Book Reviews

V. S. Tanaev, V. S. Gordon, and Y. M. Shafransky: *Scheduling Theory, Single-Stage Systems*, Kluwer Academic Publishers (1994), viii + 369 pp., Price $171.50.

and

V. S. Tanaev, Y. N. Sotskov, and V. A. Strusevich: *Scheduling Theory, Multi-Stage Systems*, Kluwer Academic Publishers (1994), viii + 401 pp., Price $185.50.

These two volumes are updated and revised translations of previously published books in Russian.

The books provide a systematic and comprehensive exposition with emphasis on theoretical results and computational complexity of scheduling theory.

The first volume is devoted to problems of determining optimal schedules for systems consisting of either a single machine or several parallel machines. After an introduction, four chapters deal with graph theory and complexity of algorithms, polynomially solvable problems, priority-generating functions, and NP-hard problems. The most important results and algorithms related to scheduling are discussed in detail. The book includes also an appendix on approximation algorithms.

The second volume is concerned with the problems of finding optimal schedules for systems comprized of several sequential machines. The first three chapters of the book are dedicated to the classical processing systems, namely, the flow shop, the job shop and the open shop. A chapter is also devoted to the mixed graph problem.

Every chapter in both books concludes with a review and a comprehensive and annotated bibliography. Both books contain an extensive list of references including many references from the Russian literature which are practically unknown to the western specialists.

These two volumes dedicated to the theory and complexity of scheduling problems are a valuable source of information to researchers and graduate students of operations research, management, and computer sciences. Readers with particular interests in production planning and flexible manufacturing are very well served by this fine set.

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H. J. Greenberg, *A Computer-Assisted Analysis System for Mathematical Programming Models and Solutions: A User's Guide for ANALYZE*, Kluwer Academic Publishers, Dordrecht, 1993.

This book presents a software system ANALYZE, which is developed in an artificial intelligent environment in order to provide assistance to the mathematical programming, modeling and analysis. The style is clear, lively, and holds the reader's attention.

In chapter 1 the author gives an overview of ANALYZE and its installation. He also describes how to get started and how to obtain further documentation and on-line help. The basic aim of ANALYZE is to provide assistance for linear programming problems.

Chapter 2 starts with a review of the forms of linear programming models and describes the syntax of the model.

In chapter 3 the author presents the sign-on screen and describes some of the interactive conventions, such as abbreviations of commands and Keyword parameters. He illustrates how to query model and solution values.

In chapter 4 the author proposes to use ANALYZE to resolve some examples of analysis. The first is a price interpretation, continuing with WOODNET, which is a linear program to minimize cost. The author demonstrates how this can be automated with a rule file in order to support the INTERPRT command. The last 2 exercises are diagnoses of elementary unfeasible instances of the WOODNET model.

Chapter 5 provides some advanced uses of ANALYZE. First, the author demonstrates how to use the BLOCK command, including the analysis problem of tracing a flow of materials (both quantities and prices). Second, he shows how to obtain and apply relevant rates of substitution with the RATEOF command. Third, he shows how to get information from the basis, including redundancy detection. Finally, he illustrates various ways to use the REDUCE command and explains the AGGREGAT command and its application to aid unfeasibility diagnosis.

In chapter 6 the author describes the types of files, which may be input or output, for ANALYZE. Some of these are for environment control, such as the use of the SETUP command. He proceeds to explain the use of various file types that provide interfaces with other systems and to offer additional computer-assisted analysis to model users. This includes the use of dictionaries, documents, execution macros, syntax files (a syntax file is generally associated with the entire model) and rule files (a rule file provides a means of giving intelligent assistance for analysis).

The author presents some of the added capabilities and limitations of the ANALYZE procedures in chapter 7. In order to demonstrate that, he explores a forestry model. He concludes with describing various ways, in which ANALYZE can be used to assist model management, that is, the ongoing maintenance, documentation and operation of the model.

Chapter 8 describes some utilities of the system. These utilities are HPAGER (converting text files produced by ANALYZE to obey page ejection for an HP Laser Jet), LPRENAME (used to rename rows and columns), and FORTREF (reading FORTRAN source files and forms a program network).

Chapter 9 is devoted to fundamental algorithms and heuristics used by ANA-LYZE for some of its commands. The aim is to further understanding the results obtained by these procedures.

In chapter 10 the author expands on views of linear programs. He successively presents the commands BLOCK, SHOW, TABLE, GRAPM and, finally, proposes schema equations in an algebraic view.

In chapter 11, the development of more rule files are discussed in order to provide a form of intelligent analysis support. Finally, it is suggested that the material of the last chapter (ch. 12) be used only by lecturers who desire to obtain the source code of the system.

The book contains two appendices A and B. Appendix A includes the error messages while appendix B describes the ANALYZE library of linear programs and relative information sources.

As one can observe, the book presents interesting material regarding the formulation of linear programming problems and their solutions. Consequently, I highly recommend this book. It will be a valuable source for academics and practitioners in the domain of mathematical programming.

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