baseball averages, American football and the like. Even many of the 'business' illustrations do little to inspire enthusiasm about the application of the techniques (applications of the Normal distribution are illustrated, *inter alia*, with references to the mean lengths of sardines in a cannery, demand for pecan pies, tree heights in a forest).

Most lecturers involved with undergraduate business statistics courses would find something in this text of interest and it is a useful addition on the reference shelf. At the end of the day, however, any decision as to whether to recommend this text to students will depend on personal preference (or dislike) of the U.S. style and flavor (sic); particularly at a price of almost £23.

MIK WISNIEWSKI

Network Flows: Theory, Algorithms, and Applications
RAVINDRA K. AHUJA, THOMAS L. MAGNANTI and JAMES B. ORLIN
Prentice Hall, Englewood Cliffs, New Jersey, 1993. xv + 846 pp. £22.95
ISBN 0 13 617549 X

The study of network flows can be traced to the early days of linear programming, and, like that subject, many of the mathematical foundations were laid in the generation from the mid-1940's to the mid-1970's. These fundamentals, both in terms of problems and algorithms, can be found in most courses on operational research and in many introductory general textbooks. Spanning trees, shortest paths, maximal flows and minimal-cost flows have all become established as tools which may be useful for solving particular problems. For many purposes, knowledge of the basic algorithms, developed a generation ago, is sufficient.

Study of network problems has not stopped with this well-tested suite of problem-solving methods. A great deal of research has continued, looking both at special cases of the fundamental problems and at ways that the algorithms can be made to run faster or more efficiently. Variants to the basic problems have arisen in practice, and have been the spurs to successful theoretical research. Sadly, much of this work has only been published in journal articles, and so may be hard to access and assess except by the devoted specialist.

This book is an encyclopaedic study of network programming, from basic problem, through the early theory for solving it, and then to the development of applications, special cases and variations of the methodology. It is extremely comprehensive. In eight hundred pages of a mixture of applications, mathematical theory and discussion of the implementation and complexity of the methods, the authors cover in depth the current state of the art in this branch of mathematical programming. They draw on their experience of active research on networks and their applications, particularly on computational analysis and minimal-cost problems.

This is not a book for the newcomer to the subject. There is too much for the uninitiated to take in and grasp the essentials. It is a text for the researcher or educator, wanting to grasp how particular algorithms have developed over the past twenty years or so, and wanting a one-volume treatment of up-to-date methods. For example, there are two chapters devoted to shortest paths. In the first, the reader is taken from Dijkstra's label-setting algorithm, through the reverse and bidirectional variants, to four ways of storing the data to improve efficiency. The second chapter is devoted to label-correcting algorithms, and presents four implementations, followed by two methods for finding all shortest paths in a network. Each of these chapters has thorough references and over fifty exercises—which could prove a valuable source of ideas for examination questions for a course on networks! Every other chapter is similarly comprehensive and laced with theory and practical examples of the usefulness of networks in many areas of decision-making. Over four hundred references and a long, well-constructed, index complete the work.

The whole book is presented at a very high standard of thoroughness and completeness. I shall regularly refer to my copy, and I wholeheartedly commend it to anyone interested in the theory and practice of network optimisation in the 1990's.

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