Editorial

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Xiao-zhi Gao received his BSc and MSc degrees from the Harbin Institute of Technology, China in 1993 and 1996, respectively. He earned his DSc (Tech.) degree from the Helsinki University of Technology (now Aalto University), Finland in 1999. Since 2004, he has been working as a Docent (Adjunct Professor) at the same university. He is also a Guest/Visiting Professor at the Harbin Institute of Technology, Beijing Normal University, and Shanghai Maritime University, China. He has published more than 290 technical papers on refereed journals and international conferences. His current research interests are nature-inspired computing methods with their applications. He is an Associate Editor of the *Applied Soft Computing*, *International Journal of Machine Learning and Cybernetics* and *Journal of Intelligent Automation and Soft Computing*.

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Nature-inspired computation becomes hugely popular in recent years and its applications has permeated into all areas of science and engineering, including artificial intelligence, computer science, data mining, engineering optimisation, computational intelligence, image processing and telecommunications, etc.

We believe that the series of works in this special issue provide a useful reference for learning the current progress on nature-inspired algorithms. In total, nine papers have been selected to reflect the call of the thematic vision. The contents of these studies are briefly described as follows.

In the paper, 'An optimisation method for urban artery coordinated control based on the cosine modified adaptive

genetic algorithm', Lei Qi et al. propose an arterial traffic coordinated control optimisation method by using the cosine modified adaptive genetic algorithm in order to relieve the traffic congestion, especially the traffic burden of the artery in the urban road network. Firstly, the paper considers the importance of different directions traffic release of intersections coordinated phase, and takes the number of vehicles within the maximised green wave bandwidth as the objective to establish the traffic coordinated control model. Secondly, the cosine modified adaptive genetic algorithm is applied to solve the model. Finally, the traffic coordinated control system including six consecutive intersections is designed in Tianshui Road, Lanzhou, China. The optimisation result shows that the cosine modified adaptive genetic algorithm has a good performance in the optimisation of the traffic coordinated control system.

In the paper, 'Multi-strategy ensemble artificial bee colony algorithm for large-scale production scheduling problem', Hui Want et al. present a multi-strategy ensemble artificial bee colony (MEABC) algorithm for solving large-scale production scheduling problem. MEABC is a new variant of artificial bee colony (ABC), which has shown good performance on many continuous optimisation problems. To apply MEABC to discrete production scheduling problem, the smallest position value (SPV) rule is employed. Moreover, a modified NEH-based population initialisation method is utilised for generating high-quality initial solutions. Experimental study is conducted on a set of 140 flow shop scheduling problems.

Estimation of distribution algorithm (EDA) is a branch of evolutionary algorithms. EDA replaces recombination and mutation operators with the estimation of probabilistic distribution of selected individuals. However, these selected individuals only cover part of the problem to be optimised, which causes that the algorithm may easily fall into a local optimum. In the paper, 'rEDA: reverse estimation of distribution algorithm for classification', Jian-cong Fan et al. propose a variation of EDA, reverse estimation of distribution algorithm (rEDA), from the perspective of reverse process. Different from the EDA process that individuals are firstly given and then the estimation of models starts, rEDA is to firstly give initial models and then regulate these models relying on sampling from the models and optimisation objective. We employ rEDA to classification in data mining area and propose a novel classification algorithm based on rEDA. The proposed rEDA algorithm and rEDA-based classification algorithm are analysed theoretically. The empirical results show our proposed algorithm outperforms some classical classification algorithms in accuracy.

In the paper, 'Particle swarm optimisation-based KNN for improving KNN and ensemble classification performance', Debojit Boro et al. use KNN algorithm for our ensemble classification process that finds out the nearest K training samples given a test sample where each sample is predictions vector generated by combined computation of classifiers ensemble and algebraic combiners. In this attempt to reduce the computational time involved in

finding K training samples by KNN, we used particle swarm optimisation (PSO) with KNN which randomly selects the training samples from the training set until a global consensus is reached among the particles and label that test sample with an appropriate class by weighted majority voting (WMV) of K training samples. The proposed method demonstrated better ensemble performance as compared to KNN and other traditional ensemble methods in terms of computational time and generalisation accuracies when tested over several datasets from UCI repository and other high dimensional datasets.

