

The Robust Capacitated Vehicle Routing Problem Under Demand Uncertainty

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Abstract:

We study the robust capacitated vehicle routing problem (CVRP) under demand uncertainty, which determines a minimum cost delivery of a product to geographically dispersed customers using capacity-constrained vehicles. Contrary to the deterministic CVRP, which postulates that the customer demands for the product are deterministic and known, the robust CVRP models the customer demands as random variables, and it determines a minimum cost delivery plan that is feasible for all anticipated demand realizations. We derive and compare the robust optimization counterparts of several deterministic CVRP formulations. We also develop robust rounded capacity inequalities and show how they can be separated efficiently for two classes of demand supports.