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A two-stage heuristic method for vehicle routing problem with split deliveries and pickups

求解集送货可拆分车辆路径问题的两阶段启发式方法

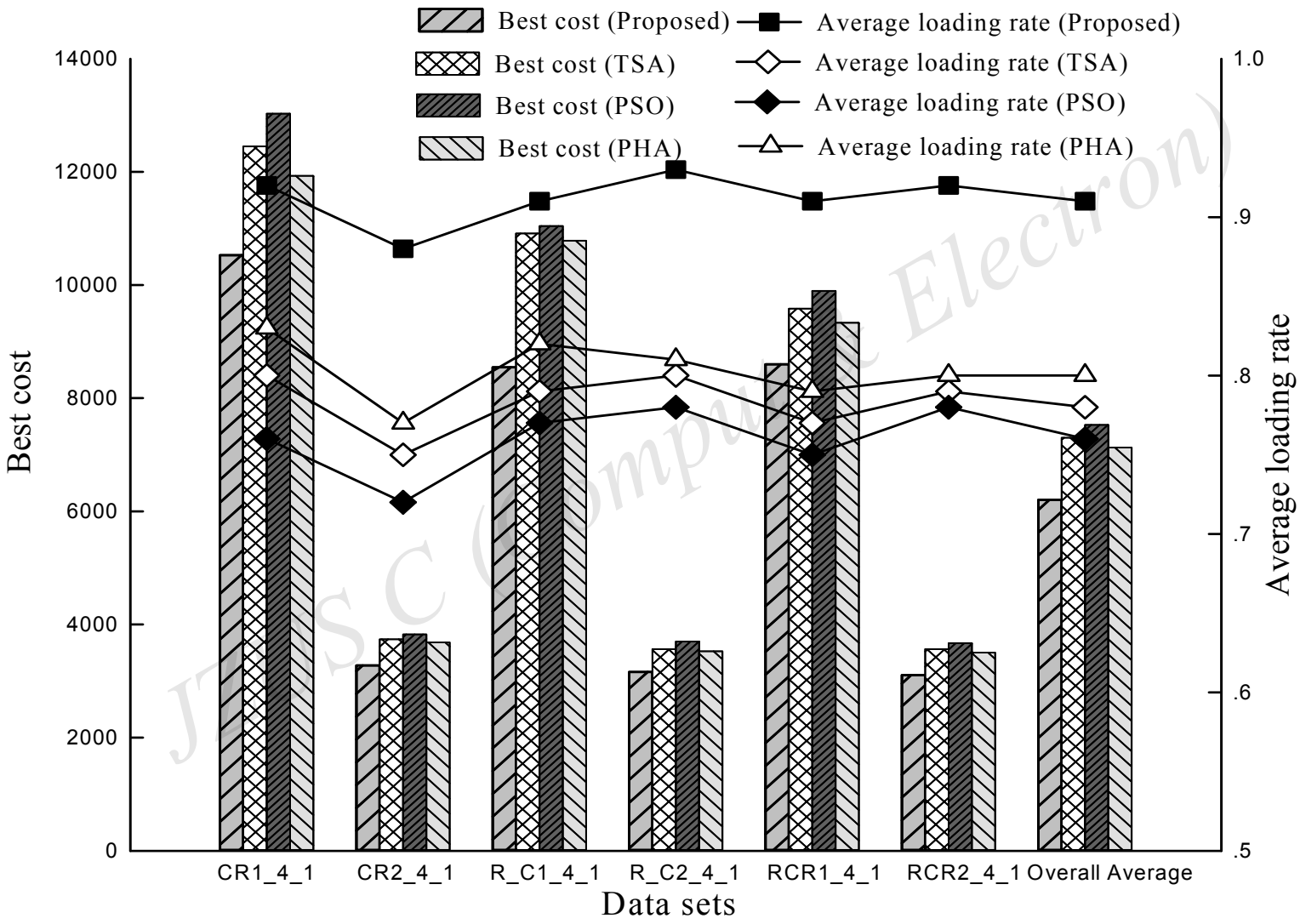
Key words: Vehicle routing problem with split deliveries and pickups (VRPSPDP), Two-stage heuristic method, Hybrid heuristic algorithm, Solomon benchmark datasets

关键词： 集送货可拆分的车辆路径问题，两阶段启发式方法，混合启发式算法，Solomon标准数据集

Motivation

- **Disadvantages of traditional VRP: 1.** Traditional VRP requires that the vehicle routes should start and end at the same depot. **2.** Each customer should be visited only once. **3.** The demand of each customer should not exceed the vehicle capacity.
- **Our method is based on a two-step process: 1.** Compute an initial feasible solution based on the clustering procedure and the initial route construction procedure. **2.** A hybrid heuristic algorithm is proposed to further improve the initial solution.

Results



Comparison between the proposed algorithms and TSA, PSO, PHA on 400 customers

Summary

- **Motivation:** The clustering procedure ensures that vehicle routes can start and end at the same depot.
- **Methodology:** The hybrid heuristic algorithm with between-route (coarse-turning) and within-route (fine-turning) operations is able to polish the initial solution.
- **Performance:** The proposed two-stage method has significantly reduced the total travel cost and increased the average loading rate.