Rich vehicle routing problems: from a taxonomy to a unified matheuristic

Abstract: This seminar sheds new light on a unified solution framework for Rich Vehicle Routing Problems (RVRPs). We first provide a comprehensive survey of the RVRP literature as well as a taxonomy. A cluster analysis based on two discriminating criteria is performed and leads to define RVRPs. Then, we solve a multi-depot multi-compartment multi-commodity vehicle routing problem with time windows (MDMCMCm-VRPTW). We propose a unified column generation heuristic cooperating with a variable neighborhood search (VNS) matheuristic. The VNS combines several removal and insertion routing heuristics as well as computationally efficient constraint checking. Two loading neighborhoods based on the solution of mathematical programs are proposed to intensify the search. The VNS based matheuristic is embedded in a column generation heuristic to solve the MDMCMCm-VRPTW. We propose an exact post-processing method to optimize the assignment of customers to vehicle routes. Last, we introduce, model and solve to optimality a RVRP arising in the olive oil collection process in Tunisia. We propose an exact branch-and-cut algorithm to solve the problem.

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