Convex Analysis By R Tyrrell Rockafellar

Variational Analysis
Robust Optimization
Lectures on the Calculus of Variations and Optimal Control Theory
Convex Analysis and Variational Problems
Convex Optimization
Semidefinite Optimization and Convex Algebraic Geometry
Statistical Inference Via Convex Optimization
Journal of Nonlinear and Convex Analysis
A First Course in Optimization Theory
Convex Optimization & Euclidean Distance Geometry
Conjugate Duality and Optimization
Convex Optimization Theory
Stochastic Optimization
Hybrid Feedback Control
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Convex Analysis
The Theory of Subgradients and Its Applications to Problems of Optimization
Variational Analysis
Equilibrium Problems and Variational Models
Nonsmooth Optimization
Conjugate Duality and Optimization
Investment Risk Management
Convex Analysis
The Hamiltonian Approach to Dynamic Economics
Linear Programming

Infinite Dimensional Analysis
Convex Analysis and Optimization
Convex Analysis
Convex Functions, Partial Orderings, and Statistical Applications
Algorithms for Convex Optimization
From Analysis to Visualization
Matrix Mathematics
Opt Art
Convex Analysis
Analysis on Polish Spaces and an Introduction to Optimal Transportation
Implicit Functions and Solution Mappings
An Easy Path to Convex Analysis and Applications
Convexity and Duality in Optimization

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ARI SINGLETON

Variational Analysis SIAM
An insightful, concise, and rigorous treatment of the basic theory of convex sets and functions in finite dimensions, and the analytical/geometrical foundations of convex optimization and duality theory. Convexity theory is first developed in a simple accessible manner, using easily visualized proofs. Then the focus shifts to a transparent geometrical line of analysis to develop the fundamental duality between descriptions of convex functions in terms of points, and in terms of hyperplanes. Finally, convexity theory and abstract duality are applied to problems of constrained optimization, Fenchel and conic duality, and game theory to develop the sharpest possible duality results within a highly visual geometric framework. This on-line version of the book, includes an extensive set of theoretical problems with detailed high-quality solutions, which significantly extend the range and value of the book. The book may be used as a text for a theoretical convex optimization course; the author has taught several variants of such a course at MIT and elsewhere over the last ten years. It may also be used as a supplementary source for nonlinear programming classes, and as a theoretical foundation for classes focused on convex optimization models (rather than theory). It is an excellent supplement to several of our books: Convex Optimization Algorithms (Athena Scientific, 2015), Nonlinear Programming (Athena Scientific, 2017), Network Optimization(Athena Scientific, 1998), Introduction to Linear Optimization (Athena Scientific, 1997), and Network Flows and

Monotropic Optimization (Athena Scientific, 1998).
Robust Optimization Morgan & Claypool Publishers
Robust optimization is still a relatively new approach to optimization problems affected by uncertainty, but it has already proved so useful in real applications that it is difficult to tackle such problems today without considering this powerful methodology. Written by the principal developers of robust optimization, and describing the main achievements of a decade of research, this is the first book to provide a comprehensive and up-to-date account of the subject. Robust optimization is designed to meet some major challenges associated with uncertainty-affected optimization problems: to operate under lack of full information on the nature of uncertainty; to model the problem in a form that can be solved efficiently; and to provide guarantees about the performance of the solution. The book starts with a relatively simple treatment of uncertain linear programming, proceeding with a deep analysis of the interconnections between the construction of appropriate uncertainty sets and the classical chance constraints (probabilistic) approach. It then develops the robust optimization theory for uncertain conic quadratic and semidefinite optimization problems and dynamic (multistage) problems. The theory is supported by numerous examples and computational illustrations. An essential book for anyone working on optimization and decision making under uncertainty, Robust Optimization also makes an ideal graduate textbook on the subject.
Lectures on the Calculus of Variations and Optimal Control Theory Springer Science & Business Media
From its origins in the minimization of integral functionals, the notion of variations has evolved greatly in connection with applications in optimization, equilibrium, and control. This book develops a unified framework and provides a detailed exposition of variational geometry and subdifferential calculus in their current forms beyond classical and convex analysis. Also covered are set-convergence, set-valued mappings, epi-convergence, duality, and normal integrands.
Convex Analysis and Variational Problems Cambridge University Press
Students and researchers from all fields of mathematics are invited to read and treasure this special Proceedings. A conference was held 25 –29 September 2017 at Noah’s On the Beach, Newcastle, Australia, to commemorate the life and work of Jonathan M. Borwein, a mathematician extraordinaire whose untimely passing in August 2016 was a sorry loss to mathematics and to so many members of its community, a loss that continues to be keenly felt. A polymath, Jonathan Borwein ranks among the most wide ranging and influential mathematicians of the last 50 years, making significant contributions to an exceptional diversity of areas and substantially expanding the use of the computer as a tool of the research mathematician. The contributions in this commemorative volume probe Dr. Borwein's ongoing legacy in areas where he did some of his most outstanding work: Applied Analysis, Optimization and Convex Functions; Mathematics Education; Financial Mathematics; plus Number Theory, Special Functions and Pi, all tinged by the double prisms of Experimental Mathematics and Visualization, methodologies he championed.
Convex Optimization Princeton University Press

