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KEY=INVENTORY - WARD RORY

Foundations of Stochastic Inventory Theory

Stanford University Press This book has a dual purpose?serving as an advanced textbook designed to prepare doctoral students to do research on the mathematical foundations of inventory theory, and as a reference work for those already engaged in such research. All chapters conclude with exercises that either solidify or extend the concepts introduced.

Foundations of Inventory Management

McGraw-Hill/Irwin Foundations of Inventory Management presents a complete treatment of inventory theory and models for use in advanced undergraduate, masters, or PhD courses in Operations research, manufacturing management or Operations management. Coverage is organized into an introductory section, followed by a section focused on predictable supply and demand, and the third section covering stochastic inventory models. Many recent developments related to or impacting inventory such as ERP systems, supply chain management, JIT, and ERP systems are integrated within the text. The text presents inventory as a critical topic for virtually all businesses today and one in which theory and practice are closely linked. Prerequisite coursework for students of this text

would include basic optimization theory, stochastic processes, and dynamic programming. The text includes examples as well as rigorous assignment problem sets.

Supply Chain Planning

Quantitative Decision Support and Advanced Planning Solutions

Springer Science & Business Media In recent years, supply chain planning has emerged as one of the most challenging problems in the industry. As a consequence, the planning focus is shifting from the management of plant-specific operations to a holistic view of the various logistics and production stages, that is an approach in which suppliers, production plants and customers are considered as constituents of an integrated network. A major driving force behind this development lies in the globalization of the world economy, which has facilitated the co-operation between different partners working together in world-wide logistics networks. Hence, considerable cost savings can be gained from optimizing the structure and the operations of complex supply networks linking plants, suppliers, distribution centres and customers. Consequently, to improve the performance of the entire logistic chain, more sophisticated planning systems and more effective decision support are needed. Clearly, successful applications of supply chain management have driven the development of advanced planning systems (APS), which are concerned with supporting decision-making activities at the strategic, tactical and operational decision level. These software packages basically rely on the application of quantitative methods, which are used to model the underlying complex decision problems considering the limited availability of resources and the need to react on time to customer orders. The core module at the mid-term level of APS comprises operational supply chain planning. In many industries, production stages are assigned to different plants and distribution centres have been established at geographically dispersed locations.

Describing Nature Through Visual Data

IGI Global People have described nature since the beginning of human history. They do it for various purposes, including to communicate about economic, social, governmental, meteorological, sustainability-related, strategic, military, and survival issues as

well as artistic expression. As a part of the whole world of living beings, we use various types of senses, known and unknown, labeled and not identified, to both communicate and create. Describing Nature Through Visual Data is a collection of impactful research that discusses issues related to the visualization of scientific concepts, picturing processes, and products, as well as the role of computing in advancing visual literacy skills. Organized into four sections, the book contains descriptions, theories, and examples of visual and music-based solutions concerning the selected natural or technological events that are shaping present-day reality. The chapters pertain to selected scientific fields, digital art, computer graphics, and new media and confer the possible ways that visuals, visualization, simulation, and interactive knowledge presentation can help us to understand and share the content of scientific thought, research, artistic works, and practice. Featuring coverage on topics that include mathematical thinking, music theory, and visual communication, this reference is ideal for instructors, professionals, researchers, and students keen on comprehending and enhancing the role of knowledge visualization in computing, sciences, design, media communication, film, advertising, and marketing.

Optimal Control and Optimization of Stochastic Supply Chain Systems

Springer Science & Business Media Optimal Control and Optimization of Stochastic Supply Chain Systems examines its subject the context of the presence of a variety of uncertainties. Numerous examples with intuitive illustrations and tables are provided, to demonstrate the structural characteristics of the optimal control policies in various stochastic supply chains and to show how to make use of these characteristics to construct easy-to-operate sub-optimal policies. In Part I, a general introduction to stochastic supply chain systems is provided. Analytical models for various stochastic supply chain systems are formulated and analysed in Part II. In Part III the structural knowledge of the optimal control policies obtained in Part II is utilized to construct easy-to-operate sub-optimal control policies for various stochastic supply chain systems accordingly. Finally, Part IV discusses the optimisation of threshold-type control policies and their robustness. A key feature of the book is its tying together of the complex analytical models produced by the requirements of operational practice, and the simple solutions needed for implementation. The analytical models and theoretical analysis propounded in this monograph will be of benefit to academic researchers and graduate students looking at logistics and supply chain management from standpoints in operations research or industrial, manufacturing, or control engineering. The practical tools and solutions and the qualitative insights into the ideas underlying functional supply chain systems will be of similar use to readers from more industrially-based backgrounds.

