

應用時窗分割與整數化策略簡化時窗收卸貨問題之研究

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摘要

The main goal of this paper is to provide a new concept to solve a Pick up and Delivery Problem with Time Window (PDPTW) efficiently and accurately. In order to achieve this goal, a PDPTW is transferred to be a new similar PDP (SPDP) without time window by the Time Window Partitioning and Discretization Strategy. Every time window of each pick up or delivery point is partitioned as many equal-length sub time window. Besides, only one of all sub time windows of the pick up or delivery point can be served. The SPDP is formulated as a 0-1 integer programming model in this paper. The optimal solution obtained by LINGO of the transferred SPDP is equal to the optimal solution of the original PDPTW when the time window is partitioned small enough, i.e. the SPDP is the same as PDPTW when the length of the sub time window is short enough. However, the size of the transferred SPDP is much bigger than the original PDPTW because a lot of new decision variables and constraints are produced. Since these additional derived decision variables and constraints will make computation inefficient, we also design a preprocessing procedure to reduce problem size of the SPDP, e.g. the redundant decision variables and constraints, and a relation structured asymmetric travel cost matrix to avoid searching the infeasible solutions. There are 18 Solomon benchmark VRP problems transferred to be PDPTW problems by the method developed by the Lau and Liang (2002). In order to show our contribution, we developed a simple Meta-Heuristic algorithm to solve both PDPTW and SPDP. According to the computation results, we can improve the accuracy about 7.88% and save the computation time about 88.1%.

關鍵字 : Pick up and Delivery Problem, Window Partitioning and Discretization Strategy, Meta-Heuristic algorithm