The Hamiltonian Approach to Dynamic Economics focuses on the application of the Hamiltonian approach to dynamic economics and attempts to provide some unification of the theory of heterogeneous capital. Emphasis is placed on the stability of long-run steady-state equilibrium in models of heterogeneous capital accumulation. Generalizations of the Samuelson-Scheinkman approach are also given. Moreover, conditions are sought on the geometry of the Hamiltonian function (that is, on static technology) that suffice to preserve under (not necessarily small) perturbation the basic properties of the Hamiltonian dynamical system. Comprised of eight essays, this book begins with an introduction to Hamiltonian dynamics in economics, followed by a discussion on optimal steady states of n-sector growth models when utility is discounted. Optimal growth and decentralized or descriptive growth models in both continuous and discrete time are treated as applications of Hamiltonian dynamics. Theproblem of optimal growth with zero discounting is considered, with emphasis on a steepness condition on the Hamiltonian function. The general problem of decentralized growth with instantaneously adjusted expectations about price changes is also analyzed, along with the global asymptotic stability of optimal control systems with applications to the theory of economic growth. This monograph will be of value to mathematicians and economists.

Semidefinite Optimization and Convex Algebraic Geometry Financial Markets and Investme

This book contains different developments of infinite dimensional convex programming in the context of convex analysis, including duality, minmax and Lagrangians, and convexification of nonconvex optimization problems in the calculus of variations (infinite dimension). It also includes the theory of convex duality applied to partial differential equations; no other reference presents this in a systematic way. The minmax theorems contained in this book have many useful applications, in particular the robust control of partial differential equations in finite time horizon. First published in English in 1976, this SIAM Classics in Applied Mathematics edition contains the original text along with a new preface and some additional references.

Statistical Inference Via Convex Optimization John Wiley & Sons Incorporated

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

Journal of Nonlinear and Convex Analysis Springer Science & Business Media

Basic predictor feedback for single-input systems -- Basic idea of adaptive control for single-input systems -- Single-input systems with full relative degree -- Single-input systems with arbitrary relative degree -- Exact predictor feedback for multi-input systems -- Full-state feedback of uncertain multi-input systems -- Output feedback of uncertain multi-input systems -- Output feedback of systems with uncertain delays, parameters and ODE state -- Predictor feedback for uncertainty-free systems -- Predictor feedback of uncertain single-input systems -- Predictor feedback of uncertain multi-input systems.

A First Course in Optimization Theory Academic Press

All investments carry with them some degree of risk. In the financial world, individuals, professional money managers, financial institutions and many others encounter and must deal

with risk. The main purpose of 'Investment Risk Management' is to provide an overview of developments in risk management and a synthesis of research involving the latest developments in the field--

Convex Optimization & Euclidean Distance Geometry Springer Science & Business Media

Provides a relatively brief introduction to conjugate duality in both finite- and infinite-dimensional problems. An emphasis is placed on the fundamental importance of the concepts of Lagrangian function, saddle-point, and saddle-value. General examples are drawn from nonlinear programming, approximation, stochastic programming, the calculus of variations, and optimal control.

Conjugate Duality and Optimization Athena Scientific

This book is divided into two parts. The first addresses the simpler variational problems in parametric and nonparametric form. The second covers extensions to optimal control theory. The author opens with the study of three classical problems whose solutions led to the theory of calculus of variations. They are the problem of geodesics, the brachistochrone, and the minimal surface of revolution. He gives a detailed discussion of the Hamilton-Jacobi theory, both in the parametric and nonparametric forms. This leads to the development of sufficiency theories describing properties of minimizing extremal arcs. Next, the author addresses existence theorems. He first develops Hilbert's basic existence theorem for parametric problems and studies some of its consequences. Finally, he develops the theory of generalized curves and "automatic" existence theorems. In the second part of the book, the author discusses optimal control problems. He notes that originally these problems were formulated as problems of Lagrange and Mayer in terms of differential constraints. In the control formulation, these constraints are expressed in a more convenient form in terms of control functions. After pointing out the new phenomenon that may arise, namely, the lack of controllability, the author develops the maximum principle and illustrates this principle by standard examples that show the switching phenomena that may occur. He extends the theory of geodesic coverings to optimal control problems. Finally, he extends the problem to generalized optimal control problems and obtains the corresponding existence theorems.

