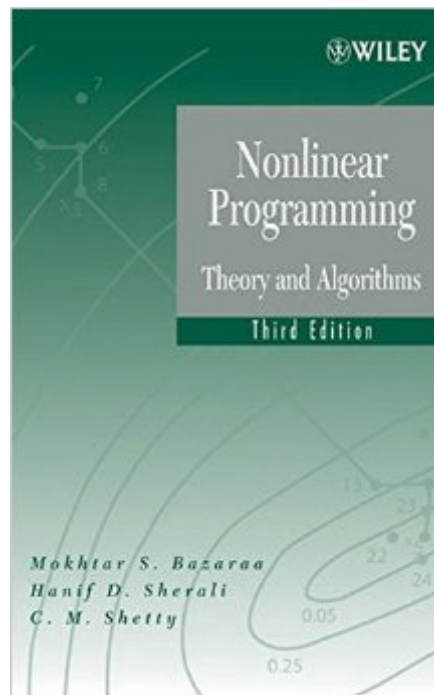# Nonlinear Programming: Theory And Algorithms

Synopsis

COMPREHENSIVE COVERAGE OF NONLINEAR PROGRAMMING THEORY AND ALGORITHMS, THOROUGHLY REVISED AND EXPANDED Nonlinear Programming: Theory and Algorithmsâ "now in an extensively updated Third Editionâ "addresses the problem of optimizing an objective function in the presence of equality and inequality constraints. Many realistic problems cannot be adequately represented as a linear program owing to the nature of the nonlinearity of the objective function and/or the nonlinearity of any constraints. The Third Edition begins with a general introduction to nonlinear programming with illustrative examples and guidelines for model construction. Concentration on the three major parts of nonlinear programming is provided: Convex analysis with discussion of topological properties of convex sets, separation and support of convex sets, polyhedral sets, extreme points and extreme directions of polyhedral sets, and linear programming Optimality conditions and duality with coverage of the nature, interpretation, and value of the classical Fritz John (FJ) and the Karush-Kuhn-Tucker (KKT) optimality conditions; the interrelationships between various proposed constraint qualifications; and Lagrangian duality and saddle point optimality conditions Algorithms and their convergence, with a presentation of algorithms for solving both unconstrained and constrained nonlinear programming problems Important features of the Third Edition include: New topics such as second interior point methods, nonconvex optimization, nondifferentiable optimization, and more Updated discussion and new applications in each chapter Detailed numerical examples and graphical illustrations Essential coverage of modeling and formulating nonlinear programs Simple numerical problems Advanced theoretical exercises The book is a solid reference for professionals as well as a useful text for students in the fields of operations research, management science, industrial engineering, applied mathematics, and also in engineering disciplines that deal with analytical optimization techniques. The logical and self-contained format uniquely covers nonlinear programming techniques with a great depth of information and an abundance of valuable examples and illustrations that showcase the most current advances in nonlinear problems.

Book Information

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Customer Reviews

I am referring to the Bazaraa, Sherali and Shetty book "Nonlinear Programming, Theory and Applications", second edition (it seems that missed the third author).This is a great book for anyone who is interested in nonlinear optimization. The book presents the topic in a clear and concise manner, provides learning aides in form of examples and generally has a very well structured layout. I have other books on NLP, but I consider this the best one (Luenberger is great, too - but very condensed). The book consists of three parts: the first part presents convex analysis, the second part looks at optimality conditions and the third part presents algorithms. If you went through some OR textbooks and felt that they didn't give you enough on NLP, this is the place to get your fix!This book for NLPs together with Dantzig's work on LPs and you have the basic toolset for static optimization.

I am also referring to the 2nd Edition of the book.I largely agree with review by Marc Sachon except the part about Dantzig's book: if you are new to LP/NLP, or Mathematical Programming in general, stay away from Dantzig's book. Its writing style is entirely outdated and will put you to sleep in no time. Reading from Dantzig to learn about LP is like reading Newton's originals to learn physics/calculus.If you're new to LP / NLP I *strongly* recommend Vanderbei, and THEN this book.This book covers enough ground for fast paced novices and beyond novices.It's mathematical but not rigorous in the strict mathematician's way - for that kind of exposure look elsewhere. It covers a breadth of subjects/issues related to LP / NLP not often found in other books at its level, so in a way it is like a small compendium.It's more up-to-date than say, R. Fletcher's "Practical Methods of Optimization", or Gill, Murray & Wright's "Practical Optimization" both good MSc level books but somewhat dated now and perhaps a bit tedious sometimes. However, if you're a novice, I advise you to look at them also, if you have access to them, as they might serve your specific needs/ reading style better/equally well. You should also look at Luenberger's "Linear and Nonlinear Programming" which is also quite old but has a classic writing style and is holding up rather well. If

you want the fine nitty-gritty details and the breadth of coverage though, Bazaraa has more. Luenberger's more solid and rigorous.Haven't had the chance to look at the more recent "Nonlinear Optimization" by Andrzej Ruszczynski but it might be as good/better as he's also an expert in the field - so keep that in mind."Convex Optimization" by Stephen Boyd is more advanced (not too advanced though, depending on your maths ability) and moving in a slightly different field/teritory.

This book is rigorous yet easily understood by someone with the appropriate background. It has an abundance of motivating examples along with numerous problems and an extensive notes section at the end of each chapter. I have the hard copy of the book, but since it is fairly bulky I wanted to get the kindle version so I could be a bit more portable. The kindle version is a mess. Most of the equations are pictures, which I am used to with kindle math books, but the pictures are so blurry that it is impossible to make out what is there. This is in fact the most poorly formatted kindle math book I've ever seen. So I highly recommend this textbook, but I'd advise staying far away from the kindle version.

This is a very detailed book with many examples, proofs and explanations. I appreciated the thoroughness of the text however at times it was a lot to take in and still be able to understand the material. I would say this is a difficult book to get through in a quarter long masters course and we are having to trim large parts out in order to meet a good timeline but in general it's a good text book.

This book presents the theory and algorithms of nonlinear programming.Summaring the contents:Ch1. IntroductionPart1 Convex AnalysisCh2. Convex SetsCh3. Convex, PseudoConvex and QuasiConvex FunctionsPart2 Optimality Conditions and DualityCh.4 The Fritz John and Karush-Kuhn-Tucker OptimalityCh. 5 Constraint QualificationsCh. 6 Lagrangian Duality and Saddle Point Optimality ConditionsPart3 Algorithms and Their ConvergenceCh. 7 The Concept of an Algorithm (based on Zangwill work)Ch. 8 Unconstrained Optimization (includes something about Trust Region)Ch. 9 Penalty and Barrier FunctionsCh. 10 Methods of Feasible DirectionsCh. 11 Linear Complementary Problem, Quadratic, Separable, Fractional, and Geometric ProgrammingApp. A Mathematical ReviewApp. B Summary of Convexity, Optimality Conditions, and Duality----------------------------- Bu this edition as the second edition has several typos.- a very good reference (up to date) for optimization courses.

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