Mathematical Optimization Models And Methods Diva Portal

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Computational Mathematical Programming
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Basic Optimization Theory and Gradient-Based Algorithms
Handbook on Modelling for Discrete Optimization
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Mathematical Models and Algorithms for Power System Optimization
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Optimization for Decision Making
Concepts, Algorithms, and Applications to Chemical Processes
Models and Methods
First-Order Methods in Optimization

ELAINE ARIANA

Optimization Methods for Logical Inference Springer Science & Business Media
This book systematically discusses nonlinear interval optimization design theory and methods. Firstly, adopting a mathematical programming theory perspective, it develops an innovative mathematical transformation model to deal with general nonlinear interval uncertain optimization problems, which is able to equivalently convert complex interval uncertain optimization problems to simple deterministic optimization problems. This model is then used as the basis for various interval uncertain optimization algorithms for engineering applications, which address the low efficiency caused by double-layer nested optimization. Further, the book extends the nonlinear interval optimization theory to design problems associated with multiple optimization objectives, multiple disciplines, and parameter dependence, and establishes the corresponding interval optimization models and solution algorithms. Lastly, it uses the proposed interval uncertain optimization models and methods to deal with practical problems in mechanical engineering and related fields, demonstrating the effectiveness of the models and methods.
Nonlinear Interval Optimization for Uncertain Problems Springer Science & Business Media
This book is focused on the discussion of the traffic assignment problem, the mathematical and practical meaning of variables, functions and basic principles. This work gives information about new approaches, methods and algorithms based on original methodological technique, developed by authors in their publications for the past several years, as well as corresponding prospective implementations. The book may be of interest to a wide range of readers, such as civil engineering students, traffic engineers, developers of traffic assignment algorithms etc. The obtained results here are to be used in both practice and theory. This book is devoted to the traffic assignment problem, formulated in a form of nonlinear optimization program. The most efficient solution algorithms related to the problem are based on its structural features and practical meaning rather than on standard nonlinear optimization techniques or approaches. The authors have carefully considered the meaning of the traffic assignment problem for efficient algorithms development.
Nonlinear Programming Springer Science & Business Media
This book addresses modern nonlinear programming (NLP) concepts and algorithms, especially as they apply to challenging applications in chemical process engineering. The author provides a firm grounding in fundamental NLP properties and algorithms, and relates them to real-world problem classes in process optimization, thus making the material understandable and useful to chemical engineers and experts in mathematical optimization.
Computational Mathematical Programming Springer
