



Interfaces

Publication details, including instructions for authors and subscription information:
<http://pubsonline.informs.org>

Book Reviews

To cite this article:

(1985) Book Reviews. Interfaces 15(6):112-117. <https://doi.org/10.1287/inte.15.6.112>

Full terms and conditions of use: <https://pubsonline.informs.org/Publications/Librarians-Portal/PubsOnLine-Terms-and-Conditions>

This article may be used only for the purposes of research, teaching, and/or private study. Commercial use or systematic downloading (by robots or other automatic processes) is prohibited without explicit Publisher approval, unless otherwise noted. For more information, contact permissions@informs.org.

The Publisher does not warrant or guarantee the article's accuracy, completeness, merchantability, fitness for a particular purpose, or non-infringement. Descriptions of, or references to, products or publications, or inclusion of an advertisement in this article, neither constitutes nor implies a guarantee, endorsement, or support of claims made of that product, publication, or service.

© 1985 INFORMS

Please scroll down for article—it is on subsequent pages



With 12,500 members from nearly 90 countries, INFORMS is the largest international association of operations research (O.R.) and analytics professionals and students. INFORMS provides unique networking and learning opportunities for individual professionals, and organizations of all types and sizes, to better understand and use O.R. and analytics tools and methods to transform strategic visions and achieve better outcomes. For more information on INFORMS, its publications, membership, or meetings visit <http://www.informs.org>

Book Reviews

MARION G. SOBOL

Edwin L. Cox School of Business
Southern Methodist University
Dallas, Texas 75275

$$\frac{1}{\beta} \Gamma^{\alpha} \cdot \approx + \frac{*}{\Sigma} \frac{-}{\lambda} \beta \mu = \epsilon \rho + \frac{\sigma}{\lambda} \frac{x}{\Sigma} \frac{\mu}{\lambda} \omega \cdot \& \mu ? \lambda \epsilon < \mu \cap \{ \pi^{\rho} \}$$

The range of books reviewed is wide, covering theory and applications in operations research, statistics, econometrics, mathematics, computers, and information systems. In addition, we include books in other fields that emphasize technical applications. We list the books and proceedings received; not all books received can be reviewed because space and time are limited. Those who would like to review books are urged to send the editor their names, addresses, and specific areas of expertise. The editor commissions all reviews and does not accept unsolicited book reviews. Readers are encouraged to suggest books that might be reviewed or to ask publishers to send copies of such books to the editor.

ROBERTS, FRED S. 1984, *Applied Combinatorics*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 606 pp., \$37.95.

BOGART, KENNETH P. 1983, *Introductory Combinatorics*, Pitman Publishing, Inc., Marshfield, Massachusetts, 388 pp., \$24.95.

In *Applied Combinatorics*, F. S. Roberts treats a great many topics of combinatorics in a concise and eminently readable fashion. Reading the book is sheer pleasure. The introductory remarks of each chapter and section never fail to rouse the curiosity of the reader; they always include interesting historical facts, example

applications, and thought-provoking questions. Theorems and proofs are presented in an elegant and precise style. Interspersed are numerous applications and exercises. Indeed, the book would be very useful for someone who would just like to learn about applications of combinatorics.

The material is organized as follows. Part I includes basic counting rules and an introduction to graph theory. Part II addresses the counting problem; specifically covered are generating functions, recurrence relations, the principle of inclusion and exclusion, and the Polya theory of counting. Existence problems

Copyright © 1985, The Institute of Management Sciences
0092-2102/85/1506/0112\$01.25

BOOK REVIEWS

are the subject of Part III; the topics include the pigeonhole principle, experimental design, coding theory, and several existence problems in graph theory. The final Part IV looks at combinatorial optimization problems involving bipartite matching, minimum spanning trees, shortest routes, and network flows.

The book would be an excellent choice for a senior year or beginning graduate course in combinatorics. It is also an excellent self-study book for the operations research specialist who has never been exposed to combinatorics. It should be pointed out, though, that combinatorial optimization, which is of great importance in operations research, is a far richer field than might be evident from the book, so the reader should rely on other texts as well.

Introductory Combinatorics by K. P. Bogart treats many topics covered in Robert's book, as one might expect. The discussion is at a more elementary level, and the book may be appropriate at the sophomore or junior year level.

