

Robust Optimization Princeton Series In Applied Ma

Computational Complexity
 Nature-inspired Methods for Stochastic, Robust and Dynamic Optimization
 Geometric Programming for Communication Systems
 Graph Theoretic Methods in Multiagent Networks
 Auxiliary Signal Design for Failure Detection
 Robust Portfolio Optimization and Management
 Distributionally Robust Optimization and its Applications in Power System Energy Storage Sizing
 Optimization
 A Gentle Introduction to Optimization
 Lectures on Modern Convex Optimization
 Modern Anti-windup Synthesis
 Impulsive and Hybrid Dynamical Systems
 Advances in Sensitivity Analysis and Parametric Programming
 Robust Optimization
 High-Dimensional Probability
 Handbook of Test Problems in Local and Global Optimization
 Optimization Algorithms on Matrix Manifolds
 Optimal Learning
 Statistical Inference Via Convex Optimization
 Introduction to Stochastic Programming
 Robust Optimization with Applications to Finance and Telecommunication
 A Non-Random Walk Down Wall Street
 Optimization Models
 Robust Optimization in Electric Energy Systems
 Financial Signal Processing and Machine Learning
 Simulation and Optimization in Finance
 Lectures on Stochastic Programming
 Active Robust Optimization: Optimizing for Robustness of Changeable Products
 Resource-Constrained Project Scheduling
 Robust Data Mining
 Robust Discrete Optimization and Its Applications
 Algorithms for Worst-Case Design and Applications to Risk Management
 Linear Programming
 Calculus of Variations and Optimal Control Theory
 Approximate Dynamic Programming
 Feedback Systems
 Local Search in Combinatorial Optimization
 Robust Optimization: Complexity and Solution Methods
 Robust Optimization
 Analytic Combinatorics

Robust Optimization Princeton Series
In Applied Ma

Downloaded from qr.bonide.com by
guest

CONWAY BRENDAN

Computational Complexity Cambridge University Press
 This Fourth Edition introduces the latest theory and applications in optimization. It emphasizes constrained optimization, beginning with a substantial treatment of linear programming and then proceeding to convex analysis, network flows, integer programming, quadratic programming, and convex optimization. Readers will discover a host of practical business applications as well as non-business applications. Topics are clearly developed with many numerical examples worked out in detail. Specific examples and concrete algorithms precede more abstract topics. With its focus on solving practical problems, the book features free C programs to implement the major algorithms covered, including the two-phase simplex method, primal-dual simplex method, path-following interior-point method, and homogeneous self-dual methods. In addition, the author provides online JAVA applets that illustrate various pivot rules and variants of the simplex method, both for linear programming and for network flows. These C programs and JAVA tools can be found on the book's website. The website also includes new online instructional tools and exercises.

Nature-inspired Methods for Stochastic, Robust and Dynamic Optimization Springer Nature

An introduction to the theory and practice of financial simulation and optimization In recent years, there has been a notable increase in the use of simulation and optimization methods in the financial industry. Applications include portfolio allocation, risk management, pricing, and capital budgeting under uncertainty. This accessible guide provides an introduction to the simulation and optimization techniques most widely used in finance, while at the same time offering background on the financial concepts in these applications. In addition, it clarifies difficult concepts in traditional models of uncertainty in finance, and teaches you how to build models with software. It does this by reviewing current simulation and optimization methodology-along with available software-and proceeds with portfolio risk management, modeling of random processes, pricing of financial derivatives, and real options applications. Contains a unique combination of finance theory and rigorous mathematical modeling emphasizing a hands-on approach through implementation with software Highlights not only classical applications, but also more recent developments, such as pricing of mortgage-backed securities Includes models and code in both spreadsheet-based software (@RISK, Solver, Evolver, VBA) and mathematical modeling software (MATLAB) Filled with in-depth insights and practical advice, Simulation and

Optimization Modeling in Finance offers essential guidance on some of the most important topics in financial management.

