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## Book Reviews

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# Book Reviews

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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.

FOULDS, L. R. 1981, *Optimization Techniques: An Introduction*, Springer-Verlag New York, New York, 502 pp., \$36.00.

The Foulds text is reasonably well written. It is intended for undergraduate and beginning graduate students of operations research and related fields.

In the preface to the book, Foulds says, "The major objective of this book is to provide an introduction to the main optimization techniques which are at present in use." He has achieved his goal admirably, capturing the essence of the fundamental optimization techniques,

which include linear programming, integer programming, network analysis, dynamic programming, and nonlinear programming. This book is especially suitable for novices. The discussions are accompanied by didactic examples, and well designed practice problems.

So what could be improved? The text suffers from lack of proper motivation. Further, Foulds defers the discussion of the dual simplex method until after post-optimality analysis. This arrangement is by no means unprecedented. I, however, find it difficult to illustrate the recovery of

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## BOOK REVIEWS

feasibility in post-optimality analysis without using the dual simplex method. Finally, a petty remark: The vector notation employed is somewhat unconventional. Both vectors and matrices are denoted by capital letters. To those accustomed to the convention of designating vectors by bold-faced or lower-case letters, this peculiarity may be disturbing.

All in all, the Foulds text is a valuable reference for beginners whose primary interest is to learn the fundamental optimization techniques. In comparison to similar publications, this book is an attractive alternative.

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THOMPSON, MARK S. 1982, *Decision Analysis for Program Evaluation*, Ballinger Publishing Company, Cambridge, Massachusetts, 424 pp., \$35.00.

Another of the many books which apply established methodologies to significant applicational domains, this book describes how decision analysis can be used in program evaluations. Dr. Thompson addresses program evaluators who are interested in decision analytic methodology, and I think he serves their needs well. The book does not include a balanced overview of program evaluation, an omission I found disappointing but which will not annoy members of the author's primary audience.

The book's first four chapters form a competent, nontechnical presentation of decision analysis, something like those in most introductory management science

textbooks. More than most, Thompson's concentrates on "value-of-information" issues, since decision analytic applications to program evaluation are predominantly of this type. After detailing how decision analysis can be used in more complex circumstances and contrasting the Bayesian approach to uncertainty with that of classical statistics, Dr. Thompson discusses the planning and interpretation of program evaluations. The book closes with an ostensibly impartial evaluation of decision analysis which, not surprisingly, finds many more pros than cons concerning its use in program evaluation.

The book is well organized, well written, makes effective use of a number of program evaluation cases, provides an elaborated set of pointers to relevant literature, and includes a chapter of problems and answers. It is largely free of typographical errors, and I found only one instance (the bottom of p. 166) of a wrong-headed (in my opinion) technical analysis. I do think that Chapters 7 and 8 are too one-sided in their depiction of the Bayesian-classicist controversy. It is somewhat disingenuous of a Bayesian to revile a classical statistician for arbitrariness in setting critical parameters, for example, cutoff levels of statistical significance, when Bayesians regularly use subjective probability estimates that have no epistemic standing and that are generated by a process that neither the analyst nor the "expert" understands or can control.

Program evaluations are intended to gather information pertinent to programmatic decisions. Decision analysis provides a formal means of assessing the value of information and consequently

may be useful in deciding if and how to conduct program evaluations. For a formal methodology to be practically useful, it must be operational given the knowledge and cognitive capacities of its users. Information analyses are often treated like hats from which rabbits can be pulled; more knowledge is assumed of the decision maker than she could possibly have. Is an estimate that the enactment of Program A has a  $p$  chance of yielding benefits of  $x$  anything more than a top-of-the-head guess? Maybe such estimates are appropriate final resorts, when all other analyses and information sources have been exhausted. But decision analysis doesn't tell us how to do these other analyses/searches, and it doesn't even require that they be done: any self-proclaimed "expert" can generate the subjective probabilities and preference structure needed to designate an "optimal" alternative. In contexts where vague and diverse values are involved and sound frequency probabilities are rarely available, decision analysis takes on the appearance of an elaborate form of question begging. Dr. Thompson's book will teach one how to use it, but I'm not convinced that, even if used well, decision analysis will significantly enhance most program evaluation decisions.

