
Editorial

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Biographical notes: Sundarapandian Vaidyanathan is a Professor and the Dean at the Research and Development Centre, Vel Tech University, Chennai, India. He earned his DSc in Electrical and Systems Engineering from the Washington University, St. Louis, USA in 1996. His current research focuses on linear and nonlinear control systems, chaotic and hyperchaotic systems, chaos modelling, chaos control and synchronisation, FPGA, backstepping control, sliding mode control, intelligent control, mathematical models of nonlinear dynamical systems, computational science and robotics. He has published three text-books on mathematics and six research books on computational intelligence, chaos and control systems. He has published over 320 Scopus-indexed research publications. He has delivered plenary lectures on control systems and chaos theory in many international conferences around the world. He has also conducted several workshops on computational science, chaos theory and control systems using MATLAB and SCILAB.

The Third International Conference on Automation, Control, Engineering and Computer Science (ACECS-2016) was conducted during March 20–22, 2016 at Hammamet, Tunisia. The conference provided an excellent research forum for professionals, academics, and researchers to share knowledge and results on automation, control, engineering, computer science and information technology. Broad areas of ACECS-2016 were classified as computer science and IT, signal processing and communication, robotics, control and instrumentation, engineering and automation, and innovation and engineering management.

The development of intelligent control was inspired by observable and imitable aspects of intelligent activity of human beings and nature. The essence of the intelligent control systems is to process and interpret data of various natures so that computational intelligence is strictly connected with the increase in available data as well as their capabilities of processing mutually supportive factors. Intelligent control and computational intelligence have applications in many fields of engineering, data analysis, forecasting, biomedicine, image and sound processing, system identification, signal processing, multidimensional data visualisation, analysis of lexicographic data, diagnostic systems, expert systems, etc. Intelligent control systems are very useful when no mathematical model is available a priori and intelligent control develops a system to be controlled. Important types of intelligent control are fuzzy logic, artificial neural networks, ant colony optimisation, bee colony optimisation, particle swarm optimisation, support vector machines (SVMs), etc.

In this special issue of the *International Journal of Intelligent Engineering Informatics (IJIEI)*, we are delighted to select eight research articles reporting on recent advances and applications in intelligent control. These papers presented in the

ACECS-2016 have been expanded in line with the reviewer recommendation and audience questions.

It is hoped that this special issue will provide a useful reference for informing recently developed technologies in intelligent control and engineering informatics. The contents of the selected eight articles are described briefly as follows.

The paper titled 'Discrete and continuous emotion recognition using sequence kernels' by Imen Trabelsi, Med Salim Bouhleb and Nilanjan Dey describes an algorithm for recognising discrete and continuous emotional states by adapting the emotional recognition system to the advanced kernel-based machine learning algorithms from the field of speaker recognition. This paper presents also the feasibility of classifying groups of emotional states according to the arousal-valence space. The authors illustrate that their proposed methodology is more efficient in terms of recognition performance. The focus in this paper is to build a range of sequence kernel to recognise discrete and continuous emotions from the well-established real-life speech dataset (IEMOCAP) and the acted Berlin emotional speech dataset (Emo-Db).

The paper titled 'Control of a photovoltaic system by fuzzy logic, comparative studies with conventional controls: results, improvements and perspectives' by Wassila Issaadi discusses the principle of the MPPT command. The command techniques most used in MPPT control are reviewed and analysed such as: observation and perturbation (O&P) and conductance incrementing (CI). The main goal of this paper is the application of the fuzzy logic command with the MPPT command. This paper also compares the performance of fuzzy logic controller with other techniques (O&P and CI) used in the control of photovoltaic systems.

The paper titled 'Synthetic aperture radar image compression based on multi-scale geometric transforms' by Amel Bouchemha, Mohamed Cherif Nait-Hamoud and Noureddine Doghmane proposes to experiment and compare an adaptive multi-scale geometric decomposition for synthetic aperture radar (SAR) image compression, called multi-scale bandelet transform, and a non-adaptive multi-scale geometric representation called ridgelet transform. The second generation of bandelet transform adopted in this work is constructed in discrete domain with bandeletisation of warped wavelet transform along the optimal direction of geometric flow that minimises the Lagrangian. This paper details the criteria and results to assess SAR image compression performances using wavelet, bandelet, and ridgelet transforms. Numerical results show that during the compression phase, the speckle noise is removed from the SAR images inducing further improvements of the coding efficiency. In order to evaluate the robustness of bandelet transform, the authors have proposed a progressive compression scheme based on the second generation of bandelet transform combined to SPIHT encoder, which is generally integrated with the wavelet transform.

