
Editorial

Sundarapandian Vaidyanathan

Research and Development Centre,
Vel Tech University,
Avadi, Chennai 600062, Tamil Nadu, India
Email: sundarcontrol@gmail.com

Biographical notes: Sundarapandian Vaidyanathan is a Professor and Dean from the R&D Centre, Vel Tech University, Chennai, India. He received his DSc in Electrical and Systems Engineering from the Washington University, St. Louis, USA in 1996. He has published over 400 Scopus-indexed research papers. His current research focuses on control systems, chaos theory, chaotic and hyperchaotic systems, sliding mode control, neuro-fuzzy control, computational science, circuits and memristors. He is the Editor-in-Chief of *International Journal of Nonlinear Dynamics and Control (IJNDC)*, Inderscience Publishers, Olney, UK. He is also in the editorial board of many control journals published by Inderscience, Olney, UK. 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 modern control systems and chaos theory using MATLAB and SCILAB.

In computer science, soft computing (SC) was inspired by the human mind as the role model. SC deals with imprecision, uncertainty, partial truth, robustness and low solution cost. The principal constituents of SC are fuzzy logic control (FLC), artificial neural networks (ANNs), evolutionary computation (EC), machine learning (ML) and probabilistic reasoning (PR). SC has applications in several fields of engineering as well as complex systems arising in biology and medicine.

In computer science, intelligent control (IC) was inspired by observable and imitable aspects of intelligent activity of human beings and nature. The essence of the IC 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.

IC 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. IC systems are very useful when no mathematical model is available, a priori and IC develops a system to be controlled. Important types of IC are fuzzy logic, ANNs, ant colony optimisation, bee colony optimisation, particle swarm optimisation (PSO), support vector machines, etc.

In this special issue of the *International Journal of Intelligent Engineering Informatics (IJIEI)*, we are delighted to select ten research articles reporting on recent applications of SC and IC. It is hoped that this special issue will provide a useful reference for informing recently developed technologies in SC and IC. The contents of the selected ten articles are described briefly as follows:

The paper titled 'Application of firefly algorithm for congestion management problem in the deregulated electricity market' by A. Ahamed Jeelani Basha, M. Anitha and E.B. Elanchezhian proposes a method to manage congestion by optimal rescheduling of the active powers of generators based on firefly algorithm (FA). In this paper, the proposed FA is tested on standard IEEE 30 bus, 118 bus systems and a practical Indian utility 62 bus system for the solution of CM problem. The results of these test systems provide minimum rescheduling cost and are compared with that of CPSO, PSO-TVIW, PSO-TVAC, VEPSO and PSO-ITVAC methods.

The paper titled 'Multi-agent model based on combination of chemical reaction optimisation metaheuristic with Tabu search for flexible job shop scheduling problem' by Bilel Marzouki, Olfa Belkahla Driss and Khaled Ghédira proposes a multi-agent model based on combination of chemical reaction optimisation metaheuristic with Tabu search to solve the FJSP to minimise the maximum completion time (makespan). To evaluate the performance of the proposed model, experiments are performed on well-known benchmark instances proposed in the literature and comparisons are made with others approaches of literature.

The paper titled 'An improved quantum particle swarm optimisation and its application on hand kinematics tracking' by Zheng Zhao and Naigong Yu proposes a dynamic search strategy fused with chaos map to strengthen the ability of escaping from local optima and replaces the attractor with beta distribution for faster convergence speed. The authors carry out experimental results to show that their proposed algorithm (DCQPSO) outperforms either traditional PSO or QPSO algorithm, and it can be well qualified with optimisation task in hand kinematics tracking.

The paper titled 'Analysis of enhanced complex SVR interpolation and SCG-based neural networks for LTE downlink system' by Anis Charrada analyses the performance of radial basis function (RBF)-based support vector machine regression (SVR) and scaled conjugate gradient back propagation (SCG)-based ANN, to estimate the channel deviations in frequency domain using the standardised pilot symbols structure for LTE downlink system.

The paper titled 'General study for energy recovery from used batteries using fuzzy logic and PI controllers' by Jabrane Chakroun and Habib Hamam proposes a special design for energy recovery from used batteries into a renewable power source. The proposed technique consists in designing and implementing proportional-integral (PI) and fuzzy-logic (FL) controllers to ensure a high ability of conversion.

The paper titled 'FFA-based speed control of BLDC motor drive' by Manoj Kumar Merugumalla and Navuri Prema Kumar presents the speed control of brushless direct current (BLDC) motor drive using nature-inspired algorithm. The proposed design problem of speed controller is formulated as an optimisation problem and firefly algorithm (FFA) is employed to search for optimal proportional-integral-derivative (PID) parameters of speed controller by minimising the time domain objective function.

The paper titled 'A very low speech model based on frequency selection-GA approach' by Lahcène Mitiche and Amel Baha Houda Adamou-Mitiche proposes a new MOR technique applied to the speech production system. Based on frequency selection and GA optimisation techniques this method guarantees an optimal approximant with some interesting proprieties like the enhancement of speech stability and minimum phase. By carrying out various simulations with different speech segments, the authors conclude that the proposed approximant approach is constructed from a minimum number of parameters which preserves the key properties of the full-order model.

The paper titled ‘Software fault prediction using firefly algorithm’ by Ishani Arora and Anju Saha propose a hybrid software fault prediction model built using firefly algorithm (FA) and ANN. It also performs an empirical comparison of the classification performance of the developed model with the genetic algorithm (GA) and the PSO-based evolutionary methods in optimising the connection weights of a neural network. The results show that FA-ANN model performs better than the genetic and particle swarm optimised ANN fault prediction models.

The paper titled ‘Fault detection and isolation of asynchronous machine based on the probabilistic neural network’ by Rahma Ouhibi, Salma Bouslama and Kaouther Laabidi propose three methods based on neural networks for fault detection and isolation of asynchronous machine: a probabilistic neural network (PNN), multi-layer perceptron (MLP) and generalised regression neural network (GRNN). Efficiency of these three neural-based methods is computed using a test set of 100 data.

The paper titled ‘Performance improvement of the particle swarm optimisation algorithm for the flexible job shop problem under machines breakdown’ by Rim Zarrouk, Imed Eddine Bennour and Jemai Abderrazak propose a set of PSO-FJSP variants that aim to improve the run time of the pre-scheduling step. The authors propose three rescheduling variants to handle machine breakdowns: two variants aim to improve the robustness of the schedule, while the third aims to improve the stability of the schedule. Standard benchmarks are used to evaluate and compare the proposed variants.

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