Nicolae Popovici's results about Pareto reducibility and applications in generalized-convex constrained multi-objective optimization

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(Joint work with Christian Günther)

Abstract

The main purpose of the talk is to investigate relationships between constrained and unconstrained multi-objective optimization problems using sufficient conditions for Pareto reducibility by Nicolae Popovici [1], see [2, 3]. We mainly focus on generalized convex multi-objective optimization problems, i.e., the objective function is a componentwise generalized convex (e.g., quasi-convex, semi-strictly quasi-convex or explicitly quasi-convex) function and the feasible domain is a not necessarily convex set. Beside the field of location theory, the assumptions of generalized convexity are found in several branches of Economics, e.g., in the field of utility theory.

In the talk, we formulate the basic constrained multi-objective optimization problem and the corresponding extended unconstrained one, we introduce solution concepts and recall results about generalized convex and semi-continuous functions.

Under suitable assumptions (e.g., generalized convexity assumptions), we derive a characterization of the set of (weakly) efficient solutions of a constrained multi-objective optimization problem using characterizations of the set of (weakly) efficient points of unconstrained multi-objective optimization problems.

Moreover, we deduce necessary optimality conditions using our results concerning relationships between constrained and unconstrained multi-objective optimization problems.

Our results can be applied to constrained point-objective location problems. The MATLAB-based software tool

Facility **L**ocation **O**ptimizer (**FLO**)

can be used for solving special types of single- as well as multi-objective location problems involving different distances measures. For more information, see http://www.project-flo.de.

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References

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