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HELMER, OLAF 1983, *Looking Forward: A Guide to Futures Research*, Sage Publications, Inc., Beverly Hills, California, 376 pp., \$29.95.

The systematic study of the future is a

relatively recent development. It arises from a philosophical assumption that the future is not prewritten and that it is in man's power to affect what the future will be. The futures movement started in Europe in the mid-1950s and has grown steadily since then. Meetings of the World Future Society, for example, have attracted 5,000 people. Attending these meetings are two groups of people: those who approach the future from a scientific inquiry view and those who have a vision of what the future ought to be and seek converts to their vision. Helmer's book belongs to the first group.

Futures research, as viewed by Helmer, concerns itself with applying the methodology of management science, specifically systems analysis, to issues in long-range planning. He is concerned with planning horizons of 10 to 20 years and more.

Within these horizons, major discontinuities can and will occur. For many such discontinuities, however, there are precursors in the present environment (for example, research and development efforts, minority social movements) which are indicators of change. Helmer considers futures research, like its parent discipline MS/OR, to be pragmatically oriented, with its principal task being operationally meaningful assistance to decision makers.

Helmer is one of the innovators in futures research, being the codeveloper of two of its most important approaches, the Delphi method and cross-impact analysis. In Delphi, panels of experts are asked to estimate the probability of occurrence of potential future events (for example, the commercialization of nuclear fusion) and the values of trends (for example, the

## BOOK REVIEWS

gross national product) as a function of time. The panels do not meet, to eliminate the well-known jury room effect where the dominant voice prevails. It has been found that by feeding back results to the panel, the process converges after a number of rounds. The cross-impact methodology carries this concept a step further. Delphi forecasts are expected values, that is, forecasts based on the assumption of all other things being equal. However, in the real world events either occur or do not occur. If an event occurs, it may affect the probability of occurrence of another event (for example, if an electrically powered car is developed, it would affect the probability of a steam powered car being developed).

In this book Helmer describes the methodologies of futures research, discusses their origins in and relationships to management science, and then presents the results of a series of futures studies (which use these methodologies) in which he has been involved over a 20-year period. The range of topics is broad, including the economy, transportation, energy, international relations, population, and quality of life. Overall these studies have led to a much more positive view of the future than those of Limits to Growth. In looking at some of the specific forecasts, Delphi panelists tended to be optimistic on the expected timing of technological developments.

Rich in detail in both methodology and application, *Looking Forward* gives insights into the way a leading futurist thinks about problems. This well-written book provides a perspective on the use of MS/OR in futures research that cannot be

found elsewhere.

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KROEBER, DONALD and WATSON, HUGH 1984, *Computer-Based Information Systems: A Management Approach*, Macmillan Publishing Company, 866 Third Ave., New York, 506 pp., \$33.25.

As I look at their bright open faces, I wonder how I can train them for careers as data processing professionals. What should I tell these initiates that will connect their algorithm-infested brains to my business world? My world is one where the most serious problems are communications problems but not the "half-duplex transmissions" variety. I am training young computer science graduates from some of the best colleges to function as systems analysts in the business environment.

Until I read *Computer-Based Information Systems: A Management Approach*, I found most textbooks of little help. The books written for computer science students offered no insights into the use of computers in a business environment. The books written for business students had too little technical content to convey the complexities of the computer systems process. Case studies in both types of texts were not current or detailed enough to be of interest. However, now I can recommend *Computer-Based Information Systems* for both business and computer science students, graduate and undergraduate. The textbook integrates well the most up-to-date and diverse material from management and information sciences.