Geometric Programming for Communication Systems John Wiley & Sons

Optimization is an essential technique for solving problems in areas as diverse as accounting, computer science and engineering. Assuming only basic linear algebra and with a clear focus on the fundamental concepts, this textbook is the perfect starting point for first- and second-year undergraduate students from a wide range of backgrounds and with varying levels of ability. Modern, real-world examples motivate the theory throughout. The authors keep the text as concise and focused as possible, with more advanced material treated separately or in starred exercises. Chapters are self-contained so that instructors and students can adapt the material to suit their own needs and a wide selection of over 140 exercises gives readers the opportunity to try out the skills they gain in each section. Solutions are available for instructors. The book also provides suggestions for further reading to help students take the next step to more advanced material.

Graph Theoretic Methods in Multiagent Networks Princeton University Press

Learn the science of collecting information to make effective decisions Everyday decisions are made without the benefit of accurate information. Optimal Learning develops the needed principles for gathering information to make decisions, especially when collecting information is time-consuming and expensive. Designed for readers with an elementary background in probability and statistics, the book presents effective and practical policies illustrated in a wide range of applications, from energy, homeland security, and transportation to engineering, health, and business. This book covers the fundamental dimensions of a learning problem and presents a simple method for testing and comparing policies for learning. Special attention is given to the knowledge gradient policy and its use with a wide range of belief models, including lookup table and parametric and for online and offline problems. Three sections develop ideas with increasing levels of sophistication: Fundamentals explores fundamental topics, including adaptive learning, ranking and selection, the knowledge gradient, and bandit problems Extensions and Applications features coverage of linear belief models, subset selection models, scalar function optimization, optimal bidding, and stopping problems Advanced Topics explores complex methods including simulation optimization, active learning in mathematical programming, and optimal continuous measurements Each chapter identifies a specific learning problem, presents the related, practical algorithms for implementation, and concludes with numerous exercises. A

related website features additional applications and downloadable software, including MATLAB and the Optimal Learning Calculator, a spreadsheet-based package that provides an introduction to learning and a variety of policies for learning.

Auxiliary Signal Design for Failure Detection John Wiley & Sons

This accessible book provides an introduction to the analysis and design of dynamic multiagent networks. Such networks are of great interest in a wide range of areas in science and engineering, including: mobile sensor networks, distributed robotics such as formation flying and swarming, quantum networks, networked economics, biological synchronization, and social networks. Focusing on graph theoretic methods for the analysis and synthesis of dynamic multiagent networks, the book presents a powerful new formalism and set of tools for networked systems. The book's three sections look at foundations, multiagent networks, and networks as systems. The authors give an overview of important ideas from graph theory, followed by a detailed account of the agreement protocol and its various extensions, including the behavior of the protocol over undirected, directed, switching, and random networks. They cover topics such as formation control, coverage, distributed estimation, social networks, and games over networks. And they explore intriguing aspects of viewing networks as systems, by making these networks amenable to control-theoretic analysis and automatic synthesis, by monitoring their dynamic evolution, and by examining higher-order interaction models in terms of simplicial complexes and their applications. The book will interest graduate students working in systems and control, as well as in computer science and robotics. It will be a standard reference for researchers seeking a self-contained account of system-theoretic aspects of multiagent networks and their wide-ranging applications. This book has been adopted as a textbook at the following universities: ? University of Stuttgart, Germany Royal Institute of Technology, Sweden Johannes Kepler University, Austria Georgia Tech, USA University of Washington, USA Ohio University, USA

Robust Portfolio Optimization and Management BoD - Books on Demand

1. Introduction -- 2. Computational complexity -- 3. Local improvement on discrete structures -- 4. Simulated annealing -- 5. Tabu search -- 6. Genetic algorithms -- 7. Artificial neural networks -- 8. The traveling salesman problem: A case study -- 9. Vehicle routing: Modern heuristics -- 10. Vehicle routing: Handling edge exchanges -- 11. Machine scheduling -- 12. VLSI layout synthesis -- 13. Code design.

