<b>Abstract</b>	<p>Hiking a relevant web service in the current environment full of various options is similar to looking for a needle in a haystack. The best possible web service is the one that completely fulfills the required functions while satisfying the QoS requested by a user. In this paper, we introduce a new context-based solution based on QoS (Quality of Service) exploiting both functional and non-functional user's requirements and providing the user ability to control and proceed the discovery of web services, i.e. the main aim of this work is to locate the appropriate web service correspondence with the context of the user. To this end, we present a two-stage web service discovery framework. The first stage is a functional matching approach that assesses the similarity across given sets of web services and provides relevant services according to the functional requirements of the user. After that and based on non-functional requirements representing the user's contexts and contexts of relevant services produced from the first stage, we compute the similarity degree between the contextual information of both of them. Based on the computed similarity, we return a set of recommended services that fulfill both functional and non-functional requirements according to user needs. To validate the proposed approach, a real dataset is used and the results show that our proposed approach can accurately provide services that a user needs.</p>
<b>Keywords</b>	Web service, Web service discovery, Functional matching, Non-functional matching

<b>Paper Title</b>	Accelerating relational database operations using both CPU and GPU co-processor
<b>Authors</b>	Esraa Shehab, Alsayed Algergawy, Amany Sarhan
<b>Conf. or Journal Name</b>	Computers & Electrical Engineering
<b>Abstract</b>	Data is evolving and the number of existing data sources is vastly growing. Therefore, there is a compelling need for effective techniques to store, retrieve and process such massive data. Significant speed-ups at a small cost can be achieved by deploying co-processors such as GPUs. To this end, in this paper, we propose a new hybrid query processing technique that makes use of the capabilities of CPUs and GPUs. The proposed approach breaks down each SQL statement into smaller parts during the parsing process. It then automatically manages the distribution of different query parts to be executed either on the CPU or parallel on the GPU and CPU. To achieve this, we developed and implemented the proposed approach on a SQL server database using the .Net framework instead of working under the Linux environment. The performance of the proposed approach is validated using different workloads and the results demonstrate that the proposed GPU-based query processor achieved speedup up to 39 as fast as multi-core CPUs.
<b>Keywords</b>	GPU, Query processing, CPU co-processor, CUDA

<b>Paper Title</b>	Optimized Hardware Implementation of Enhanced TRIPLE-DES using Cluster LUT and Pipelining on SPARTEN FPGA
<b>Authors</b>	Amany Sarhan, Marwa Fayez, Noha Hussen
<b>Conf. or Journal Name</b>	International Journal of Computer Applications
<b>Abstract</b>	<p>Due to the rapid use of Internet technology, a need for security mechanisms has appeared to protect the information. Cryptography is one of the most effective techniques used to protect and secure information. Triple Data encryption standard is a cryptography system that provides security in the commercial enterprise. A lot of research has been made over DES and Triple DES algorithms to enhance their performance.</p> <p>In this paper, an Enhanced Triple-DES Algorithm based on Cluster LUT (Look Up Table) and Pipelining (ETDCP) is proposed, as a modification of the Triple DES. ETDCP algorithm uses Cluster LUT in hardware implementation and uses the large embedded memories available in the SPARTAN-E FPGA as hardware designed to obtain the minimum utilized resource. Using cluster LUT diminishes the consumption power by reducing the number of registers and slice/area, which decreases the number of logic utilizations used for Spartan Xilinx FPGA. In addition, ETDCP uses pipelining techniques which will increase the processing rate.</p> <p>The experimental results are based on simulated and synthesized (Xilinx Spartan-E) using ModelSim 6.5 and VHDL code. The results show high throughput/area FPGA implementation. The simulation result also proves that the proposed FPGA implementation of ETDCP algorithm has better speed performance compared to previous implementations of cryptographic algorithms.</p>
<b>Keywords</b>	Cryptography, DES, FPGA, Spartan -E, Custer LUT, Pipelining

