An Empirical performances comparison of meta-heuristic algorithms for school bus routing problem

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Abstract

School Bus Routing Problem is an NP-hard Combinatorial Optimization problem, and hence solving the School Bus Routing Problem, requires the application of one or more of the metaheuristic algorithms. This work presents a model of the School Bus Routing Problem and empirical performances comparison between three meta- heuristic algorithms namely, Simulated Annealing, Tabu Search and Ant Colony for solving a real-life School Bus Routing Problem. We have analyzed their performances in terms of computation time, efficiency and solution quality. All the three algorithms have effectively demonstrated the ability to solve the School Bus Routing Problem. The computational results show that better solution quality and fastest execution time of the Meta-heuristic algorithms depends on the number of buses and stops. The results also show that Ant Colony Algorithm produces better solution, followed by Simulated Annealing, then Tabu Search for those schools with a large number of buses and stops.

Keywords— School Bus Routing Problem, Combinatorial Optimization and Meta-heuristic Algorithms.