Convex Optimization Theory Princeton University Press

This authoritative book draws on the latest research to explore the interplay of high-dimensional statistics with optimization. Through an accessible analysis of fundamental problems of hypothesis testing and signal recovery, Anatoli Juditsky and Arkadi Nemirovski show how convex optimization theory can be used to devise and analyze near-optimal statistical inferences. Statistical Inference via Convex Optimization is an essential resource for optimization specialists who are new to statistics and its applications, and for data scientists who want to improve their optimization methods. Juditsky and Nemirovski provide the first systematic treatment of the statistical techniques that have arisen from advances in the theory of optimization. They focus on four well-known statistical problems—sparse recovery, hypothesis testing, and recovery from indirect observations of both signals and functions of signals—demonstrating how they can be solved more efficiently as convex optimization problems. The emphasis

throughout is on achieving the best possible statistical performance. The construction of inference routines and the quantification of their statistical performance are given by efficient computation rather than by analytical derivation typical of more conventional statistical approaches. In addition to being computation-friendly, the methods described in this book enable practitioners to handle numerous situations too difficult for closed analytical form analysis, such as composite hypothesis testing and signal recovery in inverse problems. Statistical Inference via Convex Optimization features exercises with solutions along with extensive appendixes, making it ideal for use as a graduate text.

Stochastic Optimization Convex Analysis

Detailed account of analysis on Polish spaces with a straightforward introduction to optimal transportation.

Hybrid Feedback Control Springer Science & Business Media

Stochastic programming is the study of procedures for decision making under the presence of uncertainties and risks. Stochastic programming approaches have been successfully used in a number of areas such as energy and production planning, telecommunications, and transportation. Recently, the practical experience gained in stochastic programming has been expanded to a much larger spectrum of applications including financial modeling, risk management, and probabilistic risk analysis. Major topics in this volume include: (1) advances in theory and implementation of stochastic programming algorithms; (2) sensitivity analysis of stochastic systems; (3) stochastic programming applications and other related topics. Audience: Researchers and academies working in optimization, computer modeling, operations research and financial engineering. The book is appropriate as supplementary reading in courses on optimization and financial engineering.

Positive Definite Matrices Princeton University Press

An introductory text on convex sets, convex functions and convex optimization. Emphasizes the basic concepts and the characteristic methods of convex mathematics, and includes proofs and theorems that focus on practical applications.

Convex Analysis and Nonlinear Optimization Springer

An accessible introduction to convex algebraic geometry and semidefinite optimization. For graduate students and researchers in mathematics and computer science.

Convex Analysis Athena Scientific

This book presents functional analytic methods in a unified manner with applications to economics, social sciences, and engineering. Ideal for those without an extensive background in the area, it develops topology, convexity, Banach lattices, integration, correspondences, and the analytic approach to Markov processes. Many of the results were previously available only in esoteric monographs and will interest researchers and students who will find the material readily applicable to problems in control theory and economics.

The Theory of Subgradients and Its Applications to Problems of Optimization Springer

The implicit function theorem is one of the most important theorems in analysis and its many variants are basic tools in partial differential equations and numerical analysis. This second edition of Implicit Functions and Solution Mappings presents an updated and more complete picture of the field by including solutions of problems that have been solved since the first edition

was published, and places old and new results in a broader perspective. The purpose of this self-contained work is to provide a reference on the topic and to provide a unified collection of a number of results which are currently scattered throughout the literature. Updates to this edition include new sections in almost all chapters, new exercises and examples, updated commentaries to chapters and an enlarged index and references section.

Variational Analysis Cambridge University Press

The analysis and optimization of convex functions have re ceived a great deal of attention during the last two decades. If we had to choose two key-words from these developments, we would retain the concept of ubdi66 e and the duality theo y. As it usual in the development of mathematical theories, people had since tried to extend the known defi nitions and properties to new classes of functions, including the convex ones. For what concerns the generalization of the notion of subdifferential, tremendous achievements have been carried out in the past decade and any rna.. thematician who is faced with a nondifferentiable nonconvex function has now a panoply of generalized subdifferentials or derivatives at his disposal. A lot remains to be done in this area, especially concerning vecto -valued functions; however we think the golden age for these researches is behind us. Duality theory has also fascinated many mathematicians since the underlying mathematical framework has been laid down in the context of Convex Analysis. The various duality schemes which have emerged in the re cent years, despite of their mathematical elegance, have not always proved as powerful as expected."

Equilibrium Problems and Variational Models SIAM

Please note that the content of this book primarily consists of articles available from Wikipedia or other free sources online. Pages: 32. Chapters: Bipolar theorem, Characteristic function (convex analysis), Closed convex function, Complex convexity, Concave function, Convex cone, Convex conjugate, Convex hull, Convex optimization, Convex set, Danskin's theorem, Dieudonne's theorem, Dual cone and polar cone, Effective domain, Ekeland's variational principle, Epigraph (mathematics), Farkas' lemma, Fenchel's duality theorem, Fenchel-Moreau theorem, Gauss-Lucas theorem, Hilbert projection theorem, Hypograph (mathematics), Invex function, Kachurovskii's theorem, Karamata's inequality, Legendre transformation, Linear separability, Logarithmically concave function, Minkowski's theorem, Minkowski functional, Modulus and characteristic of convexity, Moreau's theorem, Polyconvex function, Popoviciu's inequality, Proper convex function, Pseudoconvex function, Pseudolinear function, Quasiconvex function, R. Tyrrell Rockafellar, Recession cone, Schur-convex function, Shephard's problem, Strictly convex space, Subderivative, Tonelli's theorem (functional analysis), Uniformly convex space.

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