<b>Paper Title</b>	Prediction of non-hydrocarbon gas components in separator by using Hybrid Computational Intelligence models
<b>Authors</b>	Tarek Helmy, Muhammad Imtiaz Hossain, Abdulazeez Abdulraheem, SM Rahman, Md Rafiul Hassan, Amar Khoukhi, Moustafa Elshafei
<b>Conf. or Journal Name</b>	Neural Computing and Applications journal, Springer London 2017
<b>Abstract</b>	<p>Accurate prediction of non-hydrocarbon (Non-HC) gas components in the gas-oil separators reduces the cost of gas and oil production in petroleum engineering. However, this task is difficult because there is no known relation among the properties of crude oil and the separators. There are studies that attempt to predict hydrocarbons (HCs) components using either Computational Intelligence (CI) techniques or conventional techniques like Equitation-of-State (EOS) and Empirical Correlation (EC). In this paper, we explore the applicability of CI techniques such as Artificial Neural Network, Support Vector Regressions, and Adaptive Neuro-Fuzzy Inference System to predict the Non-HC gas components in gas-oil separator tank. Further, we incorporate Genetic Algorithms (GA) into the Hybrid Computational Intelligence (HCI) models to enhance the accuracy of prediction. GA is used to determine the most favorable values of the tuning parameters in the CI models. The performances of the CI and HCI models are compared with the performance of the conventional techniques like EOS and EC. The experimental results show that accuracy of prediction by CI and HCI models outperform the conventional methods for N<sub>2</sub> and H<sub>2</sub>S gas components. Furthermore, the HCI models perform better than the non-optimized CI models while predicting the Non-HC gas components.</p>
<b>Keywords</b>	Non-HC gas components prediction Artificial Neural Network Support Vector Regression Adaptive Neuro-Fuzzy System Hybrid Computational Intelligence Genetic Algorithms



<b>Paper Title</b>	Evaluation of lesion flow coefficient for the detection of coronary artery disease in patient groups from two academic medical centers
<b>Authors</b>	Srikara V Peelukhana, Rupak Banerjee, Tim P van de Hoef, Kranthi K Kolli, Mohamed Effat, Tarek Helmy, Massoud Leesar, Hanan Kerr, Jan J Piek, Paul Succop, Lloyd Back, Imran Arif
<b>Conf. or Journal Name</b>	Cardiovascular Revascularization Medicine journal ,Elsevier
<b>Abstract</b>	<p><b>Background</b></p> <p>In this study, lesion flow coefficient (LFC: ratio of % area stenosis [%AS] to the square root of the ratio of the pressure drop across the stenosis to the dynamic pressure in the throat region), that combines both the anatomical (%AS) and functional measurements (pressure and flow), was assessed for application in a clinical setting.</p> <p><b>Methods and Results</b></p> <p>Pressure, flow, and anatomical values were obtained from patients in 251 vessels from two different centers. Fractional flow reserve (FFR), Coronary flow reserve (CFR), hyperemic stenosis resistance index (HSR) and hyperemic microvascular index (HMR) were calculated. Anatomical data was corrected for the presence of guidewire and the LFC values were calculated. LFC was correlated with FFR, CFR, HSR, HMR, individually and in combination with %AS. The <math>p &lt; 0.05</math> was used for statistical significance.</p> <p>LFC correlated significantly when the FFR (pressure-based), CFR (flow-based), and anatomical measure %AS were combined (<math>r = 0.64</math>; <math>p &lt; 0.05</math>). Similarly, LFC correlated significantly when HSR, HMR, and %AS were combined (<math>r = 0.72</math>; <math>p &lt; 0.05</math>). LFC was able to significantly (<math>p &lt; 0.05</math>) distinguish between the two concordant and the two discordant groups of FFR and CFR, corresponding to the clinically used cut-off values (FFR = 0.80 and CFR = 2.0). The LFC could also significantly (<math>p &lt; 0.05</math>) distinguish between the normal and abnormal microvasculature conditions in the presence of non-significant epicardial stenosis, while the comparison was borderline significant (<math>p = 0.09</math>) in the presence of significant stenosis.</p> <p><b>Conclusion</b></p> <p>LFC, a parameter that combines both the anatomical and functional end-points, has the potential for application in a clinical setting for CAD evaluation.</p>
<b>Keywords</b>	Coronary Physiology- Fractional Flow Reserve- Lesion Flow Coefficient- Fluid dynamics

