A study on the solution approach for the stochastic vehicle routing problem

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ABSTRACT

Vehicle routing problem (VRP) and its variants have been widely studied for several decades. Since they are of the class of NP-Hard problems, it is very difficult to obtain optimal solutions within acceptable amount of time. Heuristic algorithms are thus applied for solving VRP with large scale. Several assumptions are usually made in the modeling of VRP and its variants including: 1. demand of each customer is constant, 2. fleet type is homogeneous, 3. unlimited number of vehicles can be used. The above assumptions obviously conflict with the reality. We hence study four types of VRP variants: general VRP with single type of fleet, general VRP with mix fleet type, VRP considering stochastic demands with single fleet type, and VRP considering stochastic demands with multiple type of fleet to reflect the real situations. As far as the solution method is concerned, tabu search is used for solving the SVRP. The results indicate that the size of tabu list does not play an important role in the solving process for all types of problems. When solving the SVRP, the objective function gets better as the route failure probability α increases, and besides, the objective function gets better as the capacity filling coefficient f decreases.

Keywords : Vehicle Routing Problem ; Stochastic VRP ; Mix Fleet ; Tabu Search

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