

Applied Probability Models With Optimization Applications

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Technology and Operations Management Springer Science & Business Media

Introduction to Probability Models, Tenth Edition, provides an introduction to elementary probability theory and stochastic processes. There are two approaches to the study of probability theory. One is heuristic and nonrigorous, and attempts to develop in students an intuitive feel for the subject that enables him or her to think probabilistically. The other approach attempts a rigorous development of probability by using the tools of measure theory. The first approach is employed in this text. The book begins by introducing basic concepts of probability theory, such as the random variable, conditional probability, and conditional expectation. This is followed by discussions of stochastic processes, including Markov chains and Poisson processes. The remaining chapters cover queuing, reliability theory, Brownian motion, and simulation. Many examples are worked out throughout the text, along with exercises to be solved by students. This book will be particularly useful to those interested in learning how probability theory can be applied to the study of phenomena in fields such as engineering, computer science, management science, the physical and social sciences, and operations research. Ideally, this text would be used in a one-year course in probability models, or a one-semester course in introductory probability theory or a course in elementary stochastic processes. New to this Edition: 65% new chapter material including coverage of finite capacity queues, insurance risk models and Markov chains Contains compulsory material for new Exam 3 of the Society of Actuaries containing several sections in the new exams Updated data, and a list of commonly used notations and equations, a robust ancillary package, including a ISM, SSM, and test bank Includes SPSS PASW Modeler and SAS JMP software packages which are widely used in the field Hallmark features: Superior writing style Excellent exercises and examples covering the wide breadth of coverage of probability topics Real-world applications in engineering, science, business and economics *August 29–September 4, 1982, Brasov, Romania* World Scientific

Introduction to Stochastic Dynamic Programming presents the basic theory and examines the scope of applications of stochastic dynamic programming. The book begins with a chapter on various finite-stage models, illustrating the wide range of applications of stochastic dynamic programming. Subsequent chapters study infinite-stage models: discounting future returns, minimizing nonnegative costs, maximizing nonnegative returns, and maximizing the long-run average return. Each of these

chapters first considers whether an optimal policy need exist—providing counterexamples where appropriate—and then presents methods for obtaining such policies when they do. In addition, general areas of application are presented. The final two chapters are concerned with more specialized models. These include stochastic scheduling models and a type of process known as a multiproject bandit. The mathematical prerequisites for this text are relatively few. No prior knowledge of dynamic programming is assumed and only a moderate familiarity with probability—including the use of conditional expectation—is necessary.

Applied Probability— Computer Science: The Interface Springer Science & Business Media

Applied Probability Models with Optimization

ApplicationsCourier Corporation

Multiservice Loss Models for Broadband Telecommunication Networks
Walter de Gruyter GmbH & Co KG

Operations research uses quantitative models to analyze and predict the behavior of systems and to provide information for decision makers. Two key concepts in such research are optimization and uncertainty. Typical models in stochastic operations research include queueing models, inventory models, financial engineering models, reliability models, and simulation models. This book contains a collection of peer-reviewed papers from the International Workshop on Recent Advances in Stochastic Operations Research (2007 RASOR Nanzan) held on March 5-6, 2007, at Nanzan University, Nagoya, Japan. It enables advanced readers to understand the recent topics and results in stochastic operations research.

Models of Random Processes John Wiley & Sons

This book presents a selection of papers presented to the Second International Symposium on Semi-Markov Models: Theory and Applications held in Compiègne (France) in December 1998. This international meeting had the same aim as the first one held in Brussels in 1984 : to make, fourteen years later, the state of the art in the field of semi-Markov processes and their applications, bring together researchers in this field and also to stimulate fruitful discussions. The set of the subjects of the papers presented in Compiègne has a lot of similarities with the preceding Symposium; this shows that the main fields of semi-Markov processes are now well established particularly for basic applications in Reliability and Maintenance, Biomedicine, Queue ing, Control processes and production. A growing field is the one of insurance and finance but this is not really a surprising fact as the problem of pricing derivative products represents now a crucial problem in economics and finance. For example, stochastic models can be applied to financial and insurance models as we have to evaluate the uncertainty of the future market behavior in order, firstly, to propose different measures for important risks such as the interest risk, the risk of default or the risk of catastrophe and secondly, to describe how to act in order to optimize the situation in time. Recently, the concept of VaR (Value at Risk) was "discovered" in portfolio theory enlarging so the fundamental model of Markowitz.

