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Business Optimization Using Mathematical Programming - Josef Kallrath 2021-08-31

This book presents a structured approach to formulate, model, and solve mathematical optimization problems for a wide range of real world situations. Among the problems covered are production, distribution and supply chain planning, scheduling, vehicle routing, as well as cutting stock, packing, and nesting. The optimization techniques used to solve the problems are primarily linear, mixed-integer linear, nonlinear, and mixed integer nonlinear programming. The book also covers important considerations for solving real-world optimization problems, such as dealing with valid inequalities and symmetry during the modeling phase, but also data interfacing and visualization of results in a more and more digitized world. The broad range of ideas and approaches presented helps the reader to learn how to model a variety of problems from process industry, paper and metals industry, the energy sector, and logistics using mathematical optimization techniques.

Integrated Methods for Optimization - John N. Hooker 2011-11-13

The first edition of *Integrated Methods for Optimization* was published in January 2007. Because the book covers a rapidly developing field, the time is right for a second edition. The book provides a unified treatment of optimization methods. It brings ideas from mathematical programming (MP), constraint programming (CP), and global optimization (GO) into a single volume. There is no reason these must be learned as separate fields, as they normally are, and there are three reasons they should be studied together. (1) There is much in common among them intellectually, and to a large degree they can be understood as special cases of a single underlying solution technology. (2) A growing literature reports how they can be profitably integrated to formulate and solve a wide range of problems. (3) Several software packages now incorporate techniques from two or more of these fields. The book provides a unique resource for graduate students and practitioners who want a well-rounded background in optimization methods within a single course of study. Engineering students are a particularly large potential audience, because engineering optimization problems often benefit from a combined approach—particularly where design, scheduling, or logistics are involved. The text is also of value to those studying operations research, because their educational programs rarely cover CP, and to those studying computer science and artificial intelligence (AI), because their curricula typically omit MP and GO. The text is also useful for practitioners in any of these areas who want to learn about another, because it provides a more concise and accessible treatment than other texts. The book can cover so wide a range of material because it focuses on ideas that are relevant to the methods used in general-purpose optimization and constraint solvers. The book focuses on ideas behind the methods that have proved useful in general-purpose optimization and constraint solvers, as well as integrated solvers of the present and foreseeable future. The second edition updates results in this area and includes several major new topics: Background material in linear, nonlinear, and dynamic programming. Network flow theory, due to its importance in filtering algorithms. A chapter on generalized duality theory that more explicitly develops a unifying primal-dual algorithmic structure for optimization methods. An extensive survey of search methods from both MP and AI, using the primal-dual framework as an organizing principle. Coverage of several additional global constraints used in CP solvers. The book continues to focus on exact as opposed to heuristic methods. It is possible to bring heuristic methods into the unifying scheme described in the book, and the new edition will retain the brief discussion of how this might be done.

Linear and Mixed Integer Programming for Portfolio Optimization - Renata Mansini 2015-06-10

This book presents solutions to the general problem of single period

portfolio optimization. It introduces different linear models, arising from different performance measures, and the mixed integer linear models resulting from the introduction of real features. Other linear models, such as models for portfolio rebalancing and index tracking, are also covered. The book discusses computational issues and provides a theoretical framework, including the concepts of risk-averse preferences, stochastic dominance and coherent risk measures. The material is presented in a style that requires no background in finance or in portfolio optimization; some experience in linear and mixed integer models, however, is required. The book is thoroughly didactic, supplementing the concepts with comments and illustrative examples.

Optimization Methods in Finance - Gerard Cornuejols 2006-12-21

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.

Algebraic Modeling Systems - Josef Kallrath 2012-02-16

This book *Algebraic Modeling Systems - Modeling and Solving Real World Optimization Problems* - deals with the aspects of modeling and solving real-world optimization problems in a unique combination. It treats systematically the major algebraic modeling languages (AMLs) and modeling systems (AMS) used to solve mathematical optimization problems. AMLs helped significantly to increase the usage of mathematical optimization in industry. Therefore it is logical consequence that the GOR (Gesellschaft für Operations Research) Working Group Mathematical Optimization in Real Life had a second meeting devoted to AMLs, which, after 7 years, followed the original 71st Meeting of the GOR (Gesellschaft für Operations Research) Working Group Mathematical Optimization in Real Life which was held under the title *Modeling Languages in Mathematical Optimization* during April 23-25, 2003 in the German Physics Society Conference Building in Bad Honnef, Germany. While the first meeting resulted in the book *Modeling Languages in Mathematical Optimization*, this book is an offspring of the 86th Meeting of the GOR working group which was again held in Bad Honnef under the title *Modeling Languages in Mathematical Optimization*.

