Fair collaboration scheme for firms operating dial-a-ride services in a city network

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Abstract

Standard DARP problem consists in finding minimum-cost routing in a complete graph guaranteeing that all requests are satisfied and several variants of DARP have been proposed in the literature such as heterogeneity, multiple depots, multiple loads, transfers between different vehicles, soft time windows, multi-objective DARP, with stochastic or dynamic information. In literature very few works on collaboration in DARP problem and, in particular, considering different firms operating in dial-a-ride transport services on the same city network. Usually, the firm collects all the requests in advance and runs a DARP model in order to find the best routing in terms of pay-off. Sometimes, customers are located in such a way there is a small convenience in servicing it. The basic idea is that the firm would share customers with other firms that have more convenience in servicing them. The main issue related to sharing customers is that each firm wants to be advantaged by joining the cooperative, and hence, particular attention has to be given when revenues have to be shared among different firms. In this talk, two different MILP formulations to solve the Collaboration in DARP (shortly CDARP) are presented, each one corresponding to a different scheme able to share customers between firms fairly. Since the problem is NP-Hard, a reliable and fast ALNS algorithm is also provided. Both exact and heuristic methods have been tested on real road networks.

Keywords: collaboration, DARP, alns

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