<b>Paper Title</b>	Arabic ontology learning using deep learning
<b>Authors</b>	Saeed Albukhitan, Tarek Helmy, Ahmed Alnazer
<b>Conf. or Journal Name</b>	Proceedings of the International Conference on Web Intelligence Conference
<b>Abstract</b>	<p>Ontology, the backbone of Semantic Web, is defined as the formal specification of conceptual hierarchy with relationships between concepts. Ontology Learning (OL) is a process to create an ontology from text automatically or semi-automatically. OL is an important topic in the Semantic Web field in the last two decades but it is still not mature in Arabic not like Latin languages. Currently, there is a limited support for using knowledge from Arabic literature automatically in semantically-enabled systems. Deep Learning (DL), an artificial neural networks learning based application, has proved a good improvement in multiple areas including text mining. By using DL, it is possible to have word embedding as distributed word representations from textual data. The application of DL to aid Arabic ontology development remains largely unexplored. This paper investigates the performance of implementing DL with Arabic ontology learning tasks using major models such as Continuous Bag of Words (CBOW) and Skip-gram. Initial performance results are promising as an effective application of Arabic ontology learning.</p>
<b>Keywords</b>	

<b>Paper Title</b>	Management of Pulmonary Artery Graft Occlusion Using High Performance Coronary Equipment
<b>Authors</b>	Keval K Patel, Reem Aoun, Venkata Subbarao Boppana, Tarek Helmy
<b>Conf. or Journal Name</b>	journal of the American College of Cardiology
<b>Abstract</b>	
<b>Keywords</b>	

<b>Paper Title</b>	Multi-swarm multi-objective optimization based on a hybrid strategy
<b>Authors</b>	SherySedarous, Sherin M.El-Gokhy, ElsayedSallam
<b>Conf. or Journal Name</b>	Alexandria Engineering Journal
<b>Abstract</b>	Multi-objective optimization is a very competitive issue that emerges naturally in most real world problems. It is concerned with the optimization of conflicting objectives in multi-objective problems. The multi-objective problem treats with tradeoff solutions in order to satisfy all objectives. An extensive variety of algorithms has been developed to solve multi-objective optimization problems. In this paper, we presents a multi-swarm multi-objective intelligence-based algorithm enhanced with a hybrid strategy between decomposition and dominance (MSMO/2D) to improve convergence and diversity by splitting the primary swarm into a number of sub-swarms. The proposed algorithm is applied to fourteen standard problems and compared with two of the most familiar multi-objective optimization algorithms MOEA/D and D <sup>2</sup> MOPSO. The experimental results give evidence that the multi-swarm armed by the hybrid strategy constitutes a better alternative for multi-objective optimization problems.
<b>Keywords</b>	Multi-objective, Multi-swarm, Decomposition, Dominance

<b>Paper Title</b>	A Fine-Grained Indoor Location-Based Social Network
<b>Authors</b>	Moustafa Elhamshary, Anas Basalmah, Moustafa Youssef
<b>Conf. or Journal Name</b>	IEEE Transactions on Mobile Computing journal
<b>Abstract</b>	Existing Location-based social networks (LBSNs), e.g., Foursquare, depend mainly on GPS or cellular-based localization to infer users' locations. However, GPS is unavailable indoors and cellular-based localization provides coarse-grained accuracy. This limits the accuracy of current LBSNs in indoor environments, where people spend 89 percent of their time. This in turn affects the user experience, in terms of the accuracy of the ranked list of venues, especially for the small screens of mobile devices, misses business opportunities, and leads to reduced venues coverage. In this paper, we present CheckInside: a system that can provide a fine-grained indoor location-based social network. CheckInside leverages the crowd-sensed data collected from users' mobile devices during the check-in operation and knowledge extracted from current LBSNs to associate a place with a logical name and a semantic fingerprint. This semantic fingerprint is used to obtain a more accurate list of nearby places as well as to automatically detect new places with similar signature. A novel algorithm for detecting fake check-ins and inferring a semantically-enriched floorplan is proposed as well as an algorithm for enhancing the system performance based on the user implicit feedback. Furthermore, CheckInside encompasses a coverage extender module to automatically predict names of new venues increasing the coverage of current LBSNs. Experimental evaluation of CheckInside in four malls over the course of six weeks with 20 participants shows that it can infer the actual user place within the top five venues 99 percent of the time. This is compared to 17 percent only in the case of current LBSNs. In addition, it increases the coverage of existing LBSNs by more than 37 percent.
<b>Keywords</b>	Location-based services, semantic indoor floorplans, location-based social networks