Modeling and Solving Linear Programming with R - Jose M. Sallan 2015-09-09

Linear programming is one of the most extensively used techniques in the toolbox of quantitative methods of optimization. One of the reasons of the popularity of linear programming is that it allows to model a large variety of situations with a simple framework. Furthermore, a linear program is relatively easy to solve. The simplex method allows to solve most linear programs efficiently, and the Karmarkar interior-point method allows a more efficient solving of some kinds of linear programming. The power of linear programming is greatly enhanced when came the opportunity of solving integer and mixed integer linear programming. In these models all or some of the decision variables are integers, respectively. In this book we provide a brief introduction to

linear programming, together with a set of exercises that introduce some applications of linear programming. We will also provide an introduction to solve linear programming in R. For each problem a possible solution through linear programming is introduced, together with the code to solve it in R and its numerical solution.

Planning and Operation of Active Distribution Networks - Antonio Carlos Zambroni de Souza 2022-01-31

This book offers a broad and detailed view about how traditional distribution systems are evolving smart/active systems. The reader will be able to share the view of a number of researchers directly involved in this field. For this sake, philosophical discussions are enriched by the presentation of theoretical and computational tools. A senior reader may incorporate some concepts not available during his/her graduation process, whereas new Engineers may have contact with some material that may be essential to his/her practice as professionals.

Optimization Modeling For Supply Chain Applications - Haitao Li 2023-03-07

How to design an efficient and cost-effective logistics network? How to plan procurement, production, and transportation to meet customer demand with minimum operating costs? How to sequence jobs through machines for on-time order completion? And how to dispatch vehicles and schedule their routes to serve customers efficiently? Answers to these questions are key to effective and efficient supply chain operations. This book provides a systematic and comprehensive coverage of data-driven optimization modeling techniques and their applications in supply chain management. From the methodological perspective, it introduces various model building techniques including mathematical programming (linear and integer programming), network optimization, and constraint programming. From the application perspective, it covers the topics of supply chain network design, production planning, supply chain configuration, machine scheduling, and vehicle routing, among others. It also introduces the state-of-the-art optimization modeling software, the CPLEX OPL Studio, as a powerful and accessible tool for implementing the modeling techniques and solution methods in this book. Sample codes will be available upon purchase of the book. This book is essential reading material for researchers and students in business, data analytics, industrial engineering, computer science and applied math who would like to learn optimization modeling in the context of supply chains. It is also suitable for practitioners and consultants in industry who would like to understand the behind-the-scene techniques in off-the-shelf commercial optimization software. As a textbook, it can be used for an advanced undergraduate or graduate course in supply chain management, operations management, data analytics, economics, and industrial engineering.

Modeling, Simulation and Optimization of Complex Processes HPSC 2018 - Hans Georg Bock 2020

This proceedings volume highlights a selection of papers presented at the 7th International Conference on High Performance Scientific Computing, which took place in Hanoi, Vietnam, during March 19-23, 2018. The conference has been organized by the Institute of Mathematics of the Vietnam Academy of Science and Technology, the Interdisciplinary Center for Scientific Computing (IWR) of Heidelberg University and the Vietnam Institute for Advanced Study in Mathematics. The contributions cover a broad, interdisciplinary spectrum of scientific computing and showcase recent advances in theory, methods, and practical applications. Subjects covered include numerical simulation, methods for optimization and control, machine learning, parallel computing and software development, as well as the applications of scientific computing in mechanical engineering, aerospace engineering, environmental physics, decision making, hydrogeology, material science and electric circuits.