This book is open access under a CC BY-NC 4.0 license. This revised, updated textbook presents a systems approach to the planning, management, and operation of water resources infrastructure in the environment. Previously published in 2005 by UNESCO and Deltares (Delft Hydraulics at the time), this new edition, written again with contributions from Jery R. Stedinger, Jozef P. M. Dijkman, and Monique T. Villars, is aimed equally at students and professionals. It introduces readers to the concept of viewing issues involving water resources as a system of multiple interacting components and scales. It offers guidelines for initiating and carrying out water resource system planning and management projects. It introduces alternative optimization, simulation, and statistical methods useful for project identification, design, siting, operation and evaluation and for studying post-planning issues. The authors cover both basin-wide and urban water issues and present ways of identifying and evaluating alternatives for addressing multiple-purpose and multi-objective water quantity and quality management challenges. Reinforced with cases studies, exercises, and media supplements throughout, the text is ideal for upper-level undergraduate and graduate courses in water resource planning and management as well as for practicing planners and engineers in the field.
Convex Optimization Springer
This book opens new avenues in understanding mathematical models within the context of a transition economy. The exposition lays out the methods for combining different mathematical structures and tools to effectively build the next model that will accurately reflect real world economic processes. Mathematical modeling of weather phenomena allows us to forecast certain essential weather parameters without any possibility of changing them. By contrast, modeling of transition economies gives us the freedom to not only predict changes in important indexes of all types of economies, but also to influence them more effectively in the desired direction. Simply put: any economy, including a transitional one, can be controlled. This book is useful to anyone who wants to increase profits within their business, or improve the quality of their family life and the economic area they live in. It is beneficial for undergraduate and graduate students specializing in the fields of Economic Informatics, Economic Cybernetics, Applied Mathematics and Large Information Systems, as well as for professional economists, and employees of state planning and statistical organizations.
Stochastic Linear Programming Springer Science & Business Media
Models & Methods for Project Selection systematically examines in this book treatment the latest work in the field of project selection modeling. The models presented are drawn from mathematical programming, decision theory, and finance. These models are examined in two categorical streams: the management science stream and the financial model stream. The book describes the assumptions and limitations of each model and provides appropriate solution methodologies. Its organization follows three main themes: *Criteria for Choice: Chapters 1-3 investigate the effect of the choice of optimization criteria on the results of the portfolio optimization problem. *Risk and Uncertainty: Chapters 4-7 deal with uncertainty in the project selection problem. *Non-Linearity and Interdependence: These chapters deal with problems of non-linearity and interdependence as they arise in the project selection problem. Chapters 8, 9 and 10 present solution methodologies, which can be used to solve these most general project selection models.
Basic Optimization Theory and Gradient-Based Algorithms World Scientific
Light will be thrown on a variety of problems concerned with the construction and analysis of optimization models: equilibrium models of mathematical economy, modern numerical optimization methods and software, methods of convex programming optimal with respect to complexity, polynomial algorithms of linear programming, decomposition of optimization systems, modern apparatus of nonsmooth optimization, models and methods of discrete programming.

