Discrete Applied Mathematics 46 (1993) 187–190
North-Holland

Book Announcements

Kenneth M. Butler and M. Ray Mercer, Assessing Fault Model and Test Quality (Kluwer Academic Publishers, Boston, 1992) 132 pages

Chapter 1: *Introduction.* Functional test generation techniques. Representing symmetric functions with OBDDs. Controllability, observability, and detectability. Modeling ATPG and measuring test quality. *Chapter* 2: *Fault Modeling.* Fault model assumptions. Fault model classes. *Chapter* 3: *Ordered Binary Decision Diagrams.* History of OBDDs. Properties of OBDDs. Shannon's expansion theorem. *Chapter* 4: *Automatic Test Pattern Generation.* ATPG problem specification. Conventional ATPG algorithms. Boolean functional test generation. *Chapter* 5: *Defect Level.* Definition of defect level. Defect level simplifying assumptions. Defect level models. *Chapter* 6: *Test Performance Evaluation.* Theoretical approaches. Fault simulation approaches. Test application approaches. Layout driven approaches. *Chapter* 7: *OBDDs for Symmetric Functions.* Symmetric functions. Circuit and function terminology. The symmetry diagram. Removing redundant vertices. Derivation of OBDD size equations. Uniqueness argument. OBDDs for tree circuits. OBDD size summary. *Chapter* 8: *Difference Propagation.* The development of difference propagation. Deriving the input-output relationships. The difference propagation algorithm. The efficiency of differences. Using functional decomposition. *Chapter* 9: *Fault Model Behavior.* Selection of fault models and fault sets. Fault behaviour results and analysis. *Chapter* 10: *The Contributions of Con/Obs to Test.* Motivation to study Con/Obs. Definitions of Con/Obs. Generating Con/Obs information. Con/Obs results and analysis. Con/Obs summary. *Chapter* 11: *Analyzing Test Performance.* Defect level motivation. ATPG model development. Fault set selectability. Probabilistic non-target defect coverage. Fault sets. Test performance results. Implications to defect level. *Chapter* 12: *Conclusions. Chapter* 13: *Suggestions for Future Research.* Extensions to OBDD size research. Extensions to difference propagation. Extensions to test quality research. Using ordered partial decision diagrams. General extensions.

Michael Pidd, Computer Simulation in Management Science, Third Edition (Wiley, Chichester, 1992) 351 pages

PART I: FUNDAMENTALS OF COMPUTER SIMULATION IN MANAGEMENT SCIENCE. *Chapter* 1: *The Computer Simulation Approach. Chapter* 2: *A Variety of Modelling Approaches.* PART II: DISCRETE EVENT SIMULATION. *Chapter* 3: *Discrete Event Modeling. Chapter* 4: *Event, Activity and Process Approaches to Modelling. Chapter* 5: *The Three-Phase Approach. Chapter* 6: *Visual Interactive Simulation. Chapter* 7: *Model Testing and Validation. Chapter* 8: *Three Phase Simulation in Turbo Pascal. Chapter* 9: *Graphics and Interaction in Three-Phase Simulation. Chapter* 10: *Selecting Discrete Simulation Software. Chapter* 11: *A Classification of Discrete Simulation Software. Chapter* 12: *Sampling Methods. Chapter* 13: *Planning and Interpreting Discrete Simulations.* PART III: SYSTEM DYNAMICS. *Chapter* 14: *Modelling Feedback Systems. Chapter* 15: *System Dynamics Simulation. Chapter* 16: *System Dynamics in Practice. Appendix* 1: *Listing of the Turbo Pascal Units for the Simple Harassed Booking Clerk Simulation. Appendix* 2: *Listing of the Turbo Pascal*

Units for the Enhanced Harassed Booking Clerk Simulation. Appendix 3: Listing of the Turbo Pascal Units for the Interactive Graphical Harassed Booking Clerk Simulation.

Hamdy A. Taha, Operations Research: An Introduction, Fifth Edition (Macmillan, New York, 1992) 822 pages

