Editorial

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Biographical notes: Zhihua Cui is a Professor of Computer Science and Technology, and Director of Complex System and Computational Intelligence Laboratory at the Taiyuan University of Science and Technology, China. He is a member of IEEE and ACM, senior member of the China Computer Federation (CCF) and member of the Chinese Association of Artificial Intelligence (CAAI). He received his PhD in System Engineering from the Xi'an Jiaotong University, China in 2008, and BSc in Computer Science from the Taiyuan Heavy Machinery Institute in 2003. He is the Founding Editor-in-Chief of the *International Journal of Bio-inspired Computation*. His research interest includes computational intelligence, stochastic algorithm, and combinatorial optimisation. He has published over 60 peer-reviewed journal papers, 60 peer-reviewed full conference papers, and five books in computational intelligence.

Xiao-Zhi Gao received his BSc and MSc degrees from the Harbin Institute of Technology, China in 1993 and 1996, respectively. He obtained his DSc (Tech.) degree from the Helsinki University of Technology (now Aalto University), Finland in 1999. He was appointed as a Docent at the same university in 2004. He has been working as a Professor at the University of Eastern Finland, Finland since 2018. He is also a Guest Professor at the Harbin Institute of Technology, Beijing Normal University, and Shanghai Maritime University, China. His current research interests are nature-inspired computing methods with their applications in optimisation, data mining, machine learning, control, signal processing, and industrial electronics. He has published more than 350 technical papers in the referred journals and conferences, and his present Google Scholar H-index is 29.

Memetic computing (MC) represents a broad generic framework using the notion of meme(s) as units of information encoded in computational representations for the purpose of problem solving. These meme-inspired algorithms, frameworks and paradigms have been demonstrated with considerable success in various real-world applications.

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

In this paper, 'An enhanced cuckoo search using dimension selection', Wang et al. proposes an enhanced cuckoo search algorithm using dimension selection. In the proposed strategy, the dimensional distance measure is used to selects a part of dimensions of each solution to search for the new solution in two search components. The dimensions of each solution are selected when those dimensional distances are larger than the average distance of all dimensional distance. A suit of 20 benchmark functions are employed to verify the performance of the proposed algorithm, and the results show the improvement in effectiveness and efficiency of dimension selection.

In this paper, 'A new artificial bee colony based on neighbourhood selection', Xiong and Tang present a new artificial bee colony (ABC) for solving numerical optimisation problems. In the original ABC, a new candidate solution is generated based on the current solution and a randomly selected one. However, the random selection method is unstable. To accelerate the search, a new neighbourhood selection is proposed. For each current solution, we firstly randomly select some solutions from the current population. Then, we choose the best one among those solutions as the neighbourhood solution to generate new solutions. To verify the performance, we test several classical numerical optimisation problems. Simulation results show that our approach outperforms the original ABC and some improved ABC versions.

In the standard firefly algorithm (FA), the random moving step is very important to the direction of the firefly movement, and the parameter alpha plays an important role

in the random moving step. In this paper entitled with 'A novel firefly algorithm with self-adaptive step strategy', Wang and Liu proposed a self-adaptive step strategy based on distance control in this paper, and we called it SASFA. Thirteen well-known benchmark functions are used to verify the performance of our proposed method, the computational results show that SASFA is more efficient than many other FA algorithms.

In the paper, 'One-dimensional deep learning firefly algorithm guided by the best particle', Xie et al. propose the one-dimensional deep learning FA guided by the best particle in order to increase the convergence speed and optimisation precision of the FA. In each generation of optimisation process, the optimal particle is first updated in a fixed number of times according to the newly designed update formula. The update mode is defined as single-dimensional deep learning. After the optimal particle completes single-dimensional deep learning, other fireflies in the population keep the original evolutionary way to update the location and iteratively complete the optimisation task. Experiments with 12 benchmark functions show that the proposed algorithm has a higher optimisation capacity than the other six modified FAs.

FA, as a relatively recent emerged swarm intelligence algorithm, is powerful and popular for the complex real parameter global optimisation. However, the premature convergence has greatly affected the performance of original FA. To overcome this problem, in this paper, 'Gaussian bare-bones firefly algorithm', Peng and Peng propose a Gaussian bare-bones FA, named GBFA, in which each firefly moves to a Gaussian bare-bones method generated learning object rather than its better neighbours. The experiments are conducted on a set of widely used benchmark functions. Experimental results and comparison with the state-of-the-art FA variants have proved that the proposed algorithm is promising.

In recent years, the development of many rehabilitation robots, bionic prostheses and other sports rehabilitation equipment, which are used to assist the body to restore body movement function, has been paid more and more attention. In the paper, 'Hand motions recognition based on sEMG nonlinear feature and time domain feature fusion', Li et al. proposes a pattern recognition framework. The feature extraction of sEMG is to extract the physical quantity or a set of physical features that fully represent the characteristics of the action class from the electromyogram corresponding to the action of the human hand, in order to distinguish the other types of motion. It is very important step in hand movement recognition. In this paper, the newly developed sEMG nonlinear features AMR are fused with the traditional sEMG time-domain features WL. Feature fusion using SVM-DS fusion algorithm. Hand motions recognition based on feature fusion is improved in accuracy and stability. The accuracy of recognition can be stabilised over 95%.

One difficulty in solving optimisation problems is the handling many local optima. The usual approaches to handle the difficulty are to introduce the niche-count into evolutionary algorithms (EAs) to increase population diversity. In this paper, 'Dynamic HypE for solving single objective optimisation problems', Zhang et al. introduces the niche-count into the problems, not into the EAs. We construct a dynamic multi-objective optimisation problem (DMOP) for the single optimisation problem (SOP) and ensure both the DMOP and the SOP is equivalent to each other. The DMOP has two objectives: the original objective and a niche-count objective. The second objective aims to maintain the population diversity for handling the local optima difficulty during the search process. A dynamic version of a multi-objective evolutionary algorithm (DMOEA), specifically, HypE-DE, is used to solve the DMOP; consequently the SOP is solved. Experimental results show that the performance of the proposed method is significantly better than the state-of-the-art competitors on a set of test problems.

The winner determination problem (WDP) in combinatorial auctions is to determine an allocation of items to bidders such that each item is allocated to at most one bidder, and the auctioneer's revenue is maximised. In this paper, 'A hybrid binary harmony search algorithm for solving the winner determination problem', Lin and Li proposes a hybrid binary harmony search algorithm for the WDP. Firstly, to enhance the global search ability of the proposed algorithm, a modified harmony improvisation mechanism is developed with a modified memory consideration rule and an adaptive pitch adjustment scheme. Next, a repair operator is employed to guarantee the feasibility of the new candidate harmonies. Finally, a tabu search procedure is presented to improve the local search ability. These strategies make a good balance between intensification and diversification. In the experiments, the performance of the proposed algorithm is validated on five groups of 500 instances. Experimental results and comparisons show that the proposed algorithm is very efficient, and the tabu search procedure significantly improves the performance of the proposed algorithm.

This special issue on 'Recent advances in memetic computing' presents the latest research and development in MC. The guest editors expect that the readers will benefit from the papers presented in the special issue.

The guest editors of this special issue would like to thank all authors for submitting their interesting work. We are grateful to the reviewers for their great contributions to this special issue. Moreover, the guest co-editors are very much grateful to the Editor-in-Chief of the journal, namely Dr. Nadia Nedjah, for the opportunity to organise this special issue as well as the Managing Editor, Liz Harris and all the editorial team at Inderscience for the assistance during the submission, review and production steps.

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