The first six chapters describe the business data-processing environment, computer hardware and software, data base management, and other technical concepts. The book then discusses four major types of business systems: transaction processing, office automation, management information, and decision support. The authors define these systems on the basis of business functions and the management level served by each system. The evolution of computer technology and systems is also related to the types of business information systems. The final chapters are devoted to information systems management and the development of systems, from specification through implementation.

The presentation of technical material is comprehensive and not bogged down in detail. However, one type of systems software, teleprocessing monitors, is included in a section on data base management systems. CICS is a teleprocessing monitor to be used with a separate data base. Many data base management systems include a teleprocessing monitor but, in general, the two software functions are distinct.

The authors have written a large section on decision-making and decision support systems that is excellent. The chapter on designing decision support systems is the best I have seen. The book is unique in its presentation of this difficult and new area of systems development.

The book is easy to follow. Case studies are relevant and ample. The text summarizes the subject well. The authors of *Computer-Based Information Systems* know

from whence they speak. Now, back to my young trainees. I hope they read the book and understand the structure, preferably before they change everything around.

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DENNIS, J. E., Jr. and SCHNABLE, ROBERT B. 1983, *Numerical Methods of Unconstrained Optimization and Nonlinear Equations*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 378 pp., \$37.95.

The opening sentence in the preface states the purpose of the text: "This book offers a careful introduction, at a low level of mathematical and computational sophistication, to the numerical solution of problems in unconstrained optimization and systems of nonlinear equations." In addition to serving as an introductory text, the book is also a comprehensive state-of-the-art reference to the family of quasi-Newtonian methods for solving unconstrained optimization problems and systems of nonlinear equations. In fact, the book is useful and highly recommended for anyone who is concerned with optimization problems and equation solving.

The book consists of 11 chapters and two appendices. The first four chapters contain some introductory topics as well as background materials from numerical linear algebra and multivariate calculus. Chapters 5 to 9 form the heart of the book. Chapter 10 discusses an important special case, namely, methods for problems with special structure. Finally, the two appendices, written by R. B.

## BOOK REVIEWS

Schnable, contain a modular system of algorithms and several test problems.

I think the book is very nicely written and not difficult to read. It emphasizes both theoretical issues and practical implementation. Many examples are used to illustrate as well as to provide motivation for the methods. Considerable attention is also paid to the issue of finite-precision arithmetic and error analysis.

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STRAUSS, MELVIN J. 1981, *Computer Capacity*, Van Nostrand Reinhold, New York, 265 pp., \$24.95.

Computer capacity management as practiced in many organizations is often a rather imprecise science. Specialized personnel within the data center measure and monitor hardware capacity but do not consider some of the other related issues that affect capacity. In addition, they often have difficulty translating their capacity judgments into quantitative terms that are understandable to management.

Strauss does a very good job of removing some of the mystery and adding some precision to computer capacity management. He takes an industrial engineering approach for defining units of measure for computer demand and capacity. Alternative approaches are offered that would be meaningful to various specific audiences. For example, in discussing measures for computer demand, three methods are offered. One of these would appeal to the systems-programming technician, one to the computer performance specialist, and one to the user of data-

processing services.

Chapters include sufficient technical detail to provide guidance to the data-processing professional. However, the book really appears to be directed at the manager of data-processing professionals or at others who wish to understand the management of this often difficult and complex resource. By reducing measurements to industrial engineering terms, Strauss suggests that managing data processing is not that different from managing any other production function.

In addition to discussing computer demand, capacity, and performance measurements, he also discusses staffing issues, budgeting, and chargeout systems. The section on computer-pricing systems provides a good background on what is essentially an economic behavioral issue. That is, depending upon the price a user pays for a data-processing service, he may demand more or less of that service.

Other topics include guidance on when to use a dedicated computer system rather than a large, multipurpose system. Similarly, tools are supplied for evaluating the economics of a large computer system versus smaller, minicomputer systems. The book concludes with a chapter on communicating computer capacity and performance issues to senior management.

I recommend this book very highly to both managers and users of the data-processing function. It removes much of the mystery from computer performance issues and brings them to an understandable level.

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