

Nonlinear Multiobjective Optimization A Generalized Homotopy Approach 1st Edition

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Arguably, many industrial optimization problems are of the multiobjective type. The present work, after providing a survey of the state of the art in multiobjective optimization, gives new insight into this important mathematical field by consequently taking up the viewpoint of differential geometry. This approach, unprecedented in the literature, very naturally results in a generalized homotopy method for multiobjective optimization which is theoretically well-founded and numerically efficient.

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~~NONLINEAR MULTIOBJECTIVE OPTIMIZATION: A GENERALIZED ...~~

Abstract Based on the ordering relations induced by a pointed, closed and convex cone with a nonempty interior, we propose a nonlinear augmented Lagrangian dual scheme for a nonconvex...

~~Nonlinear augmented Lagrangian for nonconvex ...~~

In the context of economics and optimization, a fundamental role is nowadays recognized to generalized concavity which has been widely studied starting from the pioneering work of K. Arrow and A.C. Enthoven [].The study of generalized concavity of a vector valued function is not so deep as in the scalar case; nevertheless some classes with related properties have been suggested in order to ...

~~Generalized Concavity in Multi-Objective Optimization ...~~

The generalized regression neural network algorithm The GRNN neural network has strong nonlinear mapping capability, high fault tolerance and robustness. The network eventually converges to the optimized regression surface with more sample accumulation, which is suitable for solving nonlinear problems.

~~Analysis and multi-objective optimization of slag powder ...~~

Multi-objective optimization has been applied in many fields of science, including engineering, economics and logistics where optimal decisions need to be taken in the presence of trade-offs between two or more conflicting objectives. Minimizing cost while maximizing comfort while buying a car, and maximizing performance whilst minimizing fuel consumption and emission of pollutants of a vehicle are examples of multi-objective optimization problems involving two and three objectives ...

~~Multi-objective optimization - Wikipedia~~

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A new technique which converts a constrained optimization problem to an unconstrained one where conflicting figures of merit may be simultaneously considered has been combined with a complex mission analysis system. The method is compared with existing single and multiobjective optimization methods. A primary benefit from this new

~~Aircraft Design for Mission Performance Using Nonlinear ...~~

Generalizations of convexity related to optimality conditions and duality for nonlinear single objective or multiobjective optimization problems have been of much interest in the recent past and thus explored the extent of optimality conditions and duality applicability in mathematical programming problems.

~~Generalized (? ? ? ?) Type I Univex Functions in ...~~

5 Multiobjective nonlinear fractional programming problems involving generalized d-type-I n-set functions Further, if the conditions of the weak duality Theorem 2.1 also hold, then ()Suv00 0 0,, ,? is an efficient solution to (D). Now we give a strict converse duality theorem of Mangasarian type [3] for (P)

~~MULTIOBJECTIVE NONLINEAR FRACTIONAL PROGRAMMING PROBLEMS ...~~

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Mathematically, the multiobjective optimization problem can be formulated as a vector nonlinear optimization problem under constraints as follows. It is assumed that an optimization problem is described in terms of a design variable vector $x=(x_1,x_2,...,x_N)$ in the design space $X\subseteq R^N$.

~~A method for generating a well distributed Pareto set in ...~~

Wolfe-type Duality, Mond-Weir type Duality, Mixed type Duality for Multiobjective optimization problems such as Nonlinear programming problems, Fractional programming problems, Nonsmooth programming problems, Nondifferentiable programming problems, Variational and Control problems under various types of generalized convexity assumptions.

Arguably, many industrial optimization problems are of the multiobjective type. The present work, after providing a survey of the state of the art in multiobjective optimization, gives new insight into this important mathematical field by consequently taking up the viewpoint of differential geometry. This approach, unprecedented in the literature, very naturally results in a generalized homotopy method for multiobjective optimization which is theoretically well-founded and numerically efficient. The power of the new method is demonstrated by solving two real-life problems of industrial optimization. The book presents recent results obtained by the author and is aimed at mathematicians, scientists, students and practitioners interested in optimization and numerical homotopy methods.

Problems with multiple objectives and criteria are generally known as multiple criteria optimization or multiple criteria decision-making (MCDM) problems. So far, these types of problems have typically been modelled and solved by means of linear programming. However, many real-life phenomena are of a nonlinear nature, which is why we need tools for nonlinear programming capable of handling several conflicting or incommensurable objectives. In this case, methods of traditional single objective optimization and linear programming are not enough; we need new ways of thinking, new concepts, and new methods - nonlinear multiobjective optimization. Nonlinear Multiobjective Optimization provides an extensive, up-to-date, self-contained and consistent survey, review of the literature and of the state of the art on nonlinear (deterministic) multiobjective optimization, its methods, its theory and its background. The amount of literature on multiobjective optimization is immense. The treatment in this book is based on approximately 1500 publications in English printed mainly after the year 1980. Problems related to real-life applications often contain irregularities and nonsmoothnesses. The treatment of nondifferentiable multiobjective optimization in the literature is rather rare. For this reason, this book contains material about the possibilities, background, theory and methods of nondifferentiable multiobjective optimization as well. This book is intended for both researchers and students in the areas of (applied) mathematics, engineering, economics, operations research and management science; it is meant for both professionals and practitioners in many different fields of application. The intention has been to provide a consistent summary that may help in selecting an appropriate method for the problem to be solved. It is hoped the extensive bibliography will be of value to researchers.