Mixed Integer Nonlinear Programming - Jon Lee 2011-12-02

Many engineering, operations, and scientific applications include a mixture of discrete and continuous decision variables and nonlinear relationships involving the decision variables that have a pronounced effect on the set of feasible and optimal solutions. Mixed-integer nonlinear programming (MINLP) problems combine the numerical difficulties of handling nonlinear functions with the challenge of optimizing in the context of nonconvex functions and discrete variables. MINLP is one of the most flexible modeling paradigms available for optimization; but because its scope is so broad, in the most general cases it is hopelessly intractable. Nonetheless, an expanding body of researchers and practitioners — including chemical engineers, operations researchers, industrial engineers, mechanical engineers, economists, statisticians, computer scientists, operations managers, and

mathematical programmers — are interested in solving large-scale MINLP instances.

Hybrid Optimization - Pascal van Hentenryck 2010-11-05

Hybrid Optimization focuses on the application of artificial intelligence and operations research techniques to constraint programming for solving combinatorial optimization problems. This book covers the most relevant topics investigated in the last ten years by leading experts in the field, and speculates about future directions for research. This book includes contributions by experts from different but related areas of research including constraint programming, decision theory, operations research, SAT, artificial intelligence, as well as others. These diverse perspectives are actively combined and contrasted in order to evaluate their relative advantages. This volume presents techniques for hybrid modeling, integrated solving strategies including global constraints, decomposition techniques, use of relaxations, and search strategies including tree search local search and metaheuristics. Various applications of the techniques presented as well as supplementary computational tools are also discussed.

Algebraic Modeling Systems - Josef Kallrath 2012-02-14

This book Algebraic Modeling Systems - Modeling and Solving Real World Optimization Problems - deals with the aspects of modeling and solving real-world optimization problems in a unique combination. It treats systematically the major algebraic modeling languages (AMLs) and modeling systems (AMLs) used to solve mathematical optimization problems. AMLs helped significantly to increase the usage of mathematical optimization in industry. Therefore it is logical consequence that the GOR (Gesellschaft für Operations Research) Working Group Mathematical Optimization in Real Life had a second meeting devoted to AMLs, which, after 7 years, followed the original 71st Meeting of the GOR (Gesellschaft für Operations Research) Working Group Mathematical Optimization in Real Life which was held under the title Modeling Languages in Mathematical Optimization during April 23-25, 2003 in the German Physics Society Conference Building in Bad Honnef, Germany. While the first meeting resulted in the book Modeling Languages in Mathematical Optimization, this book is an offspring of the 86th Meeting of the GOR working group which was again held in Bad Honnef under the title Modeling Languages in Mathematical Optimization.

Pyomo - Optimization Modeling in Python - William E. Hart 2012-02-15

This book provides a complete and comprehensive reference/guide to Pyomo (Python Optimization Modeling Objects) for both beginning and advanced modelers, including students at the undergraduate and graduate levels, academic researchers, and practitioners. The text illustrates the breadth of the modeling and analysis capabilities that are supported by the software and support of complex real-world applications. Pyomo is an open source software package for formulating and solving large-scale optimization and operations research problems. The text begins with a tutorial on simple linear and integer programming models. A detailed reference of Pyomo's modeling components is illustrated with extensive examples, including a discussion of how to load data from data sources like spreadsheets and databases. Chapters describing advanced modeling capabilities for nonlinear and stochastic optimization are also included. The Pyomo software provides familiar modeling features within Python, a powerful dynamic programming language that has a very clear, readable syntax and intuitive object orientation. Pyomo includes Python classes for defining sparse sets, parameters, and variables, which can be used to formulate algebraic expressions that define objectives and constraints. Moreover, Pyomo can be used from a command-line interface and within Python's interactive command environment, which makes it easy to create Pyomo models, apply a variety of optimizers, and examine solutions. The software supports a different modeling approach than commercial AML (Algebraic Modeling Languages) tools, and is designed for flexibility, extensibility, portability, and maintainability but also maintains the central ideas in modern AMLs.

Principles and Practice of Constraint Programming - John Hooker 2018-08-22

This book constitutes the proceedings of the 24th International Conference on Principles and Practice of Constraint Programming, CP 2018, held in Lille, France, in August 2018. The 41 full and 9 short papers presented in this volume were carefully reviewed and selected from 114 submissions. They deal with all aspects of computing with constraints including theory, algorithms, environments, languages, models, systems, and applications such as decision making, resource allocation,

scheduling, configuration, and planning. The papers were organized according to the following topics/tracks: main technical track; applications track; CP and data science; CP and music; CP and operations research; CP, optimization and power system management; multiagent and parallel CP; and testing and verification.

