

# **The Effect of Elite Pool in Hybrid Population-based Meta-heuristics for Solving Combinatorial Optimization Problems**

**Ghaith Jaradat, Masri Ayob, Ibrahim Almarashdeh**

This work investigates the effect of elite pool that has high-quality and diverse solutions in three hybrid population-based meta-heuristics with an elite pool of a hybrid Elitist-Ant System, a hybrid Big Bang-Big Crunch optimization, and a hybrid scatter search. The purpose of incorporating an elite pool in population based meta-heuristics is to maintain the diversity of the search while exploiting the solution space as in the reference set of the scatter search. This may guarantee the effectiveness and efficiency of the search, which could enhance the performance of the algorithms and generalized well across different datasets. To test the generality of these meta-heuristics via their consistency and efficiency, we use three classes of well-known combinatorial optimization problems as follows: symmetric traveling salesman problem, 0–1 multidimensional knapsack problem, and capacitated vehicle routing problem. Experimental results showed that the performance of our hybrid population-based meta-heuristics, compared to the best known results, is competitive in many instances. This finding indicates the effectiveness of utilizing an elite pool in our hybrid meta-heuristics in diversifying the search and subsequently enhances their performance over different instances and problems.

Jaradat, Ghaith, Ayob, Masri, Almarashdeh, Ibrahim, (2016), The Effect of Elite Pool in Hybrid Population-based Meta-heuristics for Solving Combinatorial Optimization Problems, Elsevier - Applied Soft Computing.