Relationships between constrained and unconstrained multi-objective optimization

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Abstract

In this talk we investigate relationships between constrained and unconstrained multi-objective optimization problems. We mainly focus on generalized convex multi-objective optimization problems, i.e., the objective function is a componentwise generalized convex (e.g., quasi-convex or semi-strictly quasi-convex) function and the feasible domain is a convex set. Beside the field of location theory the assumptions of generalized convexity are found in several branches of Economics.

We derive a characterization of the set of efficient solutions of a constrained multi-objective optimization problem using characterizations of the sets of efficient solutions of unconstrained multi-objective optimization problems. We demonstrate the usefulness of the results by applying it on constrained multi-objective location problems. Using our new results we show that special classes of constrained multi-objective location problems (e.g., point-objective location problems, Weber location problems and center location problems) can be completely solved with the help of algorithms for the unconstrained case.

At the end of the talk, we present some information about the current development of the MATLAB-based software tool "Facility Location Optimizer".