The paper titled 'Power quality improvement using fuzzy logic controlled voltage source PWM rectifiers' by Aziz Boukadoum, Tahar Bahi and Abla Bouguerme present a direct current control based on hysteresis fuzzy logic controlled three-phase voltage source PWM rectifier for eliminating harmonics and compensating reactive power simultaneously in a power system. The paper presents a detailed mathematical model and describes its analysis. The authors use fuzzy logic control to obtain nearly sinusoidal input current and low harmonics distortion (THD). The fuzzy logic controller also improves the power factor at the unity and regulates the DC-link voltage at the required level with a better responses and excellent performance. Simulation results show the effectiveness of the proposed strategy.

The paper titled 'New CSMA/CA prioritisation based on fuzzy control mechanism' by Imen Bouazzi, Jamila Bhar and Mohamed Atri proposes to apply a dynamic allocation of priority level for nodes that compete for the access to the medium through tuning parameters in the carrier sense multiple access/collision avoidance (CSMA/CA) algorithm. A priority scheduling is achieved using a fuzzy logic mechanism exploiting queue level and traffic rate of each node in order to ensure adequate dynamic allocation. This paper demonstrates various advantages of priority-based CSMA/CA for quality of service (QoS). The authors show significant improvements achieved by their approach among the IEEE 802.15.4 MAC standards.

The paper titled 'Diagnosis and classification using ANFIS approach of stator and rotor faults in induction machine' by Merabet Hichem, Bahi Tahar and Drici Djalel proposes a reliable approach for diagnosis and detection of stator short-circuit windings and rotor broken bars faults in induction motor under varying load condition based on relative energy for each level of stator current signal using wavelet packet decomposition which will be useful as data input of adaptive neuro-fuzzy inference system (ANFIS). The ANFIS is able to identify the induction motor and it is proven to be capable of detecting broken bars and stator short-circuit fault e with high precision. The diagnostic ANFIS algorithm is applicable to a variety of industrial process based on the induction machine for detection and classified the any faults types. This approach is applied using MATLAB and the simulation results show the effectiveness of the proposed methodology.

The paper titled 'Vehicle recognition system based on customised HOG for automotive driver assistance system' by Haythem Ameer, Amina Msolli, Abdelhamid Helali, Anis Youssef and Hassen Maaref presents an optimisation vehicle detection system based on a customised histogram of oriented gradients (HOG) and investigates to achieve an accurate vehicle recognition system. The main contributions of this paper can be summarised in two fundamental points. First, a re-optimisation of the standard HOG parameters is made to get the best results for the car detection. Secondly, an amplification factor is distributed for each bin weight according to its contribution in the extracted car-features. Studies using a linear SVM classifier in MATLAB and heterogeneous databases of vehicle and non-vehicle images are made to achieve an excellent recognition rate that outperforms other similar approaches.

The paper titled 'Fuzzy regional inequality measurement: a new stochastic dominance approach with application to Tunisia' by Amal Jmaii and Besma Belhadj proposes a fuzzy version of dynamic stochastic approach to analyse between-region inequalities. The authors propose a class of fuzzy index and include them in a stochastic dominance framework to present a dominance criterion enable to class regional distribution. This study contributes to the literature of social inequalities as it takes into consideration the intrinsic nature of poverty.

The guest editor would like to thank all the authors for submitting their manuscripts in this special issue. We would want to acknowledge the reviewers for their contributions in reviewing the papers and providing constructive comments to the authors. Finally, the guest editor would like to specially thank the Editor-in-Chief of *International Journal of Intelligent Engineering Informatics (IJIEI)*, Professor Ahmad Taher Azar (Benha University, Egypt) for his great help and support in organising and coordinating the publication of this special issue.