Editorial

Hari Mohan Pandey*

Department of Computer Science,
TechHub, Room No. 12,
Edge Hill University,
St Helens Rd, Ormskirk, Lancashire, L39 4QP, UK
Email: Pandeyh@edgehill.ac.uk
Email: profharimohanpandey@gmail.com
*Corresponding author

Abhay Bansal

Department of Computer Science and Engineering,
Amity School of Engineering and Technology,
Amity University,
Sector 125, Noida 201313, UP, India
Email: abansal1@amity.edu

Ankit Chaudhary

Department of Computer Science and Engineering,
University of Missouri – St. Louis,
MO 64468, USA
Email: dr.ankit@ieee.org

Biographical notes: Hari Mohan Pandey specialised in computer science and engineering. He worked as a Postdoctoral Research Fellow Machine Learning with the Middlesex University, London, UK. He also worked on a European Commission project – Dream4car under H2020. He is a Senior Lecturer with the Department of Computer Science, Edge Hill University, UK. His research area includes artificial intelligence, soft computing, machine learning and deep learning. He authored books in computer science and engineering, published over 70 scientific papers in reputed journals and conferences. He is a Fellow of the HEA, U.K. and BCS UK, visiting Researcher at Middlesex University, London.

Abhay Bansal is currently working with Amity University Noida as Joint Head, Amity School of Engineering and Technology, HoD (CSE) and Director, DICET. He has 25+ years of industry and academic experience. He has published 100+ papers in various national and international journals/conferences. Under his guidance eight PhDs are awarded and currently he is guiding five PhD students. He is a Chairman DRC and member of Executive Council of Amity University, Noida.

Ankit Chaudhary is a major in Computer Science & Engineering and received his PhD in Computer Vision. His current research interests are in vision-based applications, intelligent systems and graph algorithms. He was a Post-Doc at Department of Electrical and Computer Engineering, The University of Iowa, USA. At present, he is working as a Professor, in Computer Science Department at University of Missouri – St. Louis, USA.

Soft computing plays an important, unique, and highly visible role in bringing a variety of technologies of granular computing, neural networks and evolutionary optimisation under the same roof with a well-articulated intent to support the design and analysis pursuit of intelligent systems. We have been witnessing significant progress in soft computing, being regarded both as a coherent methodology's platform and algorithmic platform. The leitmotiv of soft computing is about the synergy where all individual contributing technologies are seamlessly structured together, and we build on their unique strengths and compensate existing limitations. The synergies are formed in several ways, reflecting the diversity of the problems being handled. The ongoing challenges give rise to the plethora of design schemes and make the use of soft computing a highly creative endeavour.

The primary objective of this special issue is to bring forward thorough, in-depth, and well-focused developments of soft computing approaches in various applications. Our ultimate objective is to raise and discuss fundamental questions that create a tapestry of soft computing design and analysis practices of intelligent systems. What are the key design methodologies of bringing all technologies together so that the synergistic linkage could be fully exploited what are the essential challenges? What is the essence of synergies? What are the currently encountered limitations? Where did we witness failures? Why did they happen? What were the key trends reported over the last decades? What are the stumbling blocks hampering or slowing down the progress? What are the applied application domains in which soft computing has assumed a highly visible position? All these are highly intriguing, important and timely questions whose discussion may help foster further progress in the area.

The following articles in this special issue introduce a variety of soft computing and hybridisation of soft computing methods for development of intelligent systems. Most of the articles in this special issue address the problem of intelligent system development.

The article title 'Performance comparison of Bat search and Cuckoo search using software artefact infrastructure repository and regression testing' by Arun Prakash Agrawal and Arvinder Kaur, presented the application of metaheuristic algorithms for software testing. A comparative study was performed between Bat search and Cuckoo search algorithm for solving regression test case selection problem. Algorithm is tested against cuckoo search algorithm to solve regression test case selection problem. Here, two factors such as number of faults covered, and computational time were considered for the comparison.

The article title 'On the convergence and optimality of the firefly algorithm for opportunistic spectrum access' by Lakshmana Rao Kalabarige, Sireesha Rodda and Shanti Chilukuri, discussed about firefly algorithm for an optimal channel allocation in cognitive radio networks. The effect of various probability distributions including the

Lev́y alpha stable distribution for randomisation of firefly movement was studied. We also explore various functions were explored for converting firefly positions from the continuous space to the discrete space, as is necessary in the spectrum allocation problem.

The article title 'Meta-heuristic algorithm to generate optimised test cases for aspect-oriented software systems' by Abhishek Singhal, Abhay Bansal and Avadhesh Kumar have demonstrated the applicability of the metaheuristic algorithms in the field of software testing. A variant of an artificial bee colony algorithm was considered for test case optimisation for aspect-oriented software systems. Experiments were performed considering six benchmark problems, which validated the effectiveness of proposed approach. The results stated the reduction of 20%–40% number of test cases and more than 90% of code coverage in the optimised test suite, which showed the superiority of proposed approach.

The article title 'Fuzzy system for classification of microarray data using a hybrid ant stem optimisation algorithm' by S. Arul Antran Vijay and Pugalendhi GaneshKumar presented a fuzzy-based classification system to analyse microarray data. The mutual information approach was used to extract the most informative genes from the microarray dataset. In the design of fuzzy expert systems, a novel hybrid ant stem (HAS) algorithm was considered to extract the if-then rules using the membership functions from the given diabetes microarray data. The performance of the proposed technique was evaluated through two diabetes microarray datasets. Results proved that the HAS algorithm had produced a highly accurate fuzzy expert system.

The article title 'Flower pollination-based K-means algorithm for medical image compression' by G. Vimala Kumari, G. Sasibhushana Rao and B. Prabhakara Rao highlighted the applicability of the metaheuristic algorithms for medical imagine. Authors had introduced a flower pollination algorithm (FPA)-based vector quantisation for better image compression with better reconstructed image quality. Performance of proposed method was evaluated by using peak signal to noise ratio (PSNR), mean square error (MSE) and fitness function.

The article title 'Image compression based on adaptive image thresholding by maximising Shannon or fuzzy entropy using teaching learning based optimisation' by Karri Chiranjeevi, Umaranjan Jena and M.V. Nageswara Rao had implemented a teaching leaning based optimisation (TLBO) is used for maximising shannon entropy or fuzzy entropy for effective image thresholding which leads to better image compression with higher peak signal to noise ratio (PSNR). Experimentally it was demonstrated better with fuzzy entropy compared to Shannon entropy.

The article title 'An efficient and optimised approach for secured file sharing in cloud computing' by Neha Agarwal, Ajay Rana and Jai Prakash Pandey had proposed a hybrid encryption algorithm which comprises of symmetric and asymmetric public key encryption algorithms. This hybrid encryption algorithm has taken benefit of fast performance of symmetric and high security of asymmetric encryption algorithms. In addition, authors had introduced the concept of proxy re-encryption in order to ensure the security of outsourced data from colluded cloud and unauthorised users. Results demonstrated the superiority of the proposed algorithm for sharing files with other users on cloud.

The article title 'Development of ANFIS-based algorithm for MPPT controller for standalone photovoltaic system' by A. Kumar, M. Rizwan and U. Nangia had proposed an adaptive neuro fuzzy inference system (ANFIS) based algorithm for maximum power point tracking (MPPT). The proposed system was used to control the switching of DC-DC boost converter using ANFIS approach and replace the conventional PI controller to detect the error signal. The results of the proposed approach are compared with incremental conductance approach under constant and varying irradiance and temperature conditions.