

Vehicle Sequencing for Minimizing the Total Weighted Travel Distance

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Abstract

The problem of determining the optimal sequence to visit n cities is called the traveling salesman problem (TSP). Typically the objective function of the TSP is to minimize the total travel distance since it is regarded to best represent the total cost. In this study we consider a vehicle sequencing problem where a vehicle visits n cities, at each of which a certain amount of load is dropped. The objective is to minimize the total weighted travel distance where the weight is the amount of load that the vehicle carries while moving to the next city. This problem can be viewed as the weighted traveling salesman problem (WTSP).

Minimizing the total weighted travel distance is practically important in a sense that (1) the fuel consumption is almost proportional to the total weight of the vehicle; and (2) more maintenance cost and more damage on the road will occur for heavily loaded vehicles. We evaluate a few heuristic sequencing algorithms under various problem size and distance metrics. Simulation results indicate that the proposed heuristic outperforms the nearest neighbor heuristic for most practical range of the number of cities.