

The use of distance measures in routing problems

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When solving problems in the real world using optimization tools, the model solved by the tools is often only an approximation of the underlying, real, problem. Usually average values are used instead of underlying stochastic values, or some parts are simplified in order to be able to find solutions. In these circumstances, a decision maker (DM) might be more interested in a set of different, good solutions, rather than just the optimal solution as produced using the model. On the other hand, the same DM will only be interested in seeing a few of the solutions, and not the plethora of solutions often produced by modern search techniques. There is thus a need to distinguish between good solutions, based on some other concept than quality alone (i.e. objective function value). We develop a distance measure of the type proposed in the Psychology literature by Tversky for the class of VRP problems. We base our difference on the underlying structure of solutions, also including attributes of the problem that are not in the problem model.

In addition to identifying diverse solutions, there is also a need for identifying similar solutions. When the solutions are plans are produced using a rolling horizon principle, the solution is updated whenever new information becomes available, or on a regular basis. In any case, the planner have often already made commitments w.r.t. the execution of the plan represented by the solution, at least for the near future. Therefore, the planner is interested in seeing a set of high quality solutions that are close to the current (base-line) schedule in the near future, and diverse from each other in more distant time.

Our measures have been tested on a set of real-life problems from land and sea, and it provides valuable decision support flexibility for the planner.