Why

Often we care about multiple criteria at once.[1]

Definition

A *multiobjective optimization problem* is a pair $(X, f : X \to \mathbf{R}^d)$. 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 $\mathbf{R}^d$, there may exist $x \in X$ with non-comparable images under f.

Scalarization

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

[1] Future editions will modify.


Multiobjective Optimization Problems
Matrix Transpose
Combined Orders
Matrices
Vectors as Matrices
Multivariate Functions
Real Matrices
Real Inner Product
Linear Equations
Vectors
Real Norm
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Real Vectors
Optimization Problems
Space Vectors
Plane Vector Sums and Differences
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Family Unions and Intersections
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Identity Elements
Arithmetic
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Set Powers
Set Unions and Intersections
Set Dualities
Set Symmetric Differences
Intersection of Empty Set
Successor Sets
Unordered Triples
Partitions
Set Complements
Pair Unions
Set Intersections
Ordered Pairs
Pair Intersections
Set Differences
Set Unions
Empty Set
Unordered Pairs
Set Specification
Set Inclusion
Standardized Accounts
Accounts
Deduction
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
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Objects