Distributionally Robust Optimization and its Applications in Power System Energy Storage Sizing Princeton University Press

This book develops a general analysis and synthesis framework for impulsive and hybrid dynamical systems. Such a framework is imperative for modern complex engineering systems that involve interacting continuous-time and discrete-time dynamics with multiple modes of operation that place stringent demands on controller design and require implementation of increasing complexity--whether advanced high-performance tactical fighter aircraft and space vehicles, variable-cycle gas turbine engines, or air and ground transportation systems. Impulsive and Hybrid Dynamical Systems goes beyond similar treatments by developing invariant set stability theorems, partial stability, Lagrange stability, boundedness, ultimate boundedness, dissipativity theory, vector dissipativity theory, energy-based hybrid control, optimal control, disturbance rejection control, and robust control for nonlinear impulsive and hybrid dynamical systems. A major contribution to mathematical system theory and control system theory, this book is written from a system-theoretic point of view with the highest standards of exposition and rigor. It is intended for graduate students, researchers, and practitioners of engineering and applied mathematics as well as computer scientists, physicists, and other scientists who seek a fundamental understanding of the rich dynamical behavior of impulsive and hybrid dynamical systems.

[Optimization](#) Springer Science & Business Media

Optimization problems involving stochastic models occur in almost all areas of science and engineering, such as telecommunications, medicine, and finance. Their existence compels a need for rigorous ways of formulating, analyzing, and solving such problems. This book focuses on optimization problems involving uncertain parameters and covers the theoretical foundations and recent advances in areas where stochastic models are available. Readers will find coverage of the basic concepts of modeling these problems, including recourse actions and the nonanticipativity principle. The book also includes the theory of two-stage and multistage stochastic programming problems; the current state of the theory on chance (probabilistic) constraints, including the structure of the problems, optimality theory, and duality; and statistical inference in and risk-averse approaches to stochastic programming.

[A Gentle Introduction to Optimization](#) Princeton University Press

Data uncertainty is a concept closely related with most real life applications that involve data collection and interpretation. Examples can be found in data acquired with biomedical instruments or other experimental techniques. Integration of robust optimization in the existing data mining techniques aim to create new algorithms resilient to error and noise. This work encapsulates all the latest applications of robust optimization in data mining. This brief contains an overview of the rapidly growing field of robust data mining research field and presents the most well known machine learning algorithms, their robust counterpart formulations and algorithms for attacking these problems. This brief will appeal to theoreticians and data miners working in this field.

[Lectures on Modern Convex Optimization](#) Princeton University Press

A complete and accessible introduction to the real-world applications of approximate dynamic programming With the growing levels of sophistication in modern-day operations, it is vital for practitioners to understand how to approach, model, and solve complex industrial problems. Approximate Dynamic Programming is a result of the author's decades of experience working in large industrial settings to develop practical and high-quality solutions to problems that involve making decisions in the presence of uncertainty. This groundbreaking book uniquely integrates four distinct disciplines—Markov design processes, mathematical programming, simulation, and statistics—to demonstrate how to successfully model and solve a wide range of real-life problems using the techniques of approximate dynamic programming (ADP). The reader is introduced to the three curses of dimensionality that impact complex problems and is also shown how the post-decision state variable allows for the use of classical algorithmic strategies from operations research to treat complex stochastic optimization problems. Designed as an introduction and assuming no prior training in dynamic programming of any form, Approximate Dynamic Programming contains dozens of algorithms that are intended to serve as a starting point in the design of practical solutions for real problems. The book provides detailed coverage of implementation challenges including: modeling complex sequential decision processes under uncertainty, identifying robust policies, designing and estimating value function approximations, choosing effective stepsize rules, and resolving convergence issues. With a focus on modeling and algorithms in conjunction with the language of mainstream operations research, artificial intelligence, and control theory, Approximate Dynamic Programming: Models complex, high-dimensional problems in a natural and practical way, which draws on years of industrial projects Introduces and emphasizes the power of estimating a value function around the post-decision state, allowing solution algorithms to be broken down into three fundamental steps: classical simulation, classical optimization, and classical statistics Presents a thorough discussion of recursive estimation, including fundamental theory

and a number of issues that arise in the development of practical algorithms Offers a variety of methods for approximating dynamic programs that have appeared in previous literature, but that have never been presented in the coherent format of a book Motivated by examples from modern-day operations research, Approximate Dynamic Programming is an accessible introduction to dynamic modeling and is also a valuable guide for the development of high-quality solutions to problems that exist in operations research and engineering. The clear and precise presentation of the material makes this an appropriate text for advanced undergraduate and beginning graduate courses, while also serving as a reference for researchers and practitioners. A companion Web site is available for readers, which includes additional exercises, solutions to exercises, and data sets to reinforce the book's main concepts.