Chapter 1: *Decision Making in Operations Research.* The art and science of operations research. Elements of a decision model. Art of modeling. Types of OR models. Effect of data availability on modeling. Computations in OR. Phases of OR study. About this book. PART I: MATHEMATICAL PORGRAMMING. *Chapter* 2: *Linear Programming: Formulations and Graphical Solution.* A two-variable model and its graphical solutions. LP formulations. Additional LP formulations. *Chapter* 3: *Linear Programming: The Simplex Method.* Overall idea of the simplex method. Development of the simplex method. Primal simplex method. Dual simplex method. Special cases in simplex method application. Interpreting the simplex tableau: Sensitivity analysis. *Chapter* 4: *Linear Programming: Revised Simplex Method.* Mathematical foundations. Revised (primal) simplex method. *Chapter* 5: *Linear Programming: Duality, Sensitivity, and Parametric Analysis.* Definition of the dual problem. Solution of the dual problem. Economic interpretation of the dual problem. Complementary slackness. Postoptimal or sensitivity analysis. Parametric linear programming. *Chapter* 6: *Linear Programming: Transportation Model.* Definition and applications for the transportation model. Solution of the transportation problem. The assignment model. The transshipment model. *Chapter* 7: *Linear Programming: Additional Topics.* Bounded variables primal simplex method. Decomposition algorithim. Karmarkar interior-point algorithm. *Chapter* 8: *Network Models.* Network definitions. Minimal spanning tree problem. Shortest-route problem. Maximal-flow problem. Minimum-cost capacitated flow problem. *Chapter* 9: *Integer Linear Programming.* Illustrative applications of integer programming. Solution methods of integer programming. Branch-and-bound algorithm. Cutting-plane algorithms. Zero-one integer problem. *Chapter*10: *Dynamic (Multistage) Programming.* Elements of the DP model: The capital budgeting example. More on the definition of the state. Examples of DP models and computations. Problem of dimensionality in dynamic programming. Solutions of linear programs by dynamic programming. PART II: PROBABILISTIC MODELS. *Chapter* 11: *Data Representation in Operations Research.* Nature of data in OR. Forecasting techniques. *Chapter* 12: *Decision Theory and Games.* Decisions under risk. Decision trees. Decisions under uncertainty. Game theory. *Chapter* 13: *Project Scheduling by PERT-CPM.* Arrow (network) diagram representations. Critical path calculations. Construction of the time chart and resource leveling. Probability and cost considerations in project scheduling. Project control. *Chapter* 14: *Inventory Models.* The ABC inventory system. A generalized inventory model. Deterministic models. Probabilistic models. Just-in-time (JIT) manufacturing system. *Chapter* 15: *Queueing Models.* Basic elements of the queueing model. Role of the Poisson and exponential distributions. Pure birth and pure death processes. Queues with combined arrivals and departures. Specialized Poisson queues. Non-Possion queues. Queues with priorities for service. Tandem or series queues. *Chapter* 16: *Queueing Theory in Practice.* Selection of appropriate queueing model. Queueing decision models. *Chapter* 17: *Simulation Modeling with SIMNET II.* Introduction. SIMNET modeling framework. Statement representation of SIMNET II nodes. SIMNET II mathematical expressions. Layout of SIMNET II model. Model debugging in SIMNET II. Transaction routing in SIMNET II. Branches in SIMNET II. Logic switches. Resources in SIMNET II. Assembling and matching of transactions. Special assignments. Initial data. Initializing nodes and resources with run-dependent data. Gathering statistical observations. Other SIMNET II capabilities. *Chapter* 18: *Markovian Decision Process.* Scope of the Markovian decision problem: The gardener example. Finite-stage dynamic programming model. Infinite-stage model. Linear programming solution of the Markovian decision problem. PART III: NONLINEAR PROGRAMMING. *Chapter* 19: *Classical Optimization Theory.* Unconstrained extremal problems. Constrained extremal problems. *Chapter* 20: *Nonlinear Programming Algorithms.* Unconstrained nonlinear algorithms. Constrained nonlinear algorithms. APPENDIXES. *Appendix A: Review of Vectors and Matrices.* Vectors. Matrices. Quadratic Forms. Convex and concave functions. *Appendix B: Software (TORA and SIMNET II) Installation and Execution.* TORA system. SIMNET II system.

Fred Glover, Darwin Klingman and Nancy V. Phillips, Network Models in Optimization and Their Applications in Practice (Wiley, New York, 1992) 284 pages

