
The two-region multi depot pickup and delivery problem

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Abstract

Motivated by the increasing complexity of transportation networks and the problems faced nowadays by big and small transportation companies, we define the two-region pickup and delivery problem. A region in this setting refers to an area where customers and depots are located, but no direct transportation between customers belonging to different regions is allowed. The problem structure consists on a set of pickup and delivery requests to be served between two regions. Pickup and delivery locations of each request lay in different regions. Therefore, they can not be served on the same intra-region route, and a long distance transportation must exist between the clusters for the requests to be serviced. A set of depots exist in each cluster for consolidation between transportation modes. Hence we face a problem where two interrelated decisions are to be made. The problem is studied for a planning horizon of several days. The objective is to minimize the total cost of the planning, both for long and short distance transportation. We make use of the structure of the problem to design two different approaches of an adaptive large neighbourhood search algorithm, each one focusing in a different decision. We obtain results over a set of self-generated instances for both approaches applied individually and for a third approach where they are combined. Results show a better performance of the combined approach for all instances.

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