<b>Paper Title</b>	Towards Ubiquitous Indoor Spatial Awareness on a Worldwide Scale
<b>Authors</b>	Moustafa Elhamshary, Moustafa Youssef
<b>Conf. or Journal Name</b>	ACM SIGSPATIAL Newsletter special issue on Indoor Spatial Awareness
<b>Abstract</b>	<p>While a remarkable effort has been put in developing indoor spatial awareness systems, they are still isolated efforts that are tailored to specific deployments. A truly ubiquitous indoor spatial awareness system is envisioned to be deployed on a large scale worldwide, with minimum overhead, and to work with the heterogeneous IoT devices. Such a system will enable a wide set of new applications including worldwide seamless direction finding between indoor locations, anywhere anytime health monitoring, enhanced first responders' safety, and providing richer context for indoor mobile computing applications. In this paper, we describe our vision and work towards achieving ubiquitous indoor spatial awareness systems as well as the open challenges that need to be addressed to materialize this dream.</p>
<b>Keywords</b>	

<b>Paper Title</b>	Smartwatch knows how much you drink
<b>Authors</b>	Takashi Hamatani, Moustafa Elhamshary, Akira Uchiyama, Teruo Higashino
<b>Conf. or Journal Name</b>	Proceedings of the 15th Annual International Conference on Mobile Systems, Applications, and Services
<b>Abstract</b>	Water accounts for about 60% of the human body, and when the body loses it (e.g., through urine, sweat, etc.) in higher rate than its intake rate (through drinking), dehydration symptoms occur. The dehydration causes many severe health problems like organ and cognitive impairment. Therefore, it is critical for the human to drink water in a sustained manner to avoid dehydration. To prevent humans from dehydration, continuous day-scale tracking of the water intake is needed. In this paper, we propose an unobtrusive method to recognize the drinking activity as well as estimate the water intake amount in milliliter scale by leveraging smartwatches. Our basic idea is to track the arm motion and discriminate the drinking activities from the similar hand-based motions like food intake, phone calls, etc. Thereafter, we estimate the water intake amount from the drinking duration.
<b>Keywords</b>	

<b>Paper Title</b>	The Tale of Two Localization Technologies: Enabling Accurate Low-Overhead WiFi-based Localization for Low-end Phones
<b>Authors</b>	Ahmed Shokry (E-JUST), Moustafa Elhamshary (Tanta University), Moustafa Youssef (E-JUST)
<b>Conf. or Journal Name</b>	25 <sup>th</sup> ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL 2017)
<b>Abstract</b>	
<b>Keywords</b>	



<b>Paper Title</b>	A new online delay estimation-based robust adaptive stabilizer for multi-input neutral systems with unknown actuator nonlinearities
<b>Authors</b>	AH Tahoun
<b>Conf. or Journal Name</b>	ISA transactions, Elsevier
<b>Abstract</b>	This paper studies the problem of actuator-nonlinearity compensation in the multi-input uncertain neutral systems. The neutral systems with different unknown time-varying delays, unmodeled dynamics, nonlinear perturbations and disturbances are considered. A new methodology based on the online estimation of the delays to compensate for the effects generated by dead-zone and saturation, acting in series on a system's input are presented. The online estimations of the unknown delays are accomplished by adaptive laws that guarantee the exponential stabilities of the estimated delays. In the presence of state time delay, derivative state time delay, unmodeled dynamics, nonlinear perturbations, disturbances and both input dead-zone and saturation, the asymptotic stability of the closed-loop system is ensured and the state response converge to the origin. Finally, the practicability and the efficacy of the proposed approach is demonstrated via a numerical example.
<b>Keywords</b>	Robust, Neutral systems, Delays, Unmodeled dynamics, Nonlinear perturbations, Disturbances, Saturation, Dead-zone, Lyapunov-Krasovskii

<b>Paper Title</b>	Less-conservative robust adaptive control of neutral systems with mixed time-delays
<b>Authors</b>	A.H. Tahoun
<b>Conf. or Journal Name</b>	International Journal of Systems Science
<b>Abstract</b>	In this paper, the problem of robust stabilisation of a class of neutral-type uncertain linear systems via adaptive control approach is investigated. The neutral systems are assumed to be subjected to model uncertainties, disturbances and mixed time-delays. In comparison to the previous work in the literature, with the assumption that the states of the system and the delayed-states of the system with its derivatives are completely accessible, a new and less-conservative robust adaptive control algorithm is proposed. Based on Lyapunov–Krasovskii function, the model uncertainties and the disturbances are compensated and the stability of the uncertain neutral-type system is guaranteed. The tracking problem via model reference adaptive control is also considered. The most important characteristic of the proposed approach is to make the overall system stability constraints depend on desired arbitrary matrices, and not on the practical system matrices. This is achieved by means of adaptation techniques. Finally, three illustrative examples with numerical simulations are carried out to indicate the significant improvements over some existing results.
<b>Keywords</b>	Robust, model reference, neutral, linear systems, mixed delays, model uncertainties, disturbances, Lyapunov–Krasovskii

