Set-valued Optimization: An Introduction with Applications (Vector Optimization)

By Akhtar A. Khan, Christiane Tammer, Constantin Z?linescu

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Set-valued optimization is a vibrant and expanding branch of mathematics that deals with optimization problems where the objective map and/or the constraints maps are set-valued maps acting between certain spaces. Since set-valued maps subsumes single valued maps, set-valued optimization provides an important extension and unification of the scalar as well as the vector optimization problems. Therefore this relatively new discipline has justifiably attracted a great deal of attention in recent years. This book presents, in a unified framework, basic properties on ordering relations, solution concepts for set-valued optimization problems, a detailed description of convex set-valued maps, most recent developments in separation theorems, scalarization techniques, variational principles, tangent cones of first and higher order, sub-differential of set-valued maps, generalized derivatives of set-valued maps, sensitivity analysis, optimality conditions, duality and applications in economics among other things.

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Editorial Review

Review

"In this monograph, the first one entirely devoted to the subject, the authors present a unified treatment of the state of the art of most of the developments in this field. … It is very well written and contains numerous results and examples and over 600 references. … I wholeheartedly recommend this book to anyone interested in new trends in optimization, in particular, researchers who are interested in multiobjective/vector-optimization and its interconnection with variational analysis." (Miguel Sama, Mathematical Reviews, December, 2015)

"The monograph contains a very large number of interesting, new or at least recent results not only in the fields of set-valued optimization together with many examples illustrating them. It is an interesting scientific resource for all researchers investigating problems of mathematical optimization. I can highly recommend it to graduate and PhD students as well as to scientists working in the fields of nonsmooth, multicriterial or set-valued optimization." (S. Dempe, Optimization, July, 2015)

"This massive and very well-written book will probably be for many years the primary reference in set-valued optimization, the area of optimization where the objective and/or constraint functions of the considered problems are set-valued maps. … this book will be a solid reference for everyone interested in set-valued optimization, be they graduate students or established scientists." (Sorin-Mihai Grad, zbMATH 1308.49004, 2015)

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Set-valued optimization is a vibrant and expanding branch of mathematics that deals with optimization problems where the objective map and/or the constraints maps are set-valued maps acting between certain spaces. Since set-valued maps subsumes single valued maps, set-valued optimization provides an important extension and unification of the scalar as well as the vector optimization problems. Therefore this relatively new discipline has justifiably attracted a great deal of attention in recent years. This book presents, in a unified framework, basic properties on ordering relations, solution concepts for set-valued optimization problems, a detailed description of convex set-valued maps, most recent developments in separation theorems, scalarization techniques, variational principles, tangent cones of first and higher order, sub-differential of set-valued maps, generalized derivatives of set-valued maps, sensitivity analysis, optimality conditions, duality, and applications in economics among other things.

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