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A NEW APPROACH: MAXIMIZING LOAD RATIOS OF VEHICLES TO MAINTAIN PROFITABILITY IN OPEN VEHICLE PROBLEMS

Abstract:

Open vehicle routing problem (OVRP) is a special case of the well-known vehicle routing problem (VRP), which is one of the most popular optimization issues in transportation. In open vehicle problems, the ultimate goal is usually defined as finding the routes with the optimum costs, by means of fleet size and the travelled distance. Vehicles do not return to the depot after delivering their goods to the customer nodes. There is a classical approach of finding the shortest paths and minimum fleet size to solve these problems. However, most logistic companies are often interested in the load ratio of their vehicles as well. They expect their vehicles to take long distances with reasonable load ratios. For a vehicle to leave the big percentage of the load in the first delivery points and take the remaining much longer distance almost empty is an unwanted situation. In this study, a solution to the open vehicle routing problems is proposed from this perspective. To solve these kinds of NP-Hard problems, using metaheuristics is a fine way of obtaining good-enough solutions within reasonable time. In this study, a modified genetic algorithm is coded and a user-friendly decision support system is designed to solve this specific problem.

Keywords:

open vehicle routing, maximizing load ratio, transportation optimization, metaheuristics, modified genetic algorithm, crossover operators, hybrid metaheuristic, optimization, shortest path, minimum fleet size

JEL Classification: L91, L87