<b>Paper Title</b>	Anti-windup adaptive PID control design for a class of uncertain chaotic systems with input saturation
<b>Authors</b>	A.H. Tahoun
<b>Conf. or Journal Name</b>	ISA transactions, Elsevier
<b>Abstract</b>	In this paper, the stabilization problem of actuators saturation in uncertain chaotic systems is investigated via an adaptive PID control method. The PID control parameters are auto-tuned adaptively via adaptive control laws. A multi-level augmented error is designed to account for the extra terms appearing due to the use of PID and saturation. The proposed control technique uses both the state-feedback and the output-feedback methodologies. Based on Lyapunov's stability theory, new anti-windup adaptive controllers are proposed. Demonstrative examples with MATLAB simulations are studied. The simulation results show the efficiency of the proposed adaptive PID controllers.
<b>Keywords</b>	Anti-windup, PID, Saturation, Adaptive control, Chaotic systems, Disturbances, Lyapunov's stability

<b>Paper Title</b>	Deep learning for situational understanding
<b>Authors</b>	Supriyo Chakraborty, Alun Preece, Moustafa Alzantot, Tianwei Xing, Dave Braines, Mani Srivastava
<b>Conf. or Journal Name</b>	Information Fusion (Fusion), 2017 20th International Conference on IEEE
<b>Abstract</b>	Situational understanding (SU) requires a combination of insight - the ability to accurately perceive an existing situation - and foresight - the ability to anticipate how an existing situation may develop in the future. SU involves information fusion as well as model representation and inference. Commonly, heterogenous data sources must be exploited in the fusion process: often including both hard and soft data products. In a coalition context, data and processing resources will also be distributed and subjected to restrictions on information sharing. It will often be necessary for a human to be in the loop in SU processes, to provide key input and guidance, and to interpret outputs in a way that necessitates a degree of transparency in the processing: systems cannot be “black boxes”. In this paper, we characterize the Coalition Situational Understanding (CSU) problem in terms of fusion, temporal, distributed, and human requirements. There is currently significant interest in deep learning (DL) approaches for processing both hard and soft data. We analyze the state-of-the-art in DL in relation to these requirements for CSU, and identify areas where there is currently considerable promise, and key gaps
<b>Keywords</b>	Data models, Training, Training data, Servers, Machine learning, Distributed databases, Brain modeling

<b>Paper Title</b>	RSTensorFlow: GPU Enabled TensorFlow for Deep Learning on Commodity Android Devices
<b>Authors</b>	Moustafa Alzantot, Yingnan Wang, Zhengshuang Ren, Mani B Srivastava
<b>Conf. or Journal Name</b>	Proceedings of the 1st International Workshop on Deep Learning for Mobile Systems and Applications
<b>Abstract</b>	<p>Mobile devices have become an essential part of our daily lives. By virtue of both their increasing computing power and the recent progress made in AI, mobile devices evolved to act as intelligent assistants in many tasks rather than a mere way of making phone calls. However, popular and commonly used tools and frameworks for machine intelligence are still lacking the ability to make proper use of the available heterogeneous computing resources on mobile devices. In this paper, we study the benefits of utilizing the heterogeneous (CPU and GPU) computing resources available on commodity android devices while running deep learning models. We leveraged the heterogeneous computing framework RenderScript to accelerate the execution of deep learning models on commodity Android devices. Our system is implemented as an extension to the popular open- source framework TensorFlow. By integrating our acceleration framework tightly into TensorFlow, machine learning engineers can now easily make benefit of the heterogeneous computing resources on mobile devices without the need of any extra tools. We evaluate our system on different android phones models to study the trade-offs of running different neural network operations on the GPU. We also compare the performance of running different models architectures such as convolutional and recurrent neural networks on CPU only vs using heterogeneous computing resources. Our result shows that although GPUs on the phones are capable of offering substantial performance gain in matrix multiplication on mobile devices. Therefore, models that involve multiplication of large matrices can run much faster (approx. 3 times faster in our experiments) due to GPU support.</p>
<b>Keywords</b>	Deep learning; Android; RenderScript; TensorFlow; heterogeneous computing; Convolution; Neural networks; LSTM