This book presents adaptive solution methods for multiobjective optimization problems based on parameter dependent scalarization approaches. Readers will benefit from the new adaptive methods and ideas for solving multiobjective optimization.

This volume encloses research articles that were presented at the EVOLVE 2014 International Conference in Beijing, China, July 1-4, 2014. The book gathers contributions that emerged from the conference tracks, ranging from probability to set oriented numerics and evolutionary computation; all complemented by the bridging purpose of the conference, e.g. Complex Networks and Landscape Analysis, or by the more application oriented perspective. The novelty of the volume, when considering the EVOLVE series, comes from targeting also the practitioner's view. This is supported by the Machine Learning Applied to Networks and Practical Aspects of Evolutionary Algorithms tracks, providing surveys on new application areas, as in the networking area and useful insights in the development of evolutionary techniques, from a practitioner's perspective. Complementary to these directions, the conference tracks supporting the volume, follow on the individual advancements of the subareas constituting the scope of the conference, through the Computational Game Theory, Local Search and Optimization, Genetic Programming, Evolutionary Multi-objective optimization tracks.

This book features 15 chapters based on the Numerical and Evolutionary Optimization (NEO 2017) workshop, held from September 27 to 29 in the city of Tijuana, Mexico. The event gathered researchers from two complimentary fields to discuss the theory, development and application of state-of-the-art techniques to address search and optimization problems. The lively event included 7 invited talks and 64 regular talks covering a wide range of topics, from evolutionary computer vision and machine learning with evolutionary computation, to set oriented numeric and steepest descent techniques. Including research submitted by the NEO community, the book provides informative and stimulating material for future research in the field.

This volume comprises a selection of works presented at the Numerical and Evolutionary Optimization (NEO) workshop held in September 2015 in Tijuana, Mexico. The development of powerful search and optimization techniques is of great importance in today's world that requires researchers and practitioners to tackle a growing number of challenging real-world problems. In particular, there are two well-established and widely known fields that are commonly applied in this area: (i) traditional numerical optimization techniques and (ii) comparatively recent bio-inspired heuristics. Both paradigms have their unique strengths and

weaknesses, allowing them to solve some challenging problems while still failing in others. The goal of the NEO workshop series is to bring together people from these and related fields to discuss, compare and merge their complimentary perspectives in order to develop fast and reliable hybrid methods that maximize the strengths and minimize the weaknesses of the underlying paradigms. Through this effort, we believe that the NEO can promote the development of new techniques that are applicable to a broader class of problems. Moreover, NEO fosters the understanding and adequate treatment of real-world problems particularly in emerging fields that affect us all such as health care, smart cities, big data, among many others. The extended papers the NEO 2015 that comprise this book make a contribution to this goal.

This book was established after the 6th International Workshop on Numerical and Evolutionary Optimization (NEO), representing a collection of papers on the intersection of the two research areas covered at this workshop: numerical optimization and evolutionary search techniques. While focusing on the design of fast and reliable methods lying across these two paradigms, the resulting techniques are strongly applicable to a broad class of real-world problems, such as pattern recognition, routing, energy, lines of production, prediction, and modeling, among others. This volume is intended to serve as a useful reference for mathematicians, engineers, and computer scientists to explore current issues and solutions emerging from these mathematical and computational methods and their applications.

This book presents a collection of papers on recent advances in problems concerning dynamics, optimal control and optimization. In many chapters, computational techniques play a central role. Set-oriented techniques feature prominently throughout the book, yielding state-of-the-art algorithms for computing general invariant sets, constructing globally optimal controllers and solving multi-objective optimization problems.

Multiobjective optimization deals with solving problems having not only one, but multiple, often conflicting, criteria. Such problems can arise in practically every field of science, engineering and business, and the need for efficient and reliable solution methods is increasing. The task is challenging due to the fact that, instead of a single optimal solution, multiobjective optimization results in a number of solutions with different trade-offs among criteria, also known as Pareto optimal or efficient solutions. Hence, a decision maker is needed to provide additional preference information and to identify the most satisfactory solution. Depending on the paradigm used, such information may be introduced before, during, or after the optimization process. Clearly, research and application in multiobjective optimization involve expertise in optimization as well as in decision support. This state-of-the-art survey originates from the International Seminar on Practical Approaches to Multiobjective Optimization, held in Dagstuhl Castle, Germany, in December 2006, which brought together leading experts from various contemporary multiobjective optimization fields, including evolutionary multiobjective optimization (EMO), multiple criteria decision making (MCDM) and multiple criteria decision aiding (MCDA). This book gives a unique and detailed account of the current status of research and applications in the field of multiobjective optimization. It contains 16 chapters grouped in the following 5 thematic sections: Basics on Multiobjective Optimization; Recent Interactive and Preference-Based Approaches; Visualization of Solutions; Modelling, Implementation and Applications; and Quality Assessment, Learning, and Future Challenges.

This book comprises nine selected works on numerical and computational methods for solving multiobjective optimization, game theory, and machine learning problems. It provides extended versions of selected papers from various fields of science such as computer science, mathematics and engineering that were presented at EVOLVE 2013 held in July 2013 at Leiden University in the Netherlands. The internationally peer-reviewed papers include original work on important topics in both theory and applications, such as the role of diversity in optimization, statistical approaches to combinatorial optimization, computational game theory, and cell mapping techniques for numerical landscape exploration. Applications focus on aspects including robustness, handling multiple objectives, and complex search spaces in engineering design and computational biology.

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