Introduction to Probability Models CRC Press

Unrivalled coverage of a broad spectrum of industrial engineering concepts and applications The Handbook of Industrial Engineering, Third Edition contains a vast array of timely and useful methodologies

for achieving increased productivity, quality, and competitiveness and improving the quality of working life in manufacturing and service industries. This astoundingly comprehensive resource also provides a cohesive structure to the discipline of industrial engineering with four major classifications: technology; performance improvement management; management, planning, and design control; and decision-making methods. Completely updated and expanded to reflect nearly a decade of important developments in the field, this Third Edition features a wealth of new information on project management, supply-chain management and logistics, and systems related to service industries. Other important features of this essential reference include: * More than 1,000 helpful tables, graphs, figures, and formulas * Step-by-step descriptions of hundreds of problem-solving methodologies * Hundreds of clear, easy-to-follow application examples * Contributions from 176 accomplished international professionals with diverse training and affiliations * More than 4,000 citations for further reading

The Handbook of Industrial Engineering, Third Edition is an immensely useful one-stop resource for industrial engineers and technical support personnel in corporations of any size; continuous process and discrete part manufacturing industries; and all types of service industries, from healthcare to hospitality, from retailing to finance. Of related interest . . .

HANDBOOK OF HUMAN FACTORS AND ERGONOMICS, Second Edition Edited by Gavriel Salvendy (0-471-11690-4) 2,165 pages 60 chapters "A comprehensive guide that contains practical knowledge and technical background on virtually all aspects of physical, cognitive, and social ergonomics. As such, it can be a valuable source of information for any individual or organization committed to providing competitive, high-quality products and safe, productive work environments."-John F. Smith Jr., Chairman of the Board, Chief Executive Officer and President, General Motors Corporation (From the Foreword)

SIAM

Optimization problems involving stochastic models occur in almost all areas of science and engineering, such as telecommunications, medicine, and finance. Their existence compels a need for rigorous ways of formulating, analyzing, and solving such problems. This book focuses on optimization problems involving uncertain parameters and covers the theoretical foundations and recent advances in areas where stochastic models are available. Readers will find coverage of the basic concepts of modeling these problems, including recourse actions and the nonanticipativity principle. The book also includes the theory of two-stage and multistage stochastic programming problems; the current state of the theory on chance (probabilistic) constraints, including the structure of the problems, optimality theory, and duality; and statistical inference in and risk-averse approaches to stochastic programming.

Modeling Uncertainty Springer Science & Business Media

An accessible introduction to probability, stochastic processes, and statistics for computer science and engineering applications Second edition now also available in Paperback. This updated and revised edition of the popular classic first edition relates fundamental concepts in probability and statistics to the computer sciences and engineering. The author uses Markov chains and other statistical tools to illustrate processes in reliability of computer systems and networks, fault tolerance, and performance. This edition features an entirely new section on stochastic Petri nets—as well as new sections on system availability modeling, wireless system modeling, numerical solution techniques for Markov chains, and software reliability modeling, among other subjects. Extensive revisions take new developments in solution techniques and applications into account and bring this work totally up to date. It includes more than 200 worked examples and self-study exercises for each section. Probability and Statistics with Reliability, Queuing and Computer Science Applications, Second Edition offers a comprehensive introduction to probability, stochastic processes, and statistics for students of computer science, electrical and computer engineering, and applied mathematics. Its wealth of practical examples and up-to-date information makes it an excellent resource for practitioners as well. An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department.

Stochastic Processes and Their Applications Academic Press

An introduction to the state of the art of the probability theory most applicable to combinatorial optimization. The questions that receive the most attention are those that deal with discrete optimization problems for points in Euclidean space, such as the minimum spanning tree, the traveling-salesman tour, and minimal-length matchings.

Lectures on Stochastic Programming Springer

The 2004 Asian International Workshop on Advanced Reliability Modeling is a symposium for the dissemination of state-of-the-art research and the presentation of practice in reliability engineering and related issues in Asia. It brings together researchers, scientists and practitioners from Asian countries to discuss the state of research and practice in dealing with reliability issues at the system design (modeling) level, and to jointly formulate an agenda for future research in this engineering area. The proceedings cover all the key topics in reliability, maintainability and safety engineering, providing an in-depth presentation of theory and practice. The proceedings have been selected for coverage in: ? Index to Scientific & Technical Proceedings? (ISTP? / ISI Proceedings)? Index to Scientific & Technical Proceedings (ISTP CDROM version / ISI Proceedings)? CC Proceedings ? Engineering & Physical Sciences

Modeling, Stochastic Control, Optimization, and Applications Courier Corporation

ENCYCLOPEDIA OF STATISTICAL SCIENCES

Stochastic Reliability Modeling, Optimization and Applications World Scientific

This books covers the broad range of research in stochastic models and optimization. Applications presented include networks, financial engineering, production planning, and supply chain management. Each contribution is aimed at graduate students working in operations research, probability, and statistics.