<b>Paper Title</b>	Distributed Opportunistic Sensing and Fusion for Traffic Congestion Detection
<b>Authors</b>	Alistair Nottle, Daniel Harborne, Dave Braines, Moustafa Alzantot, Santiago Quintana-Amate, Richard Tomsett, Lance Kaplan, Mani B Srivastava, Supriyo Chakraborty, Alun Preece
<b>Conf. or Journal Name</b>	First International Workshop on Distributed Analytics InfraStructure and Algorithms for Multi-Organization Federations
<b>Abstract</b>	<p>Our particular research in the Distributed Analytics and Information Science International Technology Alliance (DAIS ITA) is focused on "Anticipatory Situational Understanding for Coalitions". This paper takes the concrete example of detecting and predicting traffic congestion in the UK road transport network from existing generic sensing sources, such as real-time CCTV imagery and video, which are publicly available for this purpose. This scenario has been chosen carefully as we believe that in a typical city, all data relevant to transport network congestion information is not generally available from a single unified source, and that different organizations in the city (e.g. the weather office, the police force, the general public, etc.) have their own different sensors which can provide information potentially relevant to the traffic congestion problem. In this paper we are looking at the problem of (a) identifying congestion using cameras that, for example, the police department may have access to, and (b) fusing that with other data from other agencies in order to (c) augment any base data provided by the official transportation department feeds. By taking this coalition approach this requires using standard cameras to do different supplementary tasks like car counting, and in this paper we examine how well those tasks can be done with RNN/CNN, and other distributed machine learning processes. In this paper we provide details of an initial four-layer architecture and potential tooling to enable rapid formation of human/machine hybrid teams in this setting, with a focus on opportunistic and distributed processing of the data at the edge of the network. In future work we plan to integrate additional data-sources to further augment the core imagery data</p>
<b>Keywords</b>	

<b>Paper Title</b>	Interpretability of Deep Learning Models: A Survey of Results
<b>Authors</b>	Supriyo Chakraborty, Richard Tomsett, Ramya Raghavendra, Daniel Harborne, Moustafa Alzantot, Federico Cerutti, Mani Srivastava, Alun Preece, Simon Julier, Raghuveer M Rao, Troy D Kelley, David Braines, Murat Sensoy, Christopher J Willis, Prudhvi Gurram
<b>Conf. or Journal Name</b>	
<b>Abstract</b>	<p>Deep neural networks have achieved near-human accuracy levels in various types of classification and prediction tasks including images, text, speech, and video data. However, the networks continue to be treated mostly as black-box function approximators, mapping a given input to a classification output. The next step in this human-machine evolutionary process –incorporating these networks into mission critical processes such as medical diagnosis, planning and control – requires a level of trust association with the machine output. Typically, statistical metrics are used to quantify the uncertainty of an output. However, the notion of trust also depends on the visibility that a human has into the working of the machine. In other words, the neural network should provide human-understandable justifications for its output leading to insights about the inner workings. We call such models as interpretable deep networks.</p> <p>Interpretability is not a monolithic notion. In fact, the subjectivity of an interpretation, due to different levels of human understanding, implies that there must be a multitude of dimensions that together constitute interpretability. In addition, the interpretation itself can be provided either in terms of the low-level network parameters, or in terms of input features used by the model. In this paper, we outline some of the dimensions that are useful for model interpretability, and categorize prior work along those dimensions. In the process, we perform a gap analysis of what needs to be done to improve model interpretability</p>
<b>Keywords</b>	

