

MULTIOBJECTIVE OPTIMIZATION PROBLEMS

Why

Often we care about multiple criteria at once.¹

Definition

A multiobjective optimization problem is a pair $(X, f : X \to \mathbb{R}^d)$. As before, X is the constraint set and f is called the objective function. Since f is vector valued, and there is no natural order on \mathbb{R}^d , there may exist $x \in X$ with non-comparable images under f.

Scalarization

The $\alpha \in \mathbb{R}^d$ scalarization of a multiobjective optimization problem (X, f) is the optimization problem (X, g) where $g: X \to \mathbb{R}$ is defined by $g(x) = \alpha^{\top} f(x)$. We call g the scalarized objective.

¹Future editions will modify.

