Editorial

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Biographical notes: Zhi-hua Cui is an Associate Professor at School of Computer Science & Technology, Taiyuan University of Science and Technology, leading the Complex System and Computational Intelligence Laboratory. He received his PhD in System Engineering from Xi'an Jiaotong University in 2008 and his MS in Machine Electronic Engineering from Taiyuan Machinary Institute in 2003. His research interests include intelligence science, swarm intelligence and stochastic optimisation. He is the Editor-in-Chief of *International Journal of Bio-inspired Computation*, and the editorial members of *International Journal of Innovative Computing and Applications*, *International Journal Computer Applications in Technology* and *Journal of Intelligent Computing*. He has published three books, and more than 80 research papers in journals and conferences. As the Guest Editor, he has published five special international issues. He serves as a technical program committee member, international program committee member, PC committee member, local organising chair for several international conferences.

Aladdin Ayesh is as a full time Lecturer (equivalent to Assistant Professor) at De Montfort University, He has over 80 publications including two books, and supervises six PhD projects and had 11 successful completions. He is the Editor-in-Chief of *International Journal of Computational Linguistics Research* and *Journal of Intelligent Computing*.

Zhongzhi Shi is a Professor at the Institute of Computing Technology, Chinese Academy of Sciences, leading the Intelligence Science Laboratory. His research interests include intelligence science, image processing and cognitive computing machine learning, multi-agent systems, semantic web and service computing. He has published 14 monographs, 15 books and more than 450 research papers in journals and conferences. He has won a 2nd-Grade National Award at Science and Technology Progress of China in 2002, two 2nd-Grade Awards at Science and Technology Progress of the Chinese Academy of Sciences in 1998 and 2001, respectively. He is a Senior Member of *IEEE*, member of *AAAI* and *ACM*, Chair for the WG 12.2 of IFIP. He is the Chief Editor of *Series on Intelligence Science* and served as the Vice President for Chinese Association of Artificial Intelligence.

Intelligent systems design is a promising research field of modern artificial intelligence. Its goal is to deal with natural and artificial systems, and develop new and advanced theories and technologies. Recently, intelligent systems design is becoming popular due to their capabilities in handling many real world complex problems.

We believe that the series of works in this special issue provide a useful reference for understanding recent advances on designing for intelligent system. In total, six papers have been selected to reflect the call thematic vision. The contents of these studies are briefly described as follows.

In the paper, 'A novel constraint multi-objective artificial physics optimisation algorithm and its convergence', Yan Wang, Jian-Chao Zeng, Zhi-Hua Cui and Xiao-Juan He present a constraint multi-objective artificial physics optimisation (CMOAPO) algorithm by introducing a novel optimisation paradigm called artificial physics optimisation (APO) into constraint multi-objective domain. Combining with characteristics of constraint multi-objective optimisation problems, a method of virtual force decreasing is incorporated into CMOAPO to decrease the probability of individuals moving from feasible region into infeasible region. Furthermore, the convergence of CMOAPO is analysed in terms of theory with related knowledge of probability. The performance of CMOAPO algorithm is tested using several benchmark functions. The results obtained show that the proposed approach is effective.

In the paper, 'Combining strategy of genetic algorithm and particle swarm algorithm for optimum problem of RFID reader', Jin-gui Lu et al. propose one combining strategy of genetic algorithm and particle swarm algorithm for optimisation problem of RFID reader. Simulation results show it is effective.

There are many clustering algorithms in the literature that are robust against outliers. They are robust because they decrease the effect of outliers on the cluster centroid locations but they do not result into efficient clusters as they include outliers in the final clusters. The limitation with these algorithms is that they do not identify outliers. In this paper, 'A density oriented fuzzy C-means clustering algorithm for recognising original cluster shapes from noisy data', P. Kaur and A. Gosain propose an algorithm, density oriented fuzzy C-means (DOFCM) which identifies outliers based upon density of points in the dataset before creating clusters and results into 'n + 1' clusters, with 'n' good and one invalid cluster containing noise and outliers. Propose technique is based on the concept that if these outliers are not required in clustering then their memberships should not be involved during clustering. We tried to nullify the effect of outliers by assigning them zero membership value during clustering. It is applied to various synthetic datasets, Bensaid's data and is compared with well known robust clustering techniques, namely, PFCM, CFCM, and NC. Results obtained after comparing the performance of these

algorithms concluded that DOFCM is the best method to recognise original shape of clusters from noisy datasets.

The optimal design of the multiproduct batch processes is one of the most important decision-making problems in the manufacturing industry. In the paper, 'An evolutionary Lagrange method for batch process optimal design', Yung-Chin Lin et al. propose an evolutionary Lagrange method to deal with such an MINLP problem. The computational results demonstrate the effectiveness of the algorithm in solving the optimal design problem of the multiproduct batch processes.

In the paper, 'Particle swarm optimisation with simple and efficient neighbourhood search strategies', Hui Wang, Zhijian Wu, Shahryar Rahnamayan, Changhe Li, Sanyou Zeng and Dazhi Jiang present a novel particle swarm optimiser (PSO) called PSO with simple and efficient neighbourhood search strategies (NSPSO), which employs one local and two global neighbourhood search strategies. By this way, one strong and two weak locality perturbation operators are embedded in the standard PSO. The NSPSO consists of two main steps. First, for each particle, three trail particles are generated by the mentioned three neighbourhood search strategies, respectively. Then, the best one among the three trail particles is selected to compete with the current particle, and the fitter one is accepted as a current particle. In order to verify the performance of NSPSO, it experimentally has been tested on 12-unimodal and multimodal benchmark functions. The results show that NPSO significantly outperforms other seven PSO variants.

In the paper, 'Design of an intelligent novelty detection application', Flora S. Tsai describes the design and development of an intelligent data mining application for novelty detection. We describe our experience in applying recent research advances in novelty detection to practical situations. As most of the algorithms require complex matrix calculations, implementation and optimisation of the techniques are not trivial matters. The resulting system when adapting the design to the industrial settings makes use of intelligent novelty mining techniques that can fit the changing requirements of a real-world organisation.