[Modern Anti-windup Synthesis](#) Princeton University Press

This textbook offers a concise yet rigorous introduction to calculus of variations and optimal control theory, and is a self-contained resource for graduate students in engineering, applied mathematics, and related subjects. Designed specifically for a one-semester course, the book begins with calculus of variations, preparing the ground for optimal control. It then gives a complete proof of the maximum principle and covers key topics such as the Hamilton-Jacobi-Bellman theory of dynamic programming and linear-quadratic optimal control. Calculus of Variations and Optimal Control Theory also traces the historical development of the subject and features numerous exercises, notes and references at the end of each chapter, and suggestions for further study. Offers a concise yet rigorous introduction Requires limited background in control theory or advanced mathematics Provides a complete proof of the maximum principle Uses consistent notation in the exposition of classical and modern topics Traces the historical development of the subject Solutions manual (available only to teachers) Leading universities that have adopted this book include: University of Illinois at Urbana-Champaign ECE 553: Optimum Control Systems Georgia Institute of Technology ECE 6553: Optimal Control and Optimization University of Pennsylvania ESE 680: Optimal Control Theory University of Notre Dame EE 60565: Optimal Control *Impulsive and Hybrid Dynamical Systems* Cambridge University Press

Nature-inspired algorithms have a great popularity in the current scientific community, being the focused scope of many research contributions in the literature year by year. The rationale behind the acquired momentum by this broad family of methods lies on their outstanding performance evinced in hundreds of research fields and problem instances. This book gravitates on the development of nature-inspired methods and their application to stochastic, dynamic and robust optimization. Topics covered by this book include the design and development of evolutionary algorithms, bio-inspired metaheuristics, or memetic methods, with empirical, innovative findings when used in different subfields of mathematical optimization, such as stochastic, dynamic, multimodal and robust optimization, as well as noisy optimization and dynamic and constraint satisfaction problems.

[Advances in Sensitivity Analysis and Parametric Programming](#) Springer Nature

This self-contained textbook is an informal introduction to optimization through the use of numerous illustrations and applications. The focus is on analytically solving optimization problems with a finite number of continuous variables. In addition, the authors provide introductions to classical and modern numerical methods of optimization and to dynamic optimization. The book's overarching point is that most problems may be solved by the direct application of the theorems of Fermat, Lagrange, and Weierstrass. The authors show how the intuition for each of the theoretical results can be supported by simple geometric figures. They include numerous applications through the use of varied classical and practical problems. Even experts may find some of these applications truly surprising. A basic mathematical knowledge is sufficient to understand the topics covered in this book. More advanced readers, even experts, will be surprised to see how all main results can be grounded on the Fermat-Lagrange theorem. The book can be used for courses on continuous optimization, from introductory to advanced, for any field for which optimization is relevant.

[Robust Optimization](#) Springer

This accessible textbook demonstrates how to recognize, simplify, model and solve optimization problems - and apply these principles to new projects.

[High-Dimensional Probability](#) SIAM

Praise for Robust Portfolio Optimization and Management "In the half century since Harry Markowitz introduced his elegant theory for selecting portfolios, investors and scholars have extended and refined its application to a wide range of real-world problems, culminating in the contents of this masterful book. Fabozzi, Kolm, Pachamanova, and Focardi deserve high praise for producing a technically rigorous yet remarkably accessible guide to the latest advances in portfolio construction." --Mark Kritzman, President and CEO, Windham Capital Management, LLC "The topic of robust optimization (RO) has become 'hot' over the past several years, especially in real-world financial applications. This interest has

been sparked, in part, by practitioners who implemented classical portfolio models for asset allocation without considering estimation and model robustness a part of their overall allocation methodology, and experienced poor performance. Anyone interested in these developments ought to own a copy of this book. The authors cover the recent developments of the RO area in an intuitive, easy-to-read manner, provide numerous examples, and discuss practical considerations. I highly recommend this book to finance professionals and students alike." --John M.

