
Criterion space search methods for a bi-objective facility location problem in the presence of uncertainty

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Abstract

To cope with uncertainty in optimization problems, many different approaches have been presented in the literature. The most widely used ones are stochastic optimization including concepts such as the expected value, chance constraints or risk measure, and robust optimization, including prominent concepts such as minmax robustness or adaptive robust optimization. This paper aims at investigating bi-objective modeling frameworks for an uncertain location-allocation model to design a last mile food aid delivery network in a disaster relief chain. In order to find an efficient and reliable methodology to solve the problem, we use different approaches to model demand uncertainty: scenario-based two-stage stochastic optimization, minmax robustness and adaptive robust optimization. To cope with the bi-objective nature of the problem, all three approaches are embedded into criterion space search methods, namely the well-known ϵ -constraint method and the recently introduced balanced box method. We compare the different approaches on data sets derived from a real world case study.

Keywords: Bi objective optimization, criterion space search method, uncertainty, facility location problem, humanitarian logistics

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