Springer Science & Business Media
The primary goal of this book is to provide a self-contained, comprehensive study of the main ?rst-order methods that are frequently used in solving large-scale problems. First-order methods exploit information on values and gradients/subgradients (but not Hessians) of the functions composing the model under consideration. With the increase in the number of applications that can be modeled as large or even huge-scale optimization problems, there has been a revived interest in using simple methods that require low iteration cost as well as low memory storage. The author has gathered, reorganized, and synthesized (in a unified manner) many results that are currently scattered throughout the literature, many of which cannot be typically found in optimization books. First-Order Methods in Optimization offers comprehensive study of first-order methods with the theoretical foundations; provides plentiful examples and illustrations; emphasizes rates of convergence and complexity analysis of the main first-order methods used to solve large-scale problems; and covers both variables and functional decomposition methods.
Handbook on Modelling for Discrete Optimization Wiley-VCH
Scheduled transportation networks give rise to very complex and large-scale networkoptimization problems requiring innovative solution techniques and ideas from mathematical optimization and theoretical computer science. Examples of scheduled transportation include bus, ferry, airline, and railway networks, with the latter being a prime application domain that provides a fair amount of the most complex and largest instances of such optimization problems. Scheduled transport optimization deals with planning and scheduling problems over several time horizons, and substantial progress has been made for strategic planning and scheduling problems in all transportation domains. This state-of-the-art survey presents the outcome of an open call for contributions asking for either research papers or state-of-the-art survey articles. We received 24 submissions that underwent two rounds of the standard peer-review process, out of which 18 were finally accepted for publication. The volume is organized in four parts: Robustness and Recoverability, Robust Timetabling and Route Planning, Robust Planning Under Scarce Resources, and Online Planning: Delay and Disruption Management.
Online Storage Systems and Transportation Problems with Applications Courier Dover Publications
Optimization is the act of obtaining the "best" result under given circumstances. In design, construction, and maintenance of any engineering system, engineers must make technological and managerial decisions to minimize either the effort or cost required or to maximize benefits. There is no single method available for solving all optimization problems efficiently. Several optimization methods have been developed for different types of problems. The optimum-seeking methods are mathematical programming techniques (specifically, nonlinear programming techniques). Nonlinear Optimization: Models and Applications presents the concepts in several ways to foster understanding. Geometric interpretation: is used to re-enforce the concepts and to foster understanding of the mathematical procedures. The student sees that many problems can be analyzed, and approximate solutions found before analytical solutions techniques are applied. Numerical approximations: early on, the student is exposed to numerical techniques. These numerical procedures are algorithmic and iterative. Worksheets are provided in Excel, MATLAB®, and MapleTM to facilitate the procedure. Algorithms: all algorithms are provided with a step-by-step format. Examples follow the summary to illustrate its use and application. Nonlinear Optimization: Models and Applications: Emphasizes process and interpretation throughout Presents a general classification of optimization problems Addresses situations that lead to models illustrating many types of optimization problems Emphasizes model formulations Addresses a special class of problems that can be solved using only elementary calculus Emphasizes model solution and model sensitivity analysis About the author: William P. Fox is an emeritus professor in the Department of Defense Analysis at the Naval Postgraduate School. He received his Ph.D. at Clemson University and has taught at the United States Military Academy and at Francis Marion University where he was the chair of mathematics. He has written many publications, including over 20 books and over 150 journal articles. Currently, he is an adjunct professor in the Department of Mathematics at the College of William and Mary. He is the emeritus director of both the High School Mathematical Contest in Modeling and the Mathematical Contest in Modeling.
Mathematical Models and Algorithms for Power System Optimization Springer Science & Business Media
Here is a collection of nonlinear optimization applications from the real world, expressed in the General Algebraic Modeling System (GAMS). The concepts are presented so that the reader can quickly modify and update them to represent real-world situations.
Models & Methods for Project Selection John Wiley & Sons
Provides a tutorial on the computational tools that use mathematical optimization concepts and representations for the curation, analysis and redesign of metabolic networks Organizes, for the first time, the fundamentals of mathematical optimization in the context of metabolic network analysis Reviews the fundamentals of different classes of optimization problems including LP, MILP, MLP and MINLP Explains the most efficient ways of formulating a biological problem using mathematical optimization Reviews a variety of relevant problems in metabolic network curation, analysis and redesign with an emphasis on details of optimization formulations Provides a detailed treatment of bilevel optimization techniques for computational strain design and other relevant problems
Modeling technology for practical engineering problems Springer Science & Business Media
Portfolio categorization, evaluation, and prioritization are essential processes for portfolio management and play important roles in efforts to accomplish organizational strategic goals. This paper explores the implementation of a project selection tool using mathematical programming. Project selection is an essential process for portfolio management and plays an important role in accomplishing organizational goals. This paper presents a literature review of the techniques used in project selection. Numerical methods include financial models, scoring models, and optimization models. This paper focuses on project selection using optimization models. This method selects a set of projects that deliver the maximum benefit (e.g., net present value [NPV], profit) represented for objective functions subjected to a series of constraints (e.g., budget, manpower). This paper shows simple examples, which includes formulation and solution of the problem using 0-1 integer programming (one objective portfolio) and goal programming (multiple objectives portfolio). Mathematical programming methods can improve the quality of the decision-making process reducing subjectivity and optimizing the resources allocation in the projects that add more value to the organization. This paper shows models for project selection maximizing the benefits of an