Mulvey, Professor of Operations Research and Financial Engineering, Princeton University
[Handbook of Test Problems in Local and Global Optimization](#) John Wiley & Sons

This book deals with decision making in environments of significant data uncertainty, with particular emphasis on operations and production management applications. For such environments, we suggest the use of the robustness approach to decision making, which assumes inadequate knowledge of the decision maker about the random state of nature and develops a decision that hedges against the worst contingency that may arise. The main motivating factors for a decision maker to use the robustness approach are: • It does not ignore uncertainty and takes a proactive step in response to the fact that forecasted values of uncertain parameters will not occur in most environments; • It applies to decisions of unique, non-repetitive nature, which are common in many fast and dynamically changing environments; • It accounts for the risk averse nature of decision makers; and • It recognizes that even though decision environments are fraught with data uncertainties, decisions are evaluated ex post with the realized data. For all of the above reasons, robust decisions are dear to the heart of operational decision makers. This book takes a giant first step in presenting decision support tools and solution methods for generating robust decisions in a variety of interesting application environments. Robust Discrete Optimization is a comprehensive mathematical programming framework for robust decision making.

[Optimization Algorithms on Matrix Manifolds](#) John Wiley & Sons

Analytic combinatorics aims to enable precise quantitative predictions of the properties of large combinatorial structures. The theory has emerged over recent decades as essential both for the analysis of algorithms and for the study of scientific models in many disciplines, including probability theory, statistical physics, computational biology, and information theory. With a careful combination of symbolic enumeration methods and complex analysis, drawing heavily on generating functions, results of sweeping generality emerge that can be applied in particular to fundamental structures such as permutations, sequences, strings, walks, paths, trees, graphs and maps. This account is the definitive treatment of the topic. The authors give full coverage of the underlying mathematics and a thorough treatment of both classical and modern applications of the theory. The text is complemented with exercises, examples, appendices and notes to aid understanding. The book can be used for an advanced undergraduate or a graduate course, or for self-study. *Optimal Learning* Princeton University Press

The modern financial industry has been required to deal with large and diverse portfolios in a variety of asset classes often with limited market data available. Financial Signal Processing and Machine Learning unifies a number of recent advances made in signal processing and machine learning for the design and management of investment portfolios and financial engineering. This book bridges the gap between these disciplines, offering the latest information on key topics including characterizing statistical dependence and correlation in high dimensions, constructing effective and robust risk measures, and their use in portfolio optimization and rebalancing. The book focuses on signal processing approaches to model return, momentum, and mean reversion, addressing theoretical and implementation aspects. It highlights the connections between portfolio theory, sparse learning and compressed sensing, sparse eigen-portfolios, robust optimization, non-Gaussian data-driven risk measures, graphical models, causal analysis through temporal-causal modeling, and large-scale copula-based approaches. Key features: Highlights signal processing and machine learning as key approaches to quantitative finance. Offers advanced mathematical tools for high-dimensional portfolio construction, monitoring, and post-trade analysis problems. Presents portfolio theory, sparse learning and compressed sensing, sparsity methods for investment portfolios. including eigen-portfolios, model return, momentum, mean reversion and non-Gaussian data-driven risk measures with real-world applications of these techniques. Includes contributions from leading researchers and practitioners in both the signal and information processing communities, and the quantitative finance community.

[Statistical Inference Via Convex Optimization](#) Now Publishers Inc

An integrated package of powerful probabilistic tools and key applications in modern mathematical data science.

[Introduction to Stochastic Programming](#) Princeton University Press

Recently Geometric Programming has been applied to study a variety of problems in the analysis and design of communication

systems from information theory and queuing theory to signal processing and network protocols. Geometric Programming for Communication Systems begins its comprehensive treatment of the subject by providing an in-depth tutorial on the theory, algorithms, and modeling methods of Geometric Programming. It

then gives a systematic survey of the applications of Geometric Programming to the study of communication systems. It collects in one place various published results in this area, which are currently scattered in several books and many research papers,

as well as to date unpublished results. Geometric Programming for Communication Systems is intended for researchers and students who wish to have a comprehensive starting point for understanding the theory and applications of geometric programming in communication systems.