Elements of Applied Probability John Wiley and Sons

"This book intends to highlight how the Theory of Probability supports, not only statistical modeling but how it allows describing different real life phenomena. It gives clues for understanding the philosophic roots of probability and how they are present in different areas of knowledge. The readers may use the book as a source for understanding the philosophical development of probability concepts and of the intents to obtain mathematical models. The chapters deal with the understanding of how probability models are usable for determining: A Probabilistic model of the best flight value for the design on paper of a helicopter How to model the improvement of the behavior of water heating systems and of the reliability of systems Models for determining the probability of non responses in inquiries and to evaluate the missing data. The modeling of various problems related with the behavior of ordering models of use in decision rules and of general properties of Order Statistics. A unified study of the probabilistic aspects of two Metaheuristics: Simulated Annealing and Tabu Search. How to obtain the identification of econometric techniques for dealing efficiently with the study of economic growth models under endogeneity. This book will be of interest for biometricians, statisticians, economists, engineers dealing with control and reliability, as well for informaticians"--

Handbook of Markov Decision Processes Springer Science & Business Media

This two-volume set on Mathematical Principles of the Internet provides a comprehensive overview of the mathematical principles of Internet engineering. The books do not aim to provide all of the mathematical foundations upon which the Internet is based. Instead, these cover only a partial panorama and the key principles. Volume 1 explores Internet engineering, while the supporting mathematics is covered in Volume 2. The chapters on mathematics complement those on the engineering episodes, and an effort has been made to make this work succinct, yet self-contained. Elements of information theory, algebraic coding theory, cryptography, Internet traffic, dynamics and control of Internet congestion, and queueing theory are discussed. In addition, stochastic networks, graph-theoretic algorithms, application of game theory to the Internet, Internet economics, data mining and knowledge discovery, and quantum computation,

communication, and cryptography are also discussed. In order to study the structure and function of the Internet, only a basic knowledge of number theory, abstract algebra, matrices and determinants, graph theory, geometry, analysis, optimization theory, probability theory, and stochastic processes, is required. These mathematical disciplines are defined and developed in the books to the extent that is needed to develop and justify their application to Internet engineering.

Stochastic Modeling and Optimization World Scientific

Methodology drawn from the fields of probability, statistics and decision making plays an increasingly important role in the atmospheric sciences, both in basic and applied research and in experimental and operational studies. Applications of such methodology can be found in almost every facet of the discipline, from the most theoretical and global (e.g., atmospheric predictability, global climate modeling) to the most practical and local (e.g., crop-weather modeling forecast evaluation). Almost every issue of the multitude of journals published by the atmospheric sciences community now contain some or more papers involving applications of concepts and/or methodology from the fields of probability and statistics. Despite the increasingly pervasive nature of such applications, very few book length treatments of probabilistic and statistical topics of particular interest to atmospheric scientists have appeared (especially in English) since the publication of the pioneering works of Brooks and Carruthers (*Handbook of Statistical Methods in Meteorology*) in 1953 and Panofsky and Brier (*Some Applications of Statistics to Meteorology*) in 1958. As a result, many relatively recent developments in probability and statistics are not well known to atmospheric scientists and recent work in active areas of meteorological research involving significant applications of probabilistic and statistical methods are not familiar to the meteorological community as a whole.

Athens Conference on Applied Probability and Time Series Analysis SIAM

This volume collects papers, based on invited talks given at the IMA workshop in Modeling, Stochastic Control, Optimization, and Related Applications, held at the Institute for Mathematics and Its Applications, University of Minnesota, during May and June, 2018. There were four week-long workshops during the conference. They are (1) stochastic control, computation methods, and applications, (2) queueing theory and networked systems, (3) ecological and biological applications, and (4) finance and economics applications. For broader impacts, researchers from different fields covering both theoretically oriented and application intensive areas were invited to participate in the conference. It brought together researchers from multi-disciplinary communities in applied mathematics, applied probability, engineering, biology, ecology, and networked science, to review, and substantially update most recent progress. As an archive, this volume presents some of the highlights of the workshops, and collect papers covering a broad range of topics.

