Editorial

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In the past decade, the field of intelligent systems has attracted increasing attention from researchers. Many new theoretical insights and practical applications are reported. This special issue intends to compile the latest research and development, up-to-date issues, and challenges in the field of intelligent systems. After a peer-review process, a total of 11 papers have been accepted for publication in this issue.

Chen et al. proposed an agent approach for analysing internet rumour propagation. First, an expanded rumour spreading model was established by considering the methods of spreading rumours and dispelling rumours, the dynamics of the spread rate and the mechanism for individuals to forget information. Then, the agent method is used to analyse the model. Simulation results show that the final scale of the spread of rumours can be reduced through a continuous stream of hot events. By enhancing the influence of the rumours, the number of rumours and the spread of rumours can be effectively reduced. Additionally, small-world networks and scale-free networks have no effect on the spread of rumours.

Huang et al. used deep learning to optimise the Cost 231-Hata model of wireless communication. According to the geometric relationship between base station and cell location, two new reference features are extracted. The principal component analysis is used to reduce the dimension of the dataset. Six features highly correlated with the target are taken as the input of neural network, a wireless propagation model based on deep learning is constructed by error back propagation algorithm. Simulation results show that the proposed model achieve higher prediction accuracy than the traditional Cost 231-Hata model.

Ma et al. proposed a fuzzy PID controller based on scaling factor self-regulation strategy. Firstly, based on the D-H parameter model, the linkage model of the four-DOF manipulator was established, and the homogeneous transformation matrix of the manipulator was calculated. Then, the trajectory tracking intelligent controller is designed and improved, and the optimal parameters of the controller are found by using the scale factor self-regulation strategy. Simulation results show that the trajectory tracking error of the manipulator is obviously reduced.

Li et al. proposed an effective differential evolution (DE) with staged diversity enhancement strategy (called SDESDE), which can increase the diversity of the population. In the early search stage, a balanced search strategy is emphasised. In the middle search stage, a diversity enhancement strategy is used to avoid getting trapped in the local optima. In the later search stage, a fast convergence strategy is adopted. Moreover, an adaptive

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mechanism is employed to enhance the population diversity at different stages and improve the efficiency of search. In the experiments, SDESDE is compared with four representative DE algorithms. Results demonstrate that the proposed algorithm not only has better performance in maintaining population diversity but also has highly competitive in overall performance.

Chen and Tang proposed a hybrid firefly algorithm based on modified neighbourhood attraction (called HMNaFA). The best solution selected from the current neighbourhood is used for competition. If the best solution wins the competition, the current solution flies towards the best one, otherwise a new neighbourhood search is employed to produce high quality solutions. Simulation results on 13 classical benchmark problems show HMNaFA surpasses FA with neighbourhood attraction and several other FA algorithms.

Jia et al. proposed a genetic algorithm (GA)-based robust approach for type-II U-shaped assembly line balancing problem. First, a mathematical model is established with interval task operation times. Then, GA is used to optimise the cycle time with the given station numbers. A robust solution is defined as the most frequent solution falling within a pre-specified percentage of the optimal solution for different sets of scenarios. Simulation results show that the proposed approach can obtain promising performance.

Wang et al. proposed a multi-modal multi-objective differential evolution algorithm based on spectral clustering (SC-MMODE), which mainly used some mechanisms to divide the solutions in the decision space into several mutually independent sub-populations. First, SC-MMODE used a spectral clustering algorithm to control the decision space and formed multiple sub-populations with good neighbourhood relations. Secondly, a special crowding distance mechanism was used to balance the distribution of solutions in the decision space and objective space. In addition, the classical DE algorithm could effectively prevent premature convergence.

Peng et al. proposed a novel cuckoo search (CS) algorithm with complement strategy (called CoCS). In CoCS, new solutions are generated by two strategies in a random manner. The first strategy is an improved Lévy flights, and the second one is adaptive to determine the step size based on the fitness value and the number of current iterations. Performance of CoCS is compared with the standard CA and several other CS variants on 28 benchmark functions. Experimental results prove that CoCS can obtain promising performance.

Zhou et al. proposed an improved artificial bee colony (ABC) algorithm by using elite information. Two novel solution search equations are designed based on utilising elite information, which has the advantages of accelerating convergence rate. Moreover, a new reinitialisation method is proposed based on using elite information to preserve the search experience of the scout bee phase. Experiments are conducted on the CEC 2013 and CEC 2015 test suites. Four other ABC variants are included for performance comparison. Results show that the proposed approach has better performance in terms of convergence speed and result accuracy.

Fan et al. proposed a density peak clustering algorithm based on kernel density estimation and minimum spanning tree (called DPC-MST). Gaussian kernel density is adopted to estimate the local density of samples and coordinate the relationship between the part and the whole. A new allocation strategy is combined with the idea of minimum spanning tree to generate a tree from the dataset according to the principle of high density and close distance. Experimental results show that DPC-MST obtains better clustering performance than five other algorithms.

Wu et al. proposed an elite subgroup guided particle swarm optimisation algorithm with multi-strategy adaptive learning (called EGAPSO). To help trapped particles escape from local minima, the social cognitive part can learn from the global optimal particle and the particle in the elite subgroup. Multiple strategies including elite opposition-based learning, subspace Gaussian learning, and mean centre learning with different search characteristics are adaptively selected in the evolutionary process. Simulation results on two benchmark sets show that EGAPSO performs better when compared with several other PSO variants.

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