Power System Optimization Modeling in GAMS - Alireza Soroudi
2017-08-29

This unique book describes how the General Algebraic Modeling System (GAMS) can be used to solve various power system operation and planning optimization problems. This book is the first of its kind to provide readers with a comprehensive reference that includes the solution codes for basic/advanced power system optimization problems in GAMS, a computationally efficient tool for analyzing optimization problems in power and energy systems. The book covers theoretical background as well as the application examples and test case studies. It is a suitable reference for dedicated and general audiences including power system professionals as well as researchers and developers from the energy sector and electrical power engineering community and will be helpful to undergraduate and graduate students.

Network Interdiction and Stochastic Integer Programming - David L. Woodruff
2006-04-11

On March 15, 2002 we held a workshop on network interdiction and the more general problem of stochastic mixed integer programming at the University of California, Davis. Jesús De Loera and I co-chaired the event, which included presentations of on-going research and discussion. At the workshop, we decided to produce a volume of timely work on the topics. This volume is the result. Each chapter represents state-of-the-art research and all of them were refereed by leading investigators in the respective fields. Problems - sociated with protecting and attacking computer, transportation, and social networks gain importance as the world becomes more dependent on interconnected systems. Optimization models that address the stochastic nature of these problems are an important part of the research agenda. This work relies on recent efforts to provide methods for - dressing stochastic mixed integer programs. The book is organized with interdiction papers first and the stochastic programming papers in the second part. A nice overview of the papers is provided in the Foreword written by Roger Wets.

Modern Numerical Nonlinear Optimization - Neculai Andrei
2022-10-18

This book includes a thorough theoretical and computational analysis of unconstrained and constrained optimization algorithms and combines and integrates the most recent techniques and advanced computational linear algebra methods. Nonlinear optimization methods and techniques have reached their maturity and an abundance of optimization algorithms are available for which both the convergence properties and the numerical performances are known. This clear, friendly, and rigorous exposition discusses the theory behind the nonlinear optimization algorithms for understanding their properties and their convergence, enabling the reader to prove the convergence of his/her own algorithms. It covers cases and computational performances of the most known modern nonlinear optimization algorithms that solve collections of unconstrained and constrained optimization test problems with different structures, complexities, as well as those with large-scale real applications. The book is addressed to all those interested in developing and using new advanced techniques for solving large-scale unconstrained or constrained complex optimization problems.

Mathematical programming researchers, theoreticians and practitioners in operations research, practitioners in engineering and industry researchers, as well as graduate students in mathematics, Ph.D. and master in mathematical programming will find plenty of recent information and practical approaches for solving real large-scale optimization problems and applications.

Introduction to Computational Optimization Models for

Production Planning in a Supply Chain - Stefan Voß
2013-06-05

An easy-to-read introduction to the concepts associated with the creation of optimization models for production planning starts off this book. These concepts are then applied to well-known planning models, namely mrp and MRP II. From this foundation, fairly sophisticated models for supply chain management are developed. Another unique feature is that models are developed with an eye toward implementation. In fact, there is a chapter that provides explicit examples of implementation of the basic models using a variety of popular, commercially available modeling languages.

Introduction to Software for Chemical Engineers, Second Edition - Mariano Martín Martín
2019-06-06

The field of Chemical Engineering and its link to computer science is in

constant evolution and new engineers have a variety of tools at their disposal to tackle their everyday problems. Introduction to Software for Chemical Engineers, Second Edition provides a quick guide to the use of various computer packages for chemical engineering applications. It covers a range of software applications from Excel and general mathematical packages such as MATLAB and MathCAD to process simulators, CHEMCAD and ASPEN, equation-based modeling languages, gProms, optimization software such as GAMS and AIMS, and specialized software like CFD or DEM codes. The different packages are introduced and applied to solve typical problems in fluid mechanics, heat and mass transfer, mass and energy balances, unit operations, reactor engineering, process and equipment design and control. This new edition offers a wider view of packages including open source software such as R, Python and Julia. It also includes complete examples in ASPEN Plus, adds ANSYS Fluent to CFD codes, Lingo to the optimization packages, and discusses Engineering Equation Solver. It offers a global idea of the capabilities of the software used in the chemical engineering field and provides examples for solving real-world problems. Written by leading experts, this book is a must-have reference for chemical engineers looking to grow in their careers through the use of new and improving computer software. Its user-friendly approach to simulation and optimization as well as its example-based presentation of the software, makes it a perfect teaching tool for both undergraduate and master levels.