Computational Economic Systems John Wiley & Sons

In Part I, the fundamentals of financial thinking and elementary mathematical methods of finance are presented. The method of presentation is simple enough to bridge the elements of financial arithmetic and complex models of financial math developed in the later parts. It covers characteristics of cash flows, yield curves, and valuation of securities. Part II is devoted to the allocation of funds and risk management: classics (Markowitz theory of portfolio), capital asset pricing model, arbitrage pricing theory, asset & liability management, value at risk. The method explanation takes into account the computational aspects. Part III explains modeling aspects of multistage stochastic programming on a relatively accessible level. It includes a survey of existing software, links to parametric, multiobjective and dynamic programming, and to probability and statistics. It focuses on scenario-based problems with the problems of

scenario generation and output analysis discussed in detail and illustrated within a case study.

Applied Probability Models with Optimization Springer

Eugene A. Feinberg Adam Schwartz This volume deals with the theory of Markov Decision Processes (MDPs) and their applications. Each chapter was written by a leading expert in the respective area. The papers cover major research areas and methodologies, and discuss open questions and future research directions. The papers can be read independently, with the basic notation and concepts of Section 1.2. Most chapters should be accessible by graduate or advanced undergraduate students in fields of operations research, electrical engineering, and computer science.

1.1 AN OVERVIEW OF MARKOV DECISION PROCESSES

The theory of Markov Decision Processes—also known under several other names including sequential stochastic optimization, discrete-time stochastic control, and stochastic dynamic programming—studies sequential optimization of discrete time stochastic systems. The basic object is a discrete-time stochastic system whose transition mechanism can be controlled over time. Each control policy defines the stochastic process and values of objective functions associated with this process. The goal is to select a "good" control policy. In real life, decisions that humans and computers make on all levels usually have two types of impacts: (i) they cost or save time, money, or other resources, or they bring revenues, as well as (ii) they have an impact on the future, by influencing the dynamics. In many situations, decisions with the largest immediate profit may not be good in view of future events. MDPs model this paradigm and provide results on the structure and existence of good policies and on methods for their calculation.

Continuous-Time Markov Decision Processes Springer Science & Business Media

This book presents a radically new approach to problems of evaluating and optimizing the performance of continuous-time stochastic systems. This approach is based on the use of a family of Markov processes called Piecewise-Deterministic Processes (PDPs) as a general class of stochastic system models. A PDP is a Markov process that follows deterministic trajectories between random jumps, the latter occurring either spontaneously, in a Poisson-like fashion, or when the process hits the boundary of its state space. This formulation includes an enormous variety of applied problems in engineering, operations research, management science and economics as special cases; examples include queueing systems, stochastic scheduling, inventory control, resource allocation problems, optimal planning of production or exploitation of renewable or non-renewable resources, insurance analysis, fault detection in process systems, and tracking of maneuvering targets, among many others. The first part of the book shows how these applications lead to the PDP as a system model, and the main properties of PDPs are derived. There is particular emphasis on the so-called extended generator of the process, which gives a general method for calculating expectations and distributions of system performance functions. The second half of the book is devoted to control theory for PDPs, with a view to controlling PDP models for optimal performance: characterizations are obtained of optimal strategies both for continuously-acting controllers and for control by intervention (impulse control). Throughout the book, modern methods of stochastic analysis are used, but all the necessary theory is developed from scratch and presented in a self-contained way. The book will be useful to engineers and scientists in the application areas as well as to mathematicians interested in

applications of stochastic analysis.

Applied Probability Models with Optimization Applications. Ross

Springer Science & Business Media

Modeling Uncertainty: An Examination of Stochastic Theory, Methods, and Applications, is a volume undertaken by the friends and colleagues of Sid Yakowitz in his honor. Fifty internationally known scholars have collectively contributed 30 papers on modeling uncertainty to this volume. Each of these papers was carefully reviewed and in the majority of cases the original submission was revised before being accepted for publication in the book. The papers cover a great variety of topics in probability, statistics, economics, stochastic optimization, control theory, regression analysis, simulation, stochastic programming, Markov decision process, application in the HIV context, and others. There are papers with a theoretical emphasis and others that focus on applications. A number of papers survey the work in a particular area and in a few papers the authors present their personal view of a topic. It is a book with a considerable number of expository articles, which are accessible to a nonexpert - a graduate student in mathematics, statistics, engineering, and economics departments, or just anyone with some mathematical background who is interested in a preliminary exposition of a particular topic. Many of the papers present the state of the art of a specific area or represent original contributions which advance the present state of knowledge. In sum, it is a book of considerable interest to a broad range of academic researchers and students of stochastic systems.