organization and considering its strategic goals. It includes a literature review of the project selection methodologies used in the industry. Following the theoretical framework, this paper shows the use of mathematical programming for project selection. The paper presents some examples and a discussion of the advantages, potential improvement, and limitations of this methodology.

Optimization Methods in Finance CRC Press

This monograph provides both a unified account of the development of models and methods for the problem of estimating equilibrium traffic flows in urban areas and a survey of the scope and limitations of present traffic models. The development is described and analyzed by the use of the powerful instruments of nonlinear optimization and mathematical programming within the field of operations research. The first part is devoted to mathematical models for the analysis of transportation network equilibria; the second deals with methods for traffic equilibrium problems. This title will interest readers wishing to extend their knowledge of equilibrium modeling and analysis and of the foundations of efficient optimization methods adapted for the solution of large-scale models. In addition to its value to researchers, the treatment is suitable for advanced graduate courses in transportation, operations research, and quantitative economics.

Practical Mathematical Optimization CRC Press

Mathematical Optimization Models and Methods for Open-pit Mining

Robust and Online Large-Scale Optimization Springer Science & Business Media

Although a useful and important tool, the potential of mathematical modelling for decision making is often neglected. Considered an art by many and weird science by some, modelling is not as widely appreciated in problem solving and decision making as perhaps it should be. And although many operations research, management science, and optimization books touch on modelling techniques, the short shrift they usually get in coverage is reflected in their minimal application to problems in the real world. Illustrating the important influence of modelling on the decision making process, Optimization Modelling: A Practical Approach helps you come to grips with a wide range of modelling techniques. Highlighting the modelling aspects of optimization problems, the authors present the techniques in a clear and straightforward manner, illustrated by examples. They provide and analyze the formulation and modelling of a number of well-known theoretical and practical problems and touch on solution approaches. The book demonstrates the use of optimization packages through the solution of various mathematical models and provides an interpretation of some of those solutions. It presents the practical aspects and difficulties of problem solving and solution implementation and studies a number of practical problems. The book also discusses the use of available software packages in solving optimization models without going into difficult mathematical details and complex solution methodologies. The emphasis on modelling techniques rather than solution algorithms sets this book apart. It is a single source for a wide range of methods, classic theoretical and practical problems, data collection and input preparation, the use of different optimization software, and practical issues of modelling, model solving, and implementation. The authors draw directly from their experience to provide lessons learned when applying modelling techniques to practical problem solving and implementation difficulties.

Optimization Models and Methods for Equilibrium Traffic Assignment Springer Science & Business Media

Appendices A Rotastore A. l Tabular Results for Different Models A. 2 Tabular Results for Different Algorithms B OptiTrans B. l Input Data B. l. l Input Data Common to all Solution Approaches B. 1. 2 Specific Input Data for the MILP Model and the Column Enumeration Approach B. 1. 3 Specific Input Data for the Heuristic Methods B. 1. 3. 1 Penalty Criteria B. 1. 3. 2 Control Parameters of the OptiTrans Software B. 2 Tabular Results B. 2. 1 Tabular Results for the MILP Model B. 2. 2 Tabular Results for the Heuristic Methods B. 2. 2. 1 Input Data for a Whole Day - Offline Analysis B. 2. 2. 2 Results for CIH and SA References Index Preface This book covers the analysis and development of online algorithms involving exact optimization and heuristic techniques, and their appli- tion to solve two real life problems. The first problem is concerned with a complex technical system: a special carousel based high-speed storage system - Rotastore. It is shown that this logistic problem leads to an NP-hard Batch Presorting Pr- lem (BPSP) which is not easy to solve optimally in offline situations. We consider a polynomial case and develope an exact algorithm for offline situations. Competitive analysis showed that the proposed online - gorithm is 312-competitive. Online algorithms with lookahead improve the online solutions in particular cases. If the capacity constraint on additional storage is neglected the problem has a totally unimodular polyhedron.

Springer

The AIMMS Optimization Modeling book provides not only an introduction to modeling but also a suite of worked examples. It is aimed at users who are new to modeling and those who have limited modeling experience. Both the basic concepts of optimization modeling and more advanced modeling techniques are discussed. The Optimization Modeling book is AIMMS version independent.

The Traffic Assignment Problem John Wiley & Sons

A comprehensive introduction to the tools, techniques and applications of convex optimization.

Models and Techniques for Transportation Systems SIAM

Optimization models play an increasingly important role in financial decisions. This is the first textbook devoted to explaining how recent advances in optimization models, methods and software can be applied to solve problems in computational finance more efficiently and accurately. Chapters discussing the theory and efficient solution methods for all major classes of optimization problems alternate with chapters illustrating their use in modeling problems of mathematical finance. The reader is guided through topics such as volatility estimation, portfolio optimization problems and constructing an index fund, using techniques such as nonlinear optimization models, quadratic programming formulations and integer programming models respectively. The book is based on Master's courses in financial engineering and comes with worked examples, exercises and case studies. It will be welcomed by applied mathematicians, operational researchers and others who work in mathematical and computational finance and who are seeking a text for self-learning or for use with courses.

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