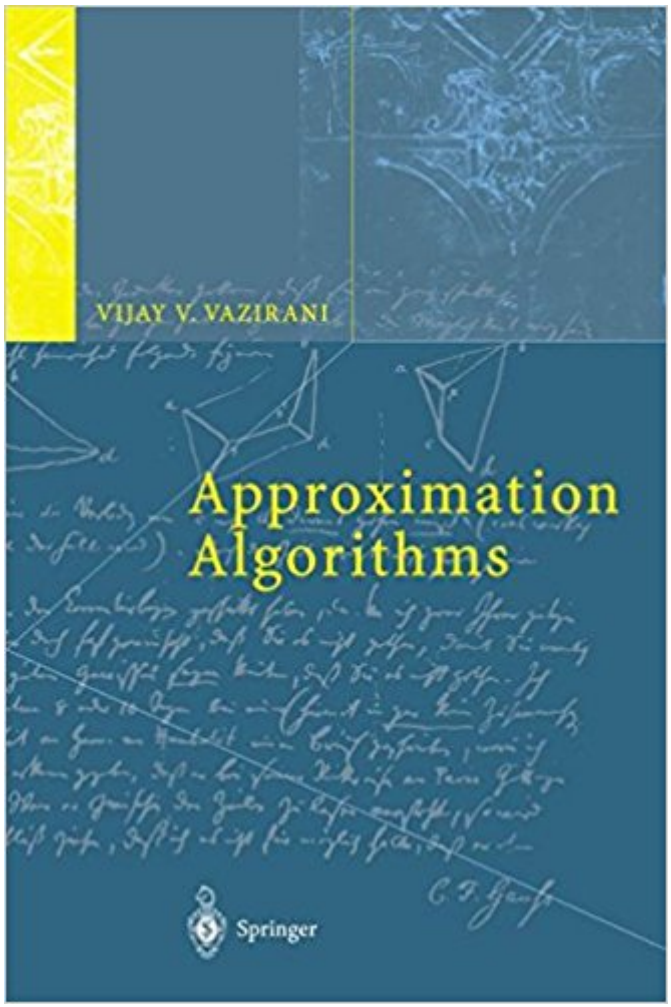
Approximation Algorithms



Synopsis

Covering the basic techniques used in the latest research work, the author consolidates progress made so far, including some very recent and promising results, and conveys the beauty and excitement of work in the field. He gives clear, lucid explanations of key results and ideas, with intuitive proofs, and provides critical examples and numerous illustrations to help elucidate the algorithms. Many of the results presented have been simplified and new insights provided. Of interest to theoretical computer scientists, operations researchers, and discrete mathematicians.

Book Information

Hardcover: 380 pages

Publisher: Springer (March 22, 2004)

Language: English

ISBN-10: 3540653678

ISBN-13: 978-3540653677

Product Dimensions: 9.2 x 0.9 x 6.1 inches

Shipping Weight: 1.6 pounds (View shipping rates and policies)

Average Customer Review: 5.0 out of 5 stars 10 customer reviews

Best Sellers Rank: #510,561 in Books (See Top 100 in Books) #102 inÃ Â Books > Science & Math > Mathematics > Pure Mathematics > Combinatorics #141 inÃ Â Books > Textbooks > Computer Science > Algorithms #248 inÃ Â Books > Business & Money > Processes & Infrastructure > Operations Research

Customer Reviews

From the reviews: "Approximation algorithms is an area where much progress has been made in the last 10 years. The book under review is a very good help for understanding these results. In each of the 27 chapters an important combinatorial optimization problem is presented and one or more approximation algorithms for it are clearly and concisely described and analyzed. In this way most of the most important results from the approximation algorithm literature are covered, often more easily comprehensible than the original articles." (Viggo Kann, Zentralblatt MATH, Vol. 1005, 2003) "The book under review concentrates on the Ã¢â ¬Â¦ design and analysis of efficient approximation algorithms with good performance guarantees. It is possibly the first textbook to provide an extensive and systematic coverage of this topic. Ã¢â ¬Â¦ The book starts briskly, using simple examples to illustrate some of the key concepts and draw the reader rapidly in. Ã¢â ¬Â¦ Copious exercises are included to test and deepen the readerÃ¢â ¬â„¢s understanding. Ã¢â ¬Â¦ It