With the rapid development of mobile commerce, more and more researchers focus on mobile users segmentation. In the paper, 'An efficient clustering method for mobile users based on hybrid PSO and ABC', Chong-huan Xu presents an efficient clustering method which involves three sub-algorithms: K-harmonic means, PSO and ABC. In order to overcome the problem of convergence to the local optimum, we use a hybrid nature-inspired algorithm, namely hybrid PSO and ABC, to solve them. In the process of evolution, the population is divided into two sub-groups. One evolves by PSO algorithm, and the other evolves by ABC algorithm. By the comparison of two fitness values generated by these different algorithms, respectively, we can get a better value. Finally, we will obtain the optimal value by iterative calculation. Detailed simulation analysis demonstrates the efficiency and effectiveness of our approach.

Bat algorithm is a novel swarm intelligent algorithm inspired by the echolocation behaviour of bats. However, the exploration capability is not well for some multi-model problems. In the paper, 'Bat algorithm with oscillation element', the control theory is applied to analyse the exploration behaviour for each bat, theoretical result shows the update manner in the standard version of bat algorithm can be viewed as a special case of oscillation element. Therefore, a new variant of bat algorithm, called bat algorithm with oscillation element, is designed. Different from the standard version, frequency is set to negative in this new variant. Furthermore, a new parameter, inertia weight is employed to provide a balance between exploitation and exploration. To test the performance, the CEC2013 shifted and rotated benchmark problems are used to compare, simulation results show our method is validity.

Cloud computing provides internet-based services to access different kind of service or resources, eliminating the need for centralised data access. There are several challenges available in cloud computing, where specific issues like resource provisioning, load imbalance and performance improvement can be solved using bio-inspired algorithms. Bio-inspired algorithms have the tendency to solve various kinds of problems naturally by providing optimised solutions. Though it is not used in cloud computing to a greater extent, it is applicable in networking, pattern recognition, data mining, wireless sensor networks, etc. The adaptability influences the use of bio-inspired algorithms to solve the major issues in cloud computing. In the paper, 'Bio-inspired algorithms for cloud computing: a

review', Balamurugan Balusamy et al. provide an extensive survey of bio-inspired algorithms for solving and optimising problems related to resource scheduling, load balancing, file searching and security in cloud computing. The work compares the performance, response time and cost optimisation of each algorithm applicable for cloud computing environment.

The offshore/onsite teams effectiveness of knowledge transfer is significantly measured by various kinds of factors. In the paper, 'A fuzzy DEMATEL approach based on intuitionistic fuzzy information for evaluating knowledge transfer effectiveness in GSD projects', Arun Kumar Sangaiah et al. propose a knowledge transfer (KT) assessment framework which integrates four criteria for evaluating the KT effectiveness of GSD teams. These are: knowledge, team, technology, and organisation factors. In this context, we present a fuzzy DEMATEL approach for assessing GSD teams KT effectiveness based on intuitionistic fuzzy numbers (IFNs). In this approach, decision makers provide their subjective judgements on the criteria, characterised on the basis of intuitionistic fuzzy sets. Moreover, intuitionistic fuzzy sets used in the fuzzy DEMATEL approach can effectively assess the KT effectiveness criteria and rank the alternatives. Subsequently, the entire process is illustrated with GSD teams KT evaluation criteria samples, and the factors are ranked using fuzzy linguistic variables which are mapped to IFNs. Afterwards, the IFNs are converted into their corresponding basic probability assignments (BPAs) and then the Dempster-Shafer theory is used to combine the group decision making process. Besides, illustrative applicability and usefulness of the proposed approach in group decision making process for the evaluation of multiple criteria under fuzzy environment has been tested by software professionals at Inowits Software Organisation in India.

Compressed sensing is a new signal sampling theory put forward recent years. It can obtain signals discrete sample in the condition that the sampling rate of signal is far smaller than the Nyquist sampling rate. It makes the original signal perfectly reconstructed with nonlinear reconstruction algorithm. In the paper, 'An adaptive transpose measurement matrix algorithm for signal reconstruction in compressed sensing', some typical greedy reconstruction algorithms, i.e., OMP, ROMP and SP are compared in terms of reconstruction accuracy, error rate and time of reconstruction. Furthermore, a new transpose measurement matrix reconstruction algorithm is proposed and tested. The experiments show that the proposed algorithm can effectively improve the optimisation of the signal transmission.

This special issue on 'Nature-inspired algorithms: theory and applications' presents the latest research and development in nature-inspired algorithms. The guest editors expect that the readers will benefit from the papers presented in the special issue.