Modeling Languages in Mathematical Optimization - Josef Kallrath
2013-12-01

This volume presents a unique combination of modeling and solving real world optimization problems. It is the only book which treats systematically the major modeling languages and systems used to solve mathematical optimization problems, and it also provides a useful overview and orientation of today's modeling languages in mathematical optimization. It demonstrates the strengths and characteristic features of such languages and provides a bridge for researchers, practitioners and students into a new world: solving real optimization problems with the most advances modeling systems.

Supply Chain Optimization - Joseph Geunes
2006-03-30

Supply Chain Optimization captures the latest results in a segment of current research activity in supply chain management. This research area focuses on applying optimization techniques to supply chain management problems. The research papers that make up the volume provide a snapshot of state-of-the-art optimization methods within the field. This book presents rigorous modelling approaches for supply chain operations problems with a goal of improving supply chain performance (or the performance of some segment thereof). It contains high-quality works from leading researchers in the field whose expertise fits within this scope. The book provides a diverse blend of research topics and novel modelling and solution approaches for difficult classes of supply chain operations, planning, and design problems.

Interfaces - 2002

Fundamentals of Service Systems - Jorge Cardoso
2015-12-12

This textbook addresses the conceptual and practical aspects of the various phases of the lifecycle of service systems, ranging from service ideation, design, implementation, analysis, improvement and trading associated with service systems engineering. Written by leading experts in the field, this indispensable textbook will enable a new wave of future professionals to think in a service-focused way with the right balance of competencies in computer science, engineering, and management. Fundamentals of Service Systems is a centerpiece for a course syllabus on service systems. Each chapter includes a summary, a list of learning objectives, an opening case, and a review section with questions, a project description, a list of key terms, and a list of further reading bibliography. All these elements enable students to learn at a faster and more comfortable pace. For researchers, teachers, and students who want to learn about this new emerging science, Fundamentals of Service Systems provides an overview of the core disciplines underlying the study of service systems. It is aimed at students of information systems, information technology, and business and economics. It also targets business and IT practitioners, especially those who are looking for better ways of innovating, designing, modeling, analyzing, and optimizing service systems.

AMPL - Robert Fourer
1993

AMPL, developed at AT&Ts Bell Laboratories, is a powerful, yet easy-to-use modeling environment for problems in linear, nonlinear, network, and integer programming. Users can formulate optimization models and

analyze solutions using common algebraic notation; the computer manages the interface to advanced optimizers. In less advanced programming software, students must write out every variable and constraint explicitly. AMPLs powerful display commands encourage creative responses to modeling assignments. The AMPL Student Edition is a full-featured version of the AMPL and optimizer software that accepts problems up to 300 variables and 300 constraints. AMPLs modeling approach can handle real-world problems. AMPL student models easily scale up to optimization problems of realistic size. AMPL Student Edition comes with both the MINOS and CPLEX solvers. Beginners need only type solve to invoke an optimizer, but advanced students have full access to algorithmic options because the AMPL Student Edition works just like the professional editions that run on computers from PCs to Crays. Classroom skills transfer directly to the job environment.

Continuous Nonlinear Optimization for Engineering Applications in GAMS Technology - Neculai Andrei 2017-12-04

This book presents the theoretical details and computational performances of algorithms used for solving continuous nonlinear optimization applications imbedded in GAMS. Aimed toward scientists and graduate students who utilize optimization methods to model and solve problems in mathematical programming, operations research, business, engineering, and industry, this book enables readers with a background in nonlinear optimization and linear algebra to use GAMS technology to understand and utilize its important capabilities to optimize algorithms for modeling and solving complex, large-scale, continuous nonlinear optimization problems or applications. Beginning with an overview of constrained nonlinear optimization methods, this book moves on to illustrate key aspects of mathematical modeling through modeling technologies based on algebraically oriented modeling languages. Next, the main feature of GAMS, an algebraically oriented language that allows for high-level algebraic representation of mathematical optimization models, is introduced to model and solve continuous nonlinear optimization applications. More than 15 real nonlinear optimization applications in algebraic and GAMS representation are presented which are used to illustrate the performances of the algorithms described in this book. Theoretical and computational results, methods, and techniques effective for solving nonlinear optimization problems, are detailed through the algorithms MINOS, KNITRO, CONOPT, SNOPT and IPOPT which work in GAMS technology.

