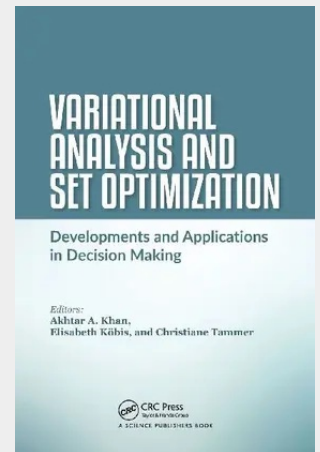


Variational Analysis and Set Optimization

Developments and Applications in Decision Making

This book contains the latest advances in variational analysis and set / vector optimization, including uncertain optimization, optimal control and bilevel optimization. Recent developments concerning scalarization techniques, necessary and sufficient optimality conditions and duality statements are given. New numerical methods for efficiently solving set optimization problems are provided. Moreover, applications in economics, finance and risk theory are discussed. Summary The objective of this book is to present advances in different areas of variational analysis and set optimization, especially uncertain optimization, optimal control and bilevel optimization. Uncertain optimization problems will be approached from both a stochastic as well as a robust point of view. This leads to different interpretations of the solutions, which widens the choices for a decision-maker given his preferences. Recent developments regarding linear and nonlinear scalarization techniques with solid and nonsolid ordering cones for solving set optimization problems are discussed in this book. These results are useful for deriving optimality conditions for set and vector optimization problems. Consequently, necessary and sufficient optimality conditions are presented within this book, both in terms of scalarization as well as generalized derivatives. Moreover, an overview of existing duality statements and new duality assertions is given. The book also addresses the field of variable domination structures in vector and set optimization. Including variable ordering cones is especially important in applications such as medical image registration with uncertainties. This book covers a wide range of applications of set optimization. These range from finance, investment, insurance, control theory, economics to risk theory. As uncertain multi-objective optimization, especially robust approaches, lead to set optimization, one main focus of this book is uncertain optimization. Important recent developments concerning numerical methods for solving set optimization problems sufficiently fast are main features of this book. These are illustrated by various examples as well as easy-to-follow-steps in order to facilitate the decision process for users. Simple techniques aimed at practitioners working in the fields of mathematical programming, finance and portfolio selection are presented. These will help in the decision-making process, as well as give an overview of nondominated solutions to choose from.

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