<b>Paper Title</b>	SeleCon: Scalable IoT Device Selection and Control Using Hand Gestures
<b>Authors</b>	Amr Alanwar, Moustafa Alzantot, Bo-Jhang Ho, Paul Martin, Mani Srivastava
<b>Conf. or Journal Name</b>	IEEE International Conference on Internet-of-Things Design and Implementation (IoTDI 2017)
<b>Abstract</b>	<p>Although different interaction modalities have been proposed in the field of human-computer interface (HCI), only a few of these techniques could reach the end users because of scalability and usability issues. Given the popularity and the growing number of IoT devices, selecting one out of many devices becomes a hurdle in a typical smarthome environment. Therefore, an easy-to-learn, scalable, and non-intrusive interaction modality has to be explored. In this paper, we propose a pointing approach to interact with devices, as pointing is arguably a natural way for device selection. We introduce SeleCon for device selection and control which uses an ultra-wideband (UWB) equipped smartwatch. To interact with a device in our system, people can point to the device to select it then draw a hand gesture in the air to specify a control action. To this end, SeleCon employs inertial sensors for pointing gesture detection and a UWB transceiver for identifying the selected device from ranging measurements. Furthermore, SeleCon supports an alphabet of gestures that can be used for controlling the selected devices. We performed our experiment in a 9m-by-10m lab space with eight deployed devices. The results demonstrate that SeleCon can achieve 84.5% accuracy for device selection and 97% accuracy for hand gesture recognition. We also show that SeleCon is power efficient to sustain daily use by turning off the UWB transceiver, when a user's wrist is stationary.</p>
<b>Keywords</b>	



<b>Paper Title</b>	SenseGen: A Deep Learning Architecture for Synthetic Sensor Data Generation
<b>Authors</b>	Moustafa Alzantot, Supriyo Chakraborty, Mani B. Srivastava
<b>Conf. or Journal Name</b>	IEEE BICA'17 (co-located with IEEE Percom 2017)
<b>Abstract</b>	<p>Our ability to synthesize sensory data that preserves specific statistical properties of the real data has had tremendous implications on data privacy and big data analytics. The synthetic data can be used as a substitute for selective real data segments - that are sensitive to the user - thus protecting privacy and resulting in improved analytics. However, increasingly adversarial roles taken by data recipients such as mobile apps, or other cloud-based analytics services, mandate that the synthetic data, in addition to preserving statistical properties, should also be “difficult” to distinguish from the real data. Typically, visual inspection has been used as a test to distinguish between datasets. But more recently, sophisticated classifier models (discriminators), corresponding to a set of events, have also been employed to distinguish between synthesized and real data. The model operates on both datasets and the respective event outputs are compared for consistency. Prior work on data synthesis have often focussed on classifiers that are built for features explicitly preserved by the synthetic data. This suggests that an adversary can build classifiers that can exploit a potentially disjoint set of features for differentiating between the two datasets. In this paper, we take a step towards generating sensory data that can pass a deep learning based discriminator model test, and make two specific contributions: first, we present a deep learning based architecture for synthesizing sensory data. This architecture comprises of a generator model, which is a stack of multiple Long-Short-Term-Memory (LSTM) networks and a Mixture Density Network (MDN); second, we use another LSTM network based discriminator model for distinguishing between the true and the synthesized data. Using a dataset of accelerometer traces, collected using smartphones of users doing their daily activities, we show that the deep learning based discriminator model can only distinguish between the real and synthesized traces with an accuracy in the neighborhood of 50%.</p>
<b>Keywords</b>	Visualization, Logic gates

<b>Paper Title</b>	Adaptive formation control of robot swarms using optimized potential field method
<b>Authors</b>	Basma Ghareeb Elkilany, Ahmed Ali, Ahmed M.R. Fathelbab
<b>Conf. or Journal Name</b>	2017 IEEE International Conference on Industrial Technology (ICIT)
<b>Abstract</b>	<p>Robot Swarm is widely used in many applications such as forest fire detection, Search and rescue missions. Swarm of Robots is supposed to move together without collision and avoid obstacles while performing its target task. Therefore, the formation control of robot swarm is required to achieve the swarm robot target. In this paper, we present an adaptive formation control algorithm for robot swarm based on the Potential Field Method. The algorithm has three tasks, to keep robot swarm in a particular formation, avoid collision with obstacles in the environment and track a certain trajectory. An artificial neural network is employed to improve the performance of the algorithm. The network optimizes the weights in each layer then updates the potential Field parameters. A simulation via MATLAB is implemented to verify the proposed adaptive formation control algorithm. The results show that robot swarm takes less time to maintain formation, less time to track a trajectory and less time to reform again after avoiding an obstacle compared with the time in [1].</p>
<b>Keywords</b>	Force, Collision avoidance, Trajectory, Optimization, Neurons, Robot kinematics