When asked to review two books on the same topic, one is tempted to make comparisons. It seems to me that Robert's treatment is more elegant, includes many more applications and is more likely to stimulate independent and creative thinking.

K. Truemper

University of Texas at Dallas, Box 830688,
Richardson, Texas 75083-0688

NEMIROVSKY, A. S. and YUDIN, D. B. *Problem Complexity and Method Efficiency in Optimization*, John Wiley and Sons, New York, 388 pp., \$49.95.

Central to the analysis of numerical methods for solving optimization problems has traditionally been the rate of convergence. This rate measures the asymptotic speed of the convergence process and is frequently used as an indicator of the theoretical efficiency of the respective methods. Due to its intrinsically local character, the rate of convergence contributes little, if any, useful knowledge toward the understanding of some global issues related to the level of difficulty, that is, the complexity of the problems being solved.

In this book, the authors adopt an entirely different point of view and develop several new approaches to investigating numerical optimization methods. Their main objective is to provide knowledge on the global solution complexity and method efficiency for various classes of optimization problems. The authors' approaches depart from the traditional treatment mainly in their nonasymptotic character. The emphasis is placed on finding out about the convergent process before the "exit" to the asymptotic behavior takes place and on the effect of other parameters, apart from accuracy, of the class of problems (parameters such as the dimension of the problems under solution). Questions such as the following are raised and answered: Given a family of optimization problems with certain characteristics, what are the potential lower bounds of "laboriousness" of all possible methods which solve all problems in the family with a prescribed accuracy? Which method realizes this potential lower limit and is therefore the best one? What are the potential lower bounds of laborious-

ness of many well-known numerical methods (such as the gradient descent ones) applied to solve some standard classes of nonlinear programming problems with a given accuracy?

The apparatus used by the authors are deep and the derived results interesting (and at times, surprising). Yet, as with many other results in the complexity theory of computations, these conclusions provide a worst-case analysis for nonlinear optimization problems and their solution methods. As such, they produce very little, if any, information on the practical performance of individual algorithms applied to specific problems.

Overall, the presentation of the materials is formal and rigorous. Many of the results have previously appeared in papers published by the authors. The book is in general well written but at times difficult to read (due to the formality as well as to the many detailed proofs). It also requires a substantial amount of mathematical maturity. Subject to this caveat, for anyone interested in the complexity theory of nonlinear optimization problems, the book serves both as an excellent introduction to the subject and as a rich reference for many fundamental and important results.

Jong-Shi Pang

The University of Texas at Dallas, School of Management, Box 830688, Richardson, Texas 75083-0688

GOFFIN, J.-L. and ROUSSEAU, J.-M. eds. 1982, *Mathematical Programming Study 20: Applications*, Elsevier North-Holland, New York, 212 pp., \$30.25 (paperback).

Applications is the twentieth volume in

the Mathematical Programming Study series. This book is for serious mathematical programmers, and I recommend it to them; it is not recommended for the casual reader. Like one of its predecessors (Volume 9), a caveat on the use of the word application must be given. None of the papers in this collection is concerned with implementation per se, and hence would not likely satisfy the *Interfaces* criteria for applications. However, in my opinion, this does not detract from the book since all the papers deal with real problems. In several papers, the proposed methods have been implemented and appropriate references are given.

In the preface, the editors state:

Fortunately, or unfortunately, a significant portion of the practical problems which are within the range of mathematical programming techniques remain difficult to solve, for rather deep, and unavoidable, theoretical reasons, mostly nonlinearities, nonconvexity or nondivisibility.

It is exactly this type of problem that is dealt with in this book. As a consequence, most of the papers are highly mathematical and, although on the whole well written, are not easy to read. As an example, one paper uses integral geometry and Ricci-calculus, while another uses the MART algorithm to maximize entropy. Of course other papers use more familiar methods such as Bender's partitioning and the generalized reduced gradient algorithm.

