Arc Routing in a Node Routing Environment

Abstract

This master thesis deals with a special variant of the Vehicle Routing Problem (VRP), where there are many customers per road segment. This kind of VRP arises in many real-life situations, e.g. mail delivery and garbage collection. VRP solvers are part of most Decision Support Systems (DSS) used by companies in this business sector. In an operational setting, it is often more important to get a good solution quickly than getting an optimal or close to optimal solution later on. Most industrial VRP solvers are not able to give good solutions in a short amount of time for routing problems with many stops per road segment, and it is thus desirable to find better ways to solve these problems such that good solutions can be found quickly.

A mathematical model for the VRP is given, together with a metaheuristic tabu search algorithm. Aggregation of customers is used to better the performance, with respect to time and solution quality, of both the exact and heuristic solution methods. Extensions of the mathematical model and the tabu search algorithm are described. The methods are tested both on test instances from the literature as well as a portfolio of new test instances especially made to fit to the problem description. Test results are reported, showing that aggregation leads to substantial improvements both in time and solution quality. This includes new best results found for some of the test instances from the literature.