Editorial

Meng-Hiot Lim¹

Published online: 13 February 2020
© Springer-Verlag GmbH Germany, part of Springer Nature 2020

This first issue of 2020 is a compilation of 5 papers. All the papers except for one, focus mainly on techniques or computational models for solving combinatorial optimization problems. As the number of papers submitted to the journal increases, managing and evaluating the papers for publication consideration will be a challenge. Challenging as it may be, it is heartening to accept this as being an indication of the general acceptance of this journal as a channel for disseminating and sharing of research results among researchers in the field.

I would like to start of this issue with an article on deep memetic computing framework by Amaya and co-workers. Their work is rooted on the idea of cooperative optimization, with a framework that embraces multiple metaheuristics within a deep memetic structure. They experimented with different structural and communication topologies as a means of influencing the depth of the cooperative dynamics. As case study to demonstrate their deep memetic framework in solving combinatorial optimization problems, they chose the tool switching problem for comparison against other state-of-art metaheuristics in literature.

In the field of computer science, the travelling salesman problem (TSP) is generally regarded as one of the classical de facto combinatorial optimization problems used as illustration and case study for search and optimization. In this paper by Eremeev and Kovalenko, the focus is on asymmetric TSP based on a memetic approach. The key operators in their evolutionary search algorithms are 3-opt and 4-opt mutation type of neighbourhood search. The results of simulations on ATSP instances from the TSPLIB are promising.

The knapsack problem is a classical combinatorial optimization problems which is known to be NP-hard. The general scope of optimization entails maximizing the value of items in knapsack subject to the weight capacity limit of the knapsack. In this paper, Zhan and co-authors explore the use of noising methods, in particular noising of objec-

tive function and noising of data as a means of escaping from local optima. The rate of noise injection is controlled using two strategies, arithmetic or geometric means, a trait that bears similarity to simulated annealing. They compared their approach to six other variants of noising methods on instances of 0-1 knapsack benchmark problems with competitive results based on simulations.

The next paper by Dulebenets outlines a new island model evolutionary algorithm to solve a practical berth scheduling problem (BSP) associated to marine container terminals. Efficient container handling at shipping terminals is crucial in international trade. The issues faced by containers terminal operators are congestions and delays. In the BSP, the goal is to compute the assignment of arriving vessels to the available container terminal berths as well as determining the order of vessels to be served at every berth. Inefficient berth schedules may lead to delays in vessel service, unbalanced workload among the handling equipment units and increasing congestion. This will further result in product delivery delays to end customers. To deal with these issues, the paper describes an approach that rely on multiple islands of evolutionary search algorithms and compare it with other metaheuristic approaches.

The final paper of this issue by Deng et. al. innovates two dynamic speciation based mutation strategies to enhance the capability of differential evolution (DE) search algorithm. Although over the years, there are many search algorithms that have been invented to solve difficult and complex optimization problems, DE is still widely regarded as an efficient, powerful yet simple algorithm. A fundamental step in their niching approach is based on a dynamic speciation technique for selective apportioning of critical individuals in the population. As validation, they tested their dynamic speciation DE on benchmarks and compared it against several other DE variants. In general, they reported results that demonstrate the overall effectiveness of their seeds-guided mutation strategies.

✉ Meng-Hiot Lim
emhlim@ntu.edu.sg

¹ Singapore, Singapore

I am indebted to the many people who acted behind the scene to bring the publication of this issue to fruition. In particular the editors tasked with the role of managing the review of the papers submitted and the anonymous reviewers who evaluated the technical content of the papers have been very professional and proficient. Their hard work and dedication

is the key to maintaining the quality and standing of this journal. I gratefully acknowledge the efforts of these individuals and their professionalism.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.