Solution Approaches For The Stochastic Location-Routing Problem

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ABSTRACT

Location-routing problem (LRP) determines the number, locations of depots (warehouses or distribution centers) and the corresponding routing sequence for customers served by each depot. LRP integrates both location-allocation and general routing problems, and is hence very hard to solve to optimality. Besides, it is always assumed that demand is known in deterministic form, which conflicts with the reality. This research therefore studies the solution method for solving the stochastic LRP. Perl and Daskin first proposed a decomposition method to solve the deterministic LRP. However, their approach seems to be inefficient in terms of computational efforts. In this paper, we propose a decomposition method in which two subproblems are introduced, location-allocation problem, and general VRP, respectively. They are then applied to simulated annealing algorithm designed for obtaining near-optimal solution. This procedure is repeated in iterative manner unitl convergence or stopping criteria are met. In addition to the traditional LRP, one variant of LRP is also discussed. That is the LRP with mix fleet and limited number of vehicles for each type of fleet. This variant is also solved with the solution procedure developed. From the results of solving test problems both appeared in literature and self-designed, it can be observed that the proposed solution method performed well in problems with small and medium sizes.

Keywords : Location-Routing Problem ; Stochastic Location-Routing Problem ; Simulated Annealing

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