deserves a place in every computer science and mathematical library." (Mark R. Jerrum, Mathematical Reviews, 2002 h) "The book of Vijay Vazirani is not the first one dedicated to approximation algorithms Ã¢â ¬Â| . However it is, I believe, among the very best from a didactical point of view: this is the text I would chose, would I have to give a course on approximation algorithms Ã¢â ¬Â| . I suspect that for many researchers it would be the first one to consult Ã¢â ¬Â| . It is a must acquisition for libraries of computer science/engineering departments Ã¢â ¬Â| ." (Francesco Maffioli, Mathematical Methods of Operations Research, Vol. 56 (2), 2002) "The book gives an overview on the theory of approximation algorithms. It presents the most important problems, the basic methods and ideas which are used in this area. Ã¢â ¬Â| The book can be used for a graduate course on approximation algorithms. Ã¢â ¬Â| The chapters also contain a section of exercises, which can help the students to understand the material in a deeper way. Ã¢â ¬Â| On the other hand the book can be used by the researchers of the field Ã¢â ¬Â| ." (CsanÃƒÂ¡d Imreh, Acta Scientiarum Mathematicarum, Vol. 68, 2002)

Ã Â This book covers the dominant theoretical approaches to the approximate solution of hard combinatorial optimization and enumeration problems. It contains elegant combinatorial theory, useful and interesting algorithms, and deep results about the intrinsic complexity of combinatorial problems. Its clarity of exposition and excellent selection of exercises will make it accessible and appealing to all those with a taste for mathematics and algorithms. Richard Karp,University Professor, University of California at Berkeley Following the development of basic combinatorial optimization techniques in the 1960s and 1970s, a main open question was to develop a theory of approximation algorithms. In the 1990s, parallel developments in techniques for designing approximation algorithms as well as methods for proving hardness of approximation results have led to a beautiful theory. The need to solve truly large instances of computationally hard problems, such as those arising from the Internet or the human genome project, has also increased interest in this theory. The field is currently very active, with the toolbox of approximation algorithm design techniques getting always richer. It is a pleasure to recommend Vijay Vazirani’s well-written and comprehensive book on this important and timely topic. I am sure the reader will find it most useful both as an introduction to approximability as well as a reference to the many aspects of approximation algorithms. LÃƒÂ¡szlÃƒÂ LovÃƒÂ¡sz, Senior Researcher, Microsoft Research

Let’s be concrete.The first part of the book presents a set of classical NP hard problems, set covering, bin packing, knapsack, etc. and their approximation algorithms. These algorithms are

extracted from a number of fundamental papers, which are of long, delicate presentations. Vazirami presented the problems and solutions in a unified framework. The presentation appears much shorter than they were in the original papers, and they are concise, precise, explicit and comprehensive. For an algorithm researcher, if he read the book first and then those papers, he will be much more efficient than doing that other way (as I and many other people did.)The second part of the book present the LP scheme of approximation algorithm design. I had little knowledge about this. But to pursue a career as an algorithm researcher, I must know this. Vazirani's book gives me a comprehensive (yet short) start.I rarely give my reviews five stars (2% of my reviews get 5 stars so far), but this book deserves.

Giving it 5 stars anyway cause it's the main text in approximation algorithms, but is sometimes hard to follow. Has many, many examples and reductions for classic problems. A must read if you're interested in delving into this area.

This is a quite nice book by an author who is well-known in the field. The book is not thematic, instead it presents certain problems in each chapter along with the main approximation algorithms and correctness proofs. Yet, each new concept is well introduced with the problems. For instance, the author presents LP-based techniques on the same problem (set cover) in the second part of the book. This makes it quite easy to compare and understand different techniques. The last part of the book is a little bit advanced compared to the first two parts which uses combinatorial or LP-based analysis of the algorithms. The presentation of the PCP theorem- arguably the deepest theorem of computer science- and its consequences are also in the last part.A warning though: The book is quite terse at times, which enforces a dense reading. This may not be suitable for an undergradute study. My only complaint is that the PCP theorem might well be introduced with a little more intution.Overall, I rate this book as excellent. If you are interested in algorithms, you should definitely buy it. Also, buy the "Complexity and Approximation" by Ausiello, Crescenzi and others. They provide a more comprehensive and thematic treatment. It also has an excellent bibliography and list of NP-hard problems. These two will make a great couple. The book edited by Hochbaum (Approximation Algorithms for NP-hard problems) on the other hand presents detailed information on the algorithms.

