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Electric Vehicle Routing Problem with Time Windows, Partial Recharges, and Covering Locations

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Abstract

This study investigates the electric vehicle routing problem with time windows, partial recharges, and covering locations (EVRPTW-PR-CL). The goal is to find an optimal routing plan that minimizes total costs, including travel costs, fixed costs for electric vehicles and covering locations, and compensation costs for self-pickup services. A mixed integer programming model is formulated and solved by the GUROBI solver. An effective variable neighborhood search (VNS) algorithm is also developed for solving large-scale EVRPTW-PR-CL instances. Numerical experiments are conducted to assess the performance of the proposed VNS. Additionally, managerial insights into delivery options and compensation costs are provided to facilitate decision-making.

Keywords

Electric Vehicle Routing Problem, Variable Neighborhood Search, Covering Location