The range of areas from which the problems are drawn is also diverse. Topics covered include regional planning, traffic flow, file location, image reconstruction, chemical processing, structural design, and both capacity expansion and

BOOK REVIEWS

production costing in energy generation. This diversity adds to the difficulty in reading some of the papers. Not since freshman chemistry had I thought about moles (except in my front lawn or LeCarre novels) until I read the paper on optimizing the output of a chemical process. Fortunately, the papers are sufficiently self-contained so that even if you know little about the application area only the subtleties are lost, while the gist of the paper remains clear.

Goffin and Rousseau are to be commended for putting together these nine interesting, state-of-the-art papers on mathematical programming. I recommend this book to advanced graduate students and researchers in mathematical programming. It will provide them with novel application areas as well as innovative methodological developments.

Bob Bulfin

Department of Industrial Engineering, Auburn University, Auburn, Alabama 36849

GREENBURG, HARVEY J.; MURPHY, FREDERICK H.; SHAW, SUSAN H., eds. 1982, *Advanced Techniques in the Practice of Operations Research*, Elsevier North-Holland New York, 462 pp., \$47.50.

These six tutorials were presented at the 1980 ORSA/TIMS convention in Colorado Springs and cover a broad range of operations research issues from both theoretical and practical standpoints.

In the first tutorial, John Maybee examines the field of qualitative matrix theory. This area, while developed primarily as part of graph theory, finds significant applicability in production flow problems. Maybee's discussion of the Perron Fro-

benious Theory for Morishima Matrices is particularly interesting.

One subarea this tutorial does not touch on is the application of these principles and of digraph results to the problem of preference ranking and consensus formation. A number of applications are found here pertaining to project ranking and planning.

The second tutorial, by W. Zangwill, focuses on fixed points and model descendants from the point of view of path following. Zangwill discusses thoroughly the "place" for fixed-point theory in the practical world. One area of interest to many practitioners is the concept of path following and interdependence. Many, in fact most, real-world situations involve interdependent activities. Qualitative matrix structures provide an effective vehicle for dealing with this phenomenon. Zangwill also examines equilibrium programming and other areas of interest in terms of path following.

Ralph Disney, in tutorial three, looks at the whole area of Markov renewal theory. He discusses some of the many problems which can be modeled in such a fashion and thus provides insights into how the state of the art in the area has evolved. An interesting aspect of this tutorial is the insight into why some processes can be modeled in an explicit analytical fashion, while others must be approached in the usual simulation manner. The unifying structure created for examining such processes provides the modeler with a frame of reference upon which to construct a proper approach to his particular problem.

In the fourth tutorial, Harvey Green-

burg presents an excellent overview of computer-assisted analysis (CAA). He describes the structures which should be and can be made available to the analyst. These tools permit the user to carry out diagnostic analysis and to answer the questions, Where?, Why?, How do I fix it? Interesting examples of existing computer diagnostic technology are given.

In tutorial five, inventory models are examined. Ehrhardt and Wagner attempt to provide insights into how far the inventory field has progressed in its capability to address real industrial problems. They concentrate mainly on approximations to (s,S) inventory models and show how close the results come to the EOQ formula. Both from the point of view of inventory control and industrial modeling in general, the presentation would be of interest to both theoreticians and practitioners.

Finally, in the sixth tutorial, R. Bixby looks at matroid theory. He discusses a number of applications and provides a unified framework for the field. His discussion of the use of matroids in combinatorial problems is particularly interesting.

While the tutorials do not naturally hang together, they all occupy an important place in the OR field. It is refreshing to get a glimpse of a field without having to go through the tremendous start-up process of literature review. These six tutorials provide this glimpse and much more to the reader.

