

# **Linear Vector Optimization: Duality, Algorithms and Applications in Finance**

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## **Abstract**

A new approach to duality for (linear) vector optimization problems is introduced. The so-called Geometric Duality involves the facial structure of certain polyhedra in the outcome space. We reinterpret the primal and dual problem using set-valued objective functions and discuss the question why, in principal, vector optimization should be studied in set-valued framework. We present improved and dual variants of Benson's outer approximation algorithm, an outcome set based method which is efficient for linear (and convex) problems in typical applications with a few objectives and many variables and constraints. Two applications concerning financial markets with transaction costs are discussed. First, minimization of coherent risk measures is formulated as a linear vector optimization problem. Secondly the calculation of the set of superhedging portfolios is shown to lead to a sequence of linear vector optimization problems.

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