I have been using Dorit Hochbaum's book on approximation algorithms for NP-Hard problems as a guideline for my work. Hochbaum's book is, without a doubt, terrific. However, the survey format

compromised a smooth flow in favor of bringing together the best people in the field. This book (Vazirani's) corrects this by being so smooth and elegant from start to finish. Excellent problem sets, excellent hints for most problems, and there is a section at the end of the book devoted to open problems, which is a really really cool feature. My favorite chapter -29 I think- deals with hardness of approximation and the PCP theorem. The chapter explains the PCP theorem so vividly that the exact next thing I was doing was reading and comprehending the latest papers in this area. If you're a researcher in algorithms and complexity, then this book is highly recommended, especially at this ridiculously low price.Note on my background: I am a graduate (masters) student in CS.

I have been looking for books related to solving NP-complete and NP-hard problems approximately. There is another book by Hochbaum and I have that too. Unfortunately, that book is more of a research oriented book as it is written by several researchers. It's like reading several research papers within two hard covers. This means that one needs to have a sort of intermediate level of experience with approximation algorithms.For a beginner, one would expect a book that starts from ground-up and that has been written as a textbook rather than as a set of research papers. The book by Dr. Vazirani, is the only book that is written by one author with a step-by-step evolution of concepts and ideas related to approximation algorithms.

I have always been a operational research aficionado, but when I skimmed through this book the first time I did not really "get it". Then, I was led back to this book and now it has become one of those books I like to pick up just to bring the remembrance of the concepts it talks about. One main topic is duality and how for different problems we can squeeze the gap between the solution built in primal and dual space. I have known the theory for years, yet it is only more recently and with help among others from this book, that I start to get a glimpse of the whole depth and magic in this area of "applied" mathematics.

This is not only the best Appoximation Algorithm book out there, its one of the best books on graduate level mathematics I have ever seen. Such eloquent coverage of advanced topics. I can not recommend it highly enough.

This is a fanastic topics book in approximation algorithms. The problems and proofs are challenging and concise, but written in a very accessible manner. It is a great reference book, and also a convenient place to grab a lecture from if you need something to fill our a course. I have found it

extremely useful, and even fun to read. I highly reccomend it for any person interested in theoretical computer science.

Approximation Algorithms for NP-Hard Problems Approximation Algorithms Principles Of Applied Mathematics: Transformation And Approximation Evolutionary Algorithms in Theory and Practice: Evolution Strategies, Evolutionary Programming, Genetic Algorithms Practical Algorithms in Pediatric Nephrology: (Practical Algorithms in Pediatrics. Series Editor: Z. Hochberg) Practical Algorithms in Pediatric Gastroenterology: (Practical Algorithms in Pediatrics. Series Editor: Z. Hochberg) Practical Algorithms in Pediatric Endocrinology: (Practical Algorithms in Pediatrics. Series Editor: Z. Hochberg) Bundle of Algorithms in C++, Parts 1-5: Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms (3rd Edition) (Pts. 1-5) Practical Algorithms in Pediatric Hematology and Oncology: (Practical Algorithms in Pediatrics. Series Editor: Z. Hochberg) Automate This: How Algorithms Came to Rule Our World Algorithms and Bugs (Kids Get Coding) Understanding Coding by Building Algorithms (Spotlight on Kids Can Code) Algorithms to Live By: The Computer Science of Human Decisions What to Do When Machines Do Everything: How to Get Ahead in a World of AI, Algorithms, Bots, and Big Data Automate This: How Algorithms Took Over Our Markets, Our Jobs, and the World Operations Research: Applications and Algorithms (with CD-ROM and InfoTrac) Pediatric Advanced Life Support (PALS) Certification Course Kit - Including Practice tests - Review of BLS and detailed instruction of PALS algorithms - A complete PALS course on the NHCPS website Things to Make and Do in the Fourth Dimension: A Mathematician's Journey Through Narcissistic Numbers, Optimal Dating Algorithms, at Least Two Kinds of Infinity, and More Analytics: Business Intelligence, Algorithms and Statistical Analysis (Predictive Analytics, Data Visualization, Data Analytics, Business Analytics, Decision Analysis, Big Data, Statistical Analysis) Introduction to Algorithms, 3rd Edition (MIT Press)