Editorial

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For this issue, I have put together a good mix of papers that cover various aspects of computational problem-solving. In the context of complex optimization, the notion of balancing exploration and exploitation will remain as a core guiding principle. Within this reality of search optimization, we have often reiterated that memes can serve as units that can be effectively managed to influence the evolutionary dynamics, with the ultimate aim of uncovering good and desirable patterns, structures, arrangements, etc. I hope this issue will further reinforce this notion and offers some enlightening exposition to the notion of memetic computation as a broadened and flexible framework for problem-solving.

Exploration and exploitation are two opposing forces at work during optimization. This is particularly evident when one traces through the mechanisms that drive a search algorithm towards desirable regions of a search space. There are many metaphor inspired algorithms that have been developed over the years and one can safely say that there will not be a clear-cut absolute winner in terms of performance superiority for any single method, which motivates further research on innovative search algorithms. To this end, we start off this issue with a relatively new nature inspired search algorithm that is based on the characteristics of birds foraging behavior. Termed as birds foraging search or BFS, Zhang et al. illustrate the potential of this approach and demonstrate its efficacy in comparison to other state-of-the-art population-based approaches based on testing on some function optimization benchmarks.

The common but important issue of representation and encoding in the context of evolutionary computation is being addressed in the paper by Sipper and Moore. The novelty of their work lies in the auto-discovery of representation and encoding for a problem of interest by means of a co-evolutionary algorithm. The idea is to set up a configuration of co-evolving of “species”—a population of representations and a population of encodings. They provided proof-of-concept through experiments to demonstrate the potential of

the approach from the perspectives of problem-solving and exploratory platform.

The next two papers deal with imbalanced data classification using different approaches. The paper by Raghuwanshi and Shukla uses an extreme learning machine (ELM) approach while the paper by Qiu et al. is based on a multi-objective evolutionary algorithm approach. For the ELM approach, the authors use kernel weighted ELM to generate class-specific ensemble. Meanwhile, the multi-objective approach capitalizes on the multi-level knee points generated during the evolution process. They make use of an adaptive clustering strategy to determine the knee points of the population. Both implementations were tested on class imbalanced benchmark datasets with competitive results.

Most existing works concerning theoretical analysis on extreme learning machines (ELM) focus on single-output regression and classification. The paper by Wang et al. attempts to deal with the estimation of the generalization performance of multi-output extreme learning machine classifier (M-ELM). M-ELM which uses a different way to encode and decode the labels of the data as compared to single-output ELM, serves as a powerful multi-class classifier. The authors presented some analysis to derive the performance bound of M-ELM in the framework of statistical learning theory.

Along the line of ELM, it has been shown that although distributed ELM can sufficiently process large-scale labelled training data, it remains a challenge to process partially labelled or unlabelled training data. The work by Zhiqiong Wang and co-workers propose a new Unified Distributed ELM with supervised, semi-supervised and unsupervised learning based on MapReduce framework to overcome the limitation of current ELM framework in handling partially labelled and unlabelled training data. They tested and verify the efficacy of their proposed framework on benchmarks and synthetic dataset.

The next paper by Barbosa et al., is on differential evolution which utilized mutation and crossover to manage the feasibility of solutions in terms of linear equality constraints for continuous optimization problems. This paper is

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an extension of an earlier work with improvement in the form numerical errors correction being incorporated.

Finally, I include a short technical letter by A. Misevicius to complete this issue. Most people working on combinatorial optimization, in particular the quadratic assignment problems (QAP) will be familiar with the QAP benchmark problems set. Among the benchmark problems, the *tail00a* instance is difficult in the sense that it is highly unstructured and the optimum is unknown. In his technical letter, Misevicius reported an improvement to the best known value for the objective function achieved using the iterated tabu search method.

This issue has presented an interesting mix of optimization algorithms and machine learning in problem-solving. I acknowledge the contributions of the reviewers for their dili-

gence in reviewing the papers and the Editors who managed the review of the papers. They are the ones behind the scene who helped to make this issue possible, ensuring the quality and consistency of the papers selected for publication. It is also with sincere appreciation to all the Editors, authors and reviewers that I announce for the recently released numbers for journal impact factors, Memetic Computing scored a highly respectable impact factor of 2.674. This is indeed a great encouragement for us to continue to do our part in maintaining the standard and quality that makes this journal a desirable channel for publication.

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