Wade D. Cook

Faculty of Administrative Studies, York University, Toronto, Ontario, Canada

Books Received for Review

- Asefa, Sisay, (ed.) 1985, *Economic Decision Making*, Iowa State University, Ames, Iowa, pp. 112, \$8.50.
- Austin, Larry M. and Burns, James R. 1985, *Management Science: An Aid for Managerial Decision Making*, Macmillan, New York, pp. 560, \$34.95.
- Baker, Kenneth R. and Kropp, Dean H. 1985, *Management Science: An Introduction to the Use of Decision Models*, John Wiley and Sons, New York, pp. 650, \$33.95.
- Beer, Stafford 1985, *Diagnosing the System for Organizations*, John Wiley and Sons, New York, pp. 152, \$19.95.
- Best, Michael J. and Ritter, Klaus 1985, *Linear Programming: Active Set Analysis and Computer Programs*, Prentice-Hall, Englewood Cliffs, New Jersey, pp. 369, \$33.95.
- Clarke, A. Bruce and Disney, Ralph L. 1985, *Probability and Random Processes: A First Course with Applications*, John Wiley and Sons, New York, pp. 324, \$32.95.
- Comer, James M. and Dubinsky, Alan J. 1985, *Managing the Successful Sales Force*, Lexington Books, Lexington, Massachusetts, pp. 141, \$18.00.
- Cornford, Robert A. and Callaghan, Dennis W. 1985, *Strategic Management: Text, Tools, and Cases for Business Policy*, Kent Publishing Company, Boston, Massachusetts, pp. 866, \$31.25.
- Cook, Thomas M. and Russell, Robert A. 1985, *Introduction to Management Science*, Prentice Hall, Englewood Cliffs, New Jersey, pp. 258, \$31.95.
- Dhillon, Balbir S. 1985, *Quality Control, Reliability, and Engineering Design*, Marcel Dekker, New York, pp. 312, \$49.50.
- Dutton, William H. and Kraemer, Kenneth L. 1985, *Modeling as Negotiating: The Political Dynamics of Computer Models in the Policy Process*, Ablex Publishing, Norwood, New Jersey, pp. 280, \$39.59.
- Eilon, Samuel 1985, *Management Assertions & Aversions*, Pergamon, New York, pp. 195, \$13.50.
- Galambos, Janos 1984, *Introductory Probability Theory*, Marcel Dekker, New York, pp. 216, \$25.00.
- Gupta, Amar and Toong, Hoo-min, ed. 1985, *Insights Into Personal Computers*, IEEE Press, New York, pp. 650, \$33.95.
- Hendricks, Wallace E. and Kahn, Lawrence M. 1985, *Wage Indexation in the United States*, Ballinger, Cambridge, Massachusetts, pp. 272, \$29.95.
- Kan, A. H. G. Rinnooy 1985, *New Challenges for Management Research*, Elsevier Science, New York, pp. 192, \$32.25.
- Kozmetsky, George 1985, *Transformational Manage-*

BOOK REVIEWS

- ment, Ballinger, Cambridge, Massachusetts, pp. 185, \$26.95.
- Macintosh, Norman B. 1985, *The Social Software of Accounting and Informational Systems*, John Wiley and Sons, New York, pp. 294, \$29.95.
- Miser, Hugh and Quade, Edwards, eds. 1985, *Handbook of Systems Analysis: Overview of Users, Procedures, Applications, and Practice*, Elsevier Science, New York, pp. 346, \$49.50.
- Negoita, Constantin Virgil 1985, *Expert Systems and Fuzzy Systems*, Benjamin/Cummings, Menlo Park, California, pp. 208, \$37.95.
- Parker, R. C. 1985, *Going for Growth: Technological Innovation in Manufacturing Industries*, John Wiley and Sons, New York, pp. 251, \$24.95.
- Razumikhin, B. S. 1984, *Physical Models and Equilibrium Methods in Programming and Economics*, pp. 351, \$64.00.
- Raval, I., ed. 1985, *Graphs and Order*, D. Reidel, Hingham, Massachusetts, pp. 769, \$99.00.
- Sandquist, Gary M. 1985, *Introduction to System Science*, Prentice Hall, Englewood Cliffs, New Jersey, pp. 567, \$37.95.
- Shingo, Shigeo 1985, *A Revolution in Manufacturing: The SMED System*, Productivity Press, Cambridge, Massachusetts, pp. 832, \$65.00.
- Skinner, Wickham 1985, *Manufacturing: The Formidable Competitive Weapon*, John Wiley and Sons, pp. 330, \$22.95.

Ed. Note

During the past year, in addition to the TIMS/Edelman award issue published in January-February and edited by Peter Kolesar, we had two other special issues. Our May-June issue was a special issue on productivity with Marty Starr serving as editor. This issue's special section on manufacturing strategy was compiled by Arnoldo Hax (always eager for a new project). The special issue editors have my sincerest thanks and admiration; no one knows better than I the work required to make an issue of this journal happen.

— Gary L. Lilien