Advanced Information Systems Engineering Workshops - Anne Persson 2015-05-26

This book constitutes the thoroughly refereed proceedings of seven international workshops held in Stockholm, Sweden, in conjunction with the 27th International Conference on Advanced Information Systems Engineering, CAiSE 2015, in June 2015. The 38 full and nine short papers were carefully selected from 107 submissions. The workshops were the Second International Workshop on Advances in Services Design based on the Notion of Capability (ASDENCA), the Third International Workshop on Cognitive Aspects of Information Systems Engineering (COGNISE), the First International Workshop on Digital Business Innovation and the Future Enterprise Information Systems Engineering (DiFenSE), the First International Workshop on Enterprise Modeling (EM), the First Workshop on the Role of Real-World Objects in Business Process Management Systems (RW-BPMS), the 10th International Workshop on Trends in Enterprise Architecture Research (TEAR), and the 5th International Workshop on Information Systems Security Engineering (WISSE).

Planning and Scheduling in Manufacturing and Services - Michael Pinedo 2005

This book focuses on planning and scheduling applications. Planning and scheduling are forms of decision-making that play an important role in most manufacturing and services industries. The planning and scheduling functions in a company typically use analytical techniques and heuristic methods to allocate its limited resources to the activities that have to be done. The application areas considered in this book are divided into manufacturing applications and services applications. The book covers five areas in manufacturing: project scheduling, job shop scheduling, scheduling of flexible assembly systems, economic lot scheduling, and planning and scheduling in supply chains. It covers four areas in services: reservations and timetabling, tournament scheduling, planning and scheduling in transportation, and workforce scheduling. At the end of each chapter, a case study or a system implementation is described in detail. Numerous examples and exercises throughout the

book illustrate the material presented. The fundamentals concerning the methodologies used in the application chapters are covered in the appendices. The book comes with a CD-ROM that contains various sets of powerpoint slides. The CD also contains several planning and scheduling systems that have been developed in academia as well as generic optimization software that has been developed in industry. This book is suitable for more advanced students in industrial engineering and operations research as well as graduate students in business. Michael Pinedo is the Julius Schlesinger Professor of Operations Management in the Stern School of Business at New York University. His research interests lie in the theoretical and applied aspects of planning and scheduling. He has written numerous papers on the theory of deterministic and stochastic scheduling and has also consulted extensively in industry. He has been actively involved in the development of several large industrial planning and scheduling systems.

Operations Research Proceedings 2019 - Janis S. Neufeld 2020-12-04

This book gathers a selection of peer-reviewed papers presented at the International Conference on Operations Research (OR 2019), which was held at Technische Universität Dresden, Germany, on September 4-6, 2019, and was jointly organized by the German Operations Research Society (GOR) the Austrian Operations Research Society (ÖGOR), and the Swiss Operational Research Society (SOR/ASRO). More than 600 scientists, practitioners and students from mathematics, computer science, business/economics and related fields attended the conference and presented more than 400 papers in plenary presentations, parallel topic streams, as well as special award sessions. The respective papers discuss classical mathematical optimization, statistics and simulation techniques. These are complemented by computer science methods, and by tools for processing data, designing and implementing information systems. The book also examines recent advances in information technology, which allow big data volumes to be processed and enable real-time predictive and prescriptive business analytics to drive decisions and actions. Lastly, it includes problems modeled and treated while taking into account uncertainty, risk management, behavioral issues, etc.

Nonlinear Optimization Applications Using the GAMS Technology - Neculai Andrei 2013-06-22

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.