Chapter 1: *Netform Origins and Uses: Why Modeling and Netforms Are Important.* Background. Netform modeling in the context of management science. A preview of netform applications. Application: The oil industry. Case: An oil company problem. *Chapter* 2: *Fundamental Models for Pure Networks.* Fundamental principles. Formulating a network model from a word problem. Intuitive problem solving. Structural variations. More General networks. Algebraic statement of pure network model. Alternative conventions for network diagrams. Application: US department of the treasury. Case: Angora. *Chapter* 3: *Additional Pure Network Formulation Techniques.* A core example. Goal programming model conditions. The goal programming classification of target conditions and pre-emptive goal programming. Target flows on arcs with two endpoints. Modeling decreasing returns to scale. An extension of goal programming conditions. Graphical interpretation of decreasing returns to scale. Combined flow restrictions. Application: Enlisted personnel assignment model. Case: Personnel assignment benchmark problem. *Chapter* 4: *Dynamic Network Models.* The inventory connection. A progressive illustration. Additional inventory components. Handling backorders. Integrating production and inventory. Modeling time lags. Parallel and multi-product production-inventory systems. Joint purchase limits. Other time-phased models. Dynamic models as layered time slices. Application: Agrico chemical company. Case: Citgo petroleum corporation, Part A. Case: Citgo petroleum corporation, Part B. Case: Citgo petroleum corporation, Part C. *Chapter* 5: *Generalized Networks.* Generalized networks: A practical step beyond pure networks. Generalized networks in production and inventory applications. Cash flow models. Construction differentiating potential and actual. The complication of discreteness. Designing generalized networks from alternative perspectives. Choices to use more or fewer nodes and arcs. Negative multipliers. Algebraic statement of generalized network model. The generalized network domain: A historical note. Application: Machine scheduling model. Case: W. R. Grace company, Part A. Case: W. R. Grace company, Part B. *Chapter* 6: *Netforms with Discrete Requirements.* Significance of discreteness: Departures from classical networks. The effect of the integer requirements in rounding. Integer model types. Zero-one discrete networks. A scheduling problem. Other constructions using negative multipliers. Fractional flow possibilities. Canonical constructions and hub diagrams. Zero-one integer programming problems as netforms. Connections to more general discrete problems. Fixed-charge model. Application: UFT Graduates. Case: Cotton valley. Case: Advanced circuitry electronics, Inc., Part A. Case: Advanced circuitry electronics, Inc., Part B. *Appendix A: Linear Programing.* Review. The dual. Model characteristics. *Appendix B: Decision Support Systems for Network Models.* Introduction. Intelligent decision support system. Salient requirements for success. Considerations for design and implementation. Application: Citgo petroleum corporation.

Barry C. Arnold, N. Balakrishnan and H. N. Nagaraja, A First Course in Order Statistics (Wiley, New York, 1992) 279 pages

Chapter 1: *Introduction and Preview.* Order statistics. Here, there, and everywhere. *Chapter* 2: *Basic Distribution Theory.* Introduction. Distribution of an order statistic. Joint distribution of two order statistics. Some properties of order statistics. Distribution of the median, range, and some other statistics. *Chapter* 3: *Discrete Order Statistics.* Introduction. Single order statistic. Joint probability mass function. Dependence structure. Distribution of the range. Geometric order statistics. Order statistics from a without-replacement sample. *Chapter* 4: *Order Statistics from some Specific Distributions.* Introduction. Bernoulli distribution. Three-point distribution. Binomial distribution. Poisson distribution. Exponential distribution. Uniform distribution. Logistic distribution. Normal distribution. Computer simulation of order statistics. *Chapter* 5: *Moment Relations, Bounds, and Approximations.* Introduction. Basic formulas. Some identities and recurrence relations. Universal bounds. Series approximations. *Chapter* 6: *Characterizations Using Order Statistics.* Who cares?. The distribution of an order statistic determines the parent distribution. Characterizations based on moments of order statistics. Characterizations based on distributional relationships among order statistics. Characterizations involving dependency assumptions.

Characterizations involving samples of random size. *Chapter 7: Order Statistics in Statistical Inference.* Introduction. Types of order statistics data. Order statistics and sufficiency. Maximum-likelihood estimation. Linear estimation of location and scale parameters. Prediction or order statistics. Distribution-free confidence and tolerance intervals. Goodness-of-fit tests. Other applications. *Chapter 8: Asymptotic Theory.* Need and history. Exponential order statistics. Sample maximum and minimum. Other extreme order statistics. Central and intermediate order statistics. Linear functions of order statistics. *Chapter 9: Record Values.* The hottest July 4th on record!. Definitions and preliminary results on record statistics. Distribution of the nth upper record. Distributions of other record statistics. Record range. Bounds on mean record values. Record values in dependent sequences. Records in improving populations.

F. Thomson Leighton, Introduction to Parallel Algorithms and Architectures: Arrays - Trees - Hypercubes (Morgan Kaufmann, San Mateo, CA, 1992) 831 pages

Preface. *Chapter 1: Arrays and Trees.* Elementary sorting and counting. Integer arithmetic. Matrix algorithms. Retiming and systolic conversion. Graph algorithms. Sorting revisited. Packet routing. Image analysis and computational geometry. Higher-dimensional arrays *. Problems. Bibliographic notes. *Chapter 2: Meshes of Trees.* The two-dimensional mesh of trees. Elementary ($O(\log N)$)-step algorithms. Integer arithmetic *. Matrix algorithms. Graph algorithms. Fast evaluation of straight-line code *. Higher-dimensional meshes of trees. Problems. Bibliographic notes. *Chapter 3: Hypercubes and Related Networks.* The hypercube. The butterfly, cube-connected-cycles, and Benes network. The shuffle-exchange and de Bruijn graphs. Packet-routing algorithms. Sorting. Simulating a parallel random access machine. The fast Fourier transform. Other hypercubic networks. Problems. Bibliographic notes.