Preface

Ying Tan¹ · Yuhui Shi² · Xin Yao³

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As a branch of meta-heuristic algorithms, swarm intelligence is concerned with the collective behavior of decentralized, self-organized and populated systems. Inspired by the complex behavior of biological populations, researchers have proposed many distributed models or algorithms for problem-solving in complex environments by means of observing, abstracting, modeling, and simulating the collaborative behavior in nature biological populations. Usually, the optimization process of a swarm intelligence algorithm is a heuristic and iterative search process by constantly generating, updating, and selecting solutions. The research objective of swarm intelligence algorithm is to design optimization algorithms with the ability of problem-solving by taking inspiration from the intelligent behavior exhibited in biological communities and understanding the characteristics of the interaction mechanism in a swarm. Exploring the wisdom of collective behavior swarm intelligence algorithms have achieved great success in many practical problems, such as path planning, task scheduling, multi-robot systems, data mining and so on. Currently, swarm intelligence algorithms and their applications are widely studied.

One of the most popular swarm intelligence algorithms is the Particle Swarm Optimization (PSO), which is inspired by the social behavior of bird flocking and has been widely used in real-parameter optimization problems. Very recently, many nature-inspired algorithms have been

proposed, such as the fireworks algorithm (FWA) which is inspired by the fireworks explosions in the air. Besides the research on improvements of algorithms, a number of important applications of swarm intelligence algorithms, including PSO, ACO, FWA, have been reported in a variety of fields. The International Conference on Swarm Intelligence (ICSI) series conference is an important forum for researchers and practitioners to exchange latest advances in theories, technologies, and applications of swarm intelligence and related areas. The Ninth and Tenth International Conference on Swarm Intelligence and the Third and Fourth International Conference of Data Mining and Big Data (ICSI-DMBD'2018&2019) were successfully held in Shanghai, China and Chiang Mai, Thailand, respectively, with the goal of prompting a combination of the swarm intelligence and computational intelligence studies all over the world. The theme of the ICSI-DMBD events was "Serving Life with Intelligence". With the help of the technical committee of this joint event, some high-quality papers from the ICSI-DMBD'2018&2019 reflecting the latest advances in swarm intelligence algorithms and their applications were recommended for this special issue.

This special issue aims at promoting research on swarm intelligence and its applications by publishing some of the important advances in current research. A number of active researchers responded enthusiastically to our call for contributions. As the outcome of a thorough reviewing process, eight papers were chosen for this special issue.

The first paper "Cooperative Search Method for Multiple AUVs Based on Target Clustering and Path.

Optimization" by Haifeng Ling, Tao Zhu, Weixiong He, Zhanliang Zhang and Hongchuan Luo studies one search method for uncertain targets using multiple autonomous underwater vehicles (AUVs). In order to improve search efficiency, a cooperative search method based on target clustering and path optimization is proposed to reduce reactive consumption and obtain more revenue. Experimental results show that the cooperative search method proposed in this paper can obtain a larger amount of total

✉ Ying Tan
ytan@pku.edu.cn
<http://www.cil.pku.edu.cn>

Yuhui Shi
shiyh@sustc.edu.cn

Xin Yao
X.Yao@cs.bham.ac.uk

¹ Peking University, Beijing, China

² Southern University of Science and Technology of China, Shenzhen, China

³ Birmingham University, Birmingham, UK

revenue in the same period of time with more stable performance than the other algorithms.

The second paper is “Adaptive CCR-ELM with Variable-length Brain Storm Optimization Algorithm for Class-imbalance Learning” by Jian Cheng, Jingjing Chen, Yi-nan Guo, Shi Cheng, Linkai Yang and Pei Zhang. An adaptive CCR-ELM (Class-specific cost regulation extreme learning machine) with variable-length brain storm optimization algorithm is proposed for the class-imbalance learning. The experimental results for nine imbalance datasets show that variable-length brain storm optimization algorithm can find better parameters of CCR-ELM, resulting in the better classification accuracy than other evolutionary optimization algorithms. In addition, the classification performance of the proposed adaptive algorithm is relatively stable under varied imbalance ratios.

