An approach for an Inventory Routing Problem presented in the VeRoLog Solver Challenge 2017

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Abstract

Our solver is based on dividing the problem into two separate algorithms dealing with finding schedules for the visits at customers and then computing routes for the pickup and delivery of tools based on the schedule.
We start with generating a population of mostly feasible candidate schedules. Scores are assigned to each candidate by including the routing and computing the objective value. A genetic algorithm is used to iteratively breed new generations while also introducing random mutations.

Since the genetic algorithm needs to be able to score a large number of schedules in a limited time-frame, we decided on a simple, but fast approach to finding routes. For each schedule we generate tours using a slightly modified parallel saving algorithm, which favors matching pickup and delivery requests. The tours are then assigned to vehicles using a best-fit packing heuristic reducing the number of required vehicles. Vehicle-routes are then further improved using 2-opt and 3-opt heuristics.
After a certain number of generations a candidate solution is found and the post-optimization stage is started where the routing of the best solution is further improved using variable neighborhood descent with move, swap, 2- and 3-opt operators.

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