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Summary: The multi-depot fleet size and mix vehicle routing problem, also known as the multi-depot routing with heterogeneous vehicles, is investigated. A mathematical formulation is given and lower as well as upper bounds are produced using a three hour execution time of CPLEX. An efficient implementation of variable neighborhood search that incorporates new features in addition to the adaptation of several existing neighborhoods and local search operators is proposed. These features include a preprocessing scheme for identifying borderline customers, a mechanism that aggregates and disaggregates routes between depots, and a neighborhood reduction test that saves nearly 80% of the CPU time, especially on the large instances. The proposed algorithm is highly competitive as it produces 23 new best results when tested on the 26 data instances published in the literature.

MSC:
90B06 Transportation, logistics and supply chain management
90C11 Mixed integer programming
90C59 Approximation methods and heuristics in mathematical programming

Keywords:
multi-depot vehicle routing; heterogeneous vehicles; distribution network; ILP formulation; variable neighborhood search

Software:
CPLEX

Full Text: DOI

References:

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