In the third paper entitled “Integrated Probability Multi-search and Solution Acceptance Rule-based Artificial Bee Colony Optimization Scheme for Web Service Composition” by N. Arunachalam and A. Amuthan, An Integrated Probability Multi-search and Solution Acceptance Rule-based Artificial Bee Colony Optimization Scheme (IPMSAR-ABCOS) is proposed for optimizing the process of service compositions derived using transaction and Quality of Service (QoS) characteristics of services. The experimental analysis of the proposed IPMSAR-ABCOS inferred that its response time, accuracy and recall value are enhanced by 24%, 22% and 19% excellent to the ABC-based meta-heuristic service composition techniques considered for analysis.

The fourth paper entitled “A Novel Hybrid BPSO-SCA Approach for Feature Selection” by Lalit Kumar and Kusum Kumari Bharti proposed a hybrid nature-inspired algorithm (NIA) for feature selection problem. It selects an informative subset of features and performs cluster analysis by employing a cross breed approach of Binary Particle Swarm Optimization (BPSO) and Sine Cosine Algorithm (SCA) named as Hybrid Binary Particle Swarm Optimization and Sine Cosine Algorithm (HBPSOSCA). The conducted analysis demonstrated that the proposed method HBPSOSCA can attain better performance in comparison with the competitive methods in most of the cases.

The fifth paper “A Multi-objective Feature Selection Method Based on Bacterial Foraging Optimization” by Ben Niu, Wenjie Yi, Lijing Tan, Shuang Geng and Hong Wang formulates feature selection as a multi-objective problem. In order to address feature selection problem, this paper used the multi-objective bacterial foraging optimization algorithm (MOBFO) to select the feature subsets and k-nearest neighbor algorithm (KNN) as the evaluation algorithm. On six small datasets and ten high-dimensional

datasets, comparative experiments with different conventional wrapper methods and several evolutionary algorithms demonstrate the superiority of the proposed bacteria-inspired based feature selection method.

The sixth paper is “Ensemble Learning Based on Fitness Euclidean-distance Ratio Differential Evolution for Classification” by Jing Liang, Yunpeng Wei, Boyang Qu, Caitong Yue and Hui Song proposes a novel ensemble learning algorithm based on fitness Euclidean-distance ratio differential evolution. A dynamic ensemble selection scheme is applied to select appropriate individuals for the ensemble. The proposed algorithm is evaluated on several benchmark problems and experimental results demonstrate that the proposed algorithm outperforms the related works and can produce the neural network ensembles with better generalization.

The seventh paper is “Multi-objective Bacterial Colony Optimization Algorithm for Integrated Container Terminal Scheduling Problem” by Ben Niu, Qianying Liu, Zhengxu Wang, Lijing Tan and Li Li. A multi-objective integrated container terminal scheduling problem is proposed by considering three key components: berth allocation, quay cranes assignment and containers transportation in port operation process. In order to test the performance of the MORBCO, benchmark tests are performed and compared with traditional MOBCO and three other well-known multi-objective algorithms. The computational results indicate that the proposed algorithm can outperform other rivals and efficiently solve a variety of multi-objective problems in most of cases.

The eighth paper is “An Enhanced Monarch Butterfly Optimization Algorithm with Self-Adaptive Crossover Operator for Unconstrained and Constrained Optimization Problems” by Mingyang Chen. This paper incorporated several modifications into the basic MBO algorithm and proposed an improved MBO algorithm with self-adaptive crossover namely SACMBO, for unstrained and constrained optimization problems. The experimental results on 22 unstrained optimization problems indicate that the proposed SACMBO algorithm outperforms the basic MBO and other five state-of-the-art metaheuristic algorithms.

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