Abstract:

This research is motivated by a real world case in field staff routing and scheduling: a group of technicians has to complete a set of tasks at different locations, some of which require more than one, in general two technicians to be completed. Tasks are of different types and their durations are not known with certainty. However, based on historical data, probability distributions can be derived. The aim is to complete all tasks and to minimize the total expected duration of the technicians' working days. The underlying optimization problem can be modeled as a two-stage stochastic program. We evaluate and compare different problem formulations and valid inequalities. In order to solve the proposed models, we use ideas from the l-shaped method and we benchmark our decomposition approaches against solving deterministic equivalent formulations with CPLEX directly. Furthermore, we investigate the impact of stochastic service times on the requirement for inter-route visit time synchronization on a set of randomly generated instances with different (real world) characteristics and we derive first insights on the structural properties of the obtained routes.