Convex Optimization - Stephen Boyd 2004-03-08

Convex optimization problems arise frequently in many different fields. This book provides a comprehensive introduction to the subject, and shows in detail how such problems can be solved numerically with great efficiency. The book begins with the basic elements of convex sets and functions, and then describes various classes of convex optimization problems. Duality and approximation techniques are then covered, as are statistical estimation techniques. Various geometrical problems are then presented, and there is detailed discussion of unconstrained and constrained minimization problems, and interior-point methods. The focus of the book is on recognizing convex optimization problems and then finding the most appropriate technique for solving them. It contains many worked examples and homework exercises and will appeal to students, researchers and practitioners in fields such as engineering, computer science, mathematics, statistics, finance and economics.

Introduction to Software for Chemical Engineers - Mariano Martín Martín 2014-07-01

The field of chemical engineering is in constant evolution, and access to information technology is changing the way chemical engineering problems are addressed. Inspired by the need for a user-friendly chemical engineering text that demonstrates the real-world applicability of different computer programs, Introduction to Software for Chemical Engi

Computational Intelligence in Logistics and Supply Chain Management - Thomas Hanne 2016-07-27

This book deals with complex problems in the fields of logistics and supply chain management and discusses advanced methods, especially from the field of computational intelligence (CI), for solving them. The first two chapters provide general introductions to logistics and supply chain management on the one hand, and to computational intelligence on the other hand. The subsequent chapters cover specific fields in logistics and supply chain management, work out the most relevant problems found in those fields, and discuss approaches for solving them. Chapter 3 discusses problems in the field of production and inventory management. Chapter 4 considers planning activities on a finer level of granularity

which is usually denoted as scheduling. In chapter 5 problems in transportation planning such as different types of vehicle routing problems are considered. While chapters 3 to 5 rather discuss planning problems which appear on an operative level, chapter 6 discusses the strategic problem of designing a supply chain or network. The final chapter provides an overview of academic and commercial software and information systems for the discussed applications. There appears to be a gap between general textbooks on logistics and supply chain management and more specialized literature dealing with methods for computational intelligence, operations research, etc., for solving the complex operational problems in these fields. For readers, it is often difficult to proceed from introductory texts on logistics and supply chain management to the sophisticated literature which deals with the usage of advanced methods. This book fills this gap by providing state-of-the-art descriptions of the corresponding problems and suitable methods for solving them.

Applications of Supply Chain Management and E-Commerce Research - Joseph Geunes 2006-03-30

In February 2002, the Industrial and Systems Engineering (ISE) Department at the University of Florida hosted a National Science Foundation Workshop on Collaboration and Negotiation in Supply Chain Management and E Commerce. This workshop focused on characterizing the challenges facing leading edge firms in supply chain management and electronic commerce, and identifying research opportunities for developing new technological and decision support capabilities sought by industry. The audience included practitioners in the areas of supply chain management and E Commerce, as well as academic researchers working in these areas. The workshop provided a unique setting that has facilitated ongoing dialog between academic researchers and industry practitioners. This book codifies many of the important themes and issues around which the workshop discussions centered. The editors of this book, all faculty members in the ISE Department at the University of Florida, also served as the workshop's coordinators. In addition to workshop participants, we also invited contributions from leading academics and practitioners who were not able to attend. As a result, the chapters herein represent a collection of research contributions, monographs, and case studies from a variety of disciplines and viewpoints. On the academic side alone, chapter authors include faculty members in supply chain and operations management, marketing, industrial engineering, economics, computer science, civil and environmental engineering, and building construction departments.

Operations Research Proceedings 2019 - Janis S. Neufeld 2020-09-24

This book gathers a selection of peer-reviewed papers presented at the International Conference on Operations Research (OR 2019), which was held at Technische Universität Dresden, Germany, on September 4-6, 2019, and was jointly organized by the German Operations Research Society (GOR) the Austrian Operations Research Society (ÖGOR), and the Swiss Operational Research Society (SOR/ASRO). More than 600 scientists, practitioners and students from mathematics, computer science, business/economics and related fields attended the conference and presented more than 400 papers in plenary presentations, parallel topic streams, as well as special award sessions. The respective papers discuss classical mathematical optimization, statistics and simulation techniques. These are complemented by computer science methods, and by tools for processing data, designing and implementing information systems. The book also examines recent advances in information technology, which allow big data volumes to be processed and enable real-time predictive and prescriptive business analytics to drive decisions and actions. Lastly, it includes problems modeled and treated while taking into account uncertainty, risk management, behavioral issues, etc.

