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A multi-depot dial-a-ride problem with heterogeneous vehicles and compatibility constraints in healthcare

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Abstract

In this paper, a multi-depot dial-a-ride problem arising from a real-world healthcare application is addressed, concerning the non-emergency transportation of patients. The problem presents several constraints and features, such as heterogeneous vehicles, vehicle-patient compatibility constraints, quality of service requirements, patients' preferences, tariffs depending on the vehicles' waiting. Variable Neighborhood Search and Tabu Search algorithms are proposed able to tackle all the characteristics of the problem. A Mixed Integer Linear Programming formulation is also presented. Computational results on large real-world and random instances based on real data show the effectiveness of the proposed approaches.

keywords: Dial-a-ride problem, healthcare, Variable Neighborhood Search, Tabu Search.

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