

The Vehicle Routing Problem with Flexible Time Windows and Traveling Times

Hideki HASHIMOTO, Toshihide IBARAKI, Shinji IMAHORI, and Mutsunori
YAGIURA

We generalize the standard vehicle routing problem by allowing soft time window and soft traveling time constraints, where both constraints are treated as cost functions. With the proposed generalization, the problems very general. In our algorithm, we use local search to determine the routes of vehicles. After fixing the route of each vehicle, we must determine the optimal start times of services at visited customers. We show that this subproblem is NP-hard when cost functions are general, but can be efficiently solved with dynamic programming when traveling time cost functions are convex even if time window cost functions are non-convex. We deal with the latter situation in the developed iterated local search algorithm. Finally we report computational results on benchmark instances, and confirm the benefits of the proposed generalization.