Applications of Optimization with Xpress-MP - Christelle Guéret 2002

Integer Programming - Laurence A. Wolsey 2020-09-10

A PRACTICAL GUIDE TO OPTIMIZATION PROBLEMS WITH DISCRETE OR INTEGER VARIABLES, REVISED AND UPDATED The revised second edition of Integer Programming explains in clear and simple terms how to construct custom-made algorithms or use existing commercial software to obtain optimal or near-optimal solutions for a variety of real-world problems. The second edition also includes information on the remarkable progress in the development of mixed integer programming solvers in the 22 years since the first edition of the book appeared. The updated text includes information on the most recent developments in the field such as the much improved preprocessing/presolving and the many new ideas for primal heuristics included in the solvers. The result has been a speed-up of several orders of magnitude. The other major

change reflected in the text is the widespread use of decomposition algorithms, in particular column generation (branch-(cut)-and-price) and Benders' decomposition. The revised second edition: Contains new developments on column generation Offers a new chapter on Benders' algorithm Includes expanded information on preprocessing, heuristics, and branch-and-cut Presents several basic and extended formulations, for example for fixed cost network flows Also touches on and briefly introduces topics such as non-bipartite matching, the complexity of extended formulations or a good linear program for the implementation of lift-and-project Written for students of integer/mathematical programming in operations research, mathematics, engineering, or computer science, Integer Programming offers an updated edition of the basic text that reflects the most recent developments in the field.

Aimms Optimization Modeling - Johannes Bisschop 2006

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.

Data Science for Business and Decision Making - Luiz Paulo Fávero 2019-04-11

Data Science for Business and Decision Making covers both statistics and operations research while most competing textbooks focus on one or the other. As a result, the book more clearly defines the principles of business analytics for those who want to apply quantitative methods in their work. Its emphasis reflects the importance of regression, optimization and simulation for practitioners of business analytics. Each chapter uses a didactic format that is followed by exercises and answers. Freely-accessible datasets enable students and professionals to work with Excel, Stata Statistical Software®, and IBM SPSS Statistics Software®. Combines statistics and operations research modeling to teach the principles of business analytics Written for students who want to apply statistics, optimization and multivariate modeling to gain competitive advantages in business Shows how powerful software packages, such as SPSS and Stata, can create graphical and numerical outputs

OPTIMIZATION AND OPERATIONS RESEARCH - Volume I - Ulrich Derigs 2009-02-09

Optimization and Operations Research is a component of Encyclopedia of Mathematical Sciences in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty one Encyclopedias. The Theme on Optimization and Operations Research is organized into six different topics which represent the main scientific areas of the theme: 1. Fundamentals of Operations Research; 2. Advanced Deterministic Operations Research; 3. Optimization in Infinite Dimensions; 4. Game Theory; 5. Stochastic Operations Research; 6. Decision Analysis, which are then expanded into multiple subtopics, each as a chapter. These four volumes are aimed at the following five major target audiences: University and College students Educators, Professional Practitioners, Research Personnel and Policy Analysts, Managers, and Decision Makers and NGOs.

Production Planning by Mixed Integer Programming - Yves Pochet 2006-09-23

This textbook provides a comprehensive modeling, reformulation and optimization approach for solving production planning and supply chain planning problems, covering topics from a basic introduction to planning systems, mixed integer programming (MIP) models and algorithms through the advanced description of mathematical results in polyhedral combinatorics required to solve these problems. Based on twenty years worth of research in which the authors have played a significant role, the book addresses real life industrial production planning problems (involving complex production structures with multiple production stages) using MIP modeling and reformulation approach. The book provides an introduction to MIP modeling and to planning systems, a unique collection of reformulation results, and an easy to use problem-solving library. This approach is demonstrated through a series of real life case studies, exercises and detailed illustrations. Review by Jakub Marecek (Computer Journal) The emphasis put on mixed integer rounding and mixing sets, heuristics in-built in general purpose integer programming solvers, as well as on decompositions and heuristics using integer programming should be praised... There is no doubt that this volume offers the present best introduction to integer programming formulations of lotsizing problems, encountered in production planning. (2007)