Inventory Analytics

Open Book Publishers Inventory Analytics provides a comprehensive and accessible introduction to the theory and practice of inventory control - a significant research area central to supply chain planning. The book outlines the foundations of inventory systems and surveys prescriptive analytics models for deterministic inventory control. It further discusses predictive analytics techniques for demand forecasting in inventory control and also examines prescriptive analytics models for stochastic inventory control. Inventory Analytics is the first book of its kind to adopt a practicable, Python-driven approach to illustrating theories and concepts via computational examples, with each model covered in the book accompanied by its Python code. Originating as a collection of self-contained lectures, Inventory Analytics will be an indispensable resource for practitioners, researchers, teachers, and students alike.

Advances on P2P, Parallel, Grid, Cloud and Internet Computing

Proceedings of the 13th International Conference on P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC-2018)

Springer This book presents the latest research findings, as well as innovative theoretical and practical research results, methods and development techniques related to P2P, grid, cloud and Internet computing. It also reveals the synergies among such large scale computing paradigms. P2P, Grid, Cloud and Internet computing technologies have rapidly become established as breakthrough paradigms for solving complex problems by enabling aggregation and sharing of an increasing variety of distributed computational resources on a large scale. Grid computing originated as a paradigm for high-performance computing, offering an alternative to

expensive supercomputers through different forms of large-scale distributed computing. P2P computing emerged as a new paradigm following on from client-server and web-based computing and has proved useful in the development of social networking, B2B (Business to Business), B2C (Business to Consumer), B2G (Business to Government), and B2E (Business to Employee). Cloud computing has been described as a “computing paradigm where the boundaries of computing are determined by economic rationale rather than technical limits”. Cloud computing has fast become the computing paradigm with applicability and adoption in all domains and providing utility computing at large scale. Lastly, Internet computing is the basis of any large-scale distributed computing paradigm; it has very quickly developed into a vast and flourishing field with enormous impact on today’s information societies and serving as a universal platform comprising a large variety of computing forms such as grid, P2P, cloud and mobile computing.

Probability Models for Economic Decisions, second edition

MIT Press An introduction to the use of probability models for analyzing risk and economic decisions, using spreadsheets to represent and simulate uncertainty. This textbook offers an introduction to the use of probability models for analyzing risks and economic decisions. It takes a learn-by-doing approach, teaching the student to use spreadsheets to represent and simulate uncertainty and to analyze the effect of such uncertainty on an economic decision. Students in applied business and economics can more easily grasp difficult analytical methods with Excel spreadsheets. The book covers the basic ideas of probability, how to simulate random variables, and how to compute conditional probabilities via Monte Carlo simulation. The first four chapters use a large collection of probability distributions to simulate a range of problems involving worker efficiency, market entry, oil exploration, repeated investment, and subjective belief elicitation. The book then covers correlation and multivariate normal random variables; conditional expectation; optimization of decision variables, with discussions of the strategic value of information, decision trees, game theory, and adverse selection; risk sharing and finance; dynamic models of growth; dynamic models of arrivals; and model risk. New material in this second edition includes two new chapters on additional dynamic models and model risk; new sections in every chapter; many new end-of-chapter exercises; and coverage of such topics as simulation model workflow, models of probabilistic electoral forecasting, and real options. The book comes equipped with Simtools, an open-source, free software used throughout the book, which allows students to conduct Monte Carlo simulations seamlessly in Excel.

Advanced Methodologies and Technologies in Medicine and Healthcare

IGI Global Advancements in medical and healthcare technologies pave the way to improving treatments and diagnoses while also streamlining processes to ensure the highest quality care is given to patients. In the last few decades, revolutionary technology has radically progressed the healthcare industry by increasing life expectancy and reducing human error. Advanced Methodologies and Technologies in Medicine and Healthcare provides emerging research on bioinformatics, medical ethics, and clinical science in modern applications and settings. While highlighting the challenges medical practitioners and healthcare professionals face when treating patients and striving to optimize their processes, the book shows how revolutionary technologies and methods are vastly improving how healthcare is implemented globally. This book is an important resource for medical researchers, healthcare administrators, doctors, nurses, biomedical engineers, and students looking for comprehensive research on the advancements in healthcare technologies.

Operations Research and Enterprise Systems

9th International Conference, ICORES 2020, Valetta, Malta, February 22–24, 2020, and 10th International Conference, ICORES 2021, Virtual Event, February 4–6, 2021, Revised Selected Papers

Springer Nature This book includes extended and revised versions of selected papers from the 9th and 10th edition of the International Conference on Operations Research and Enterprise Systems (ICORES 2020 and ICORES 2021). ICORES 2020 was held in

Valletta, Malta from 22 - 24 of February 2020, and ICORES 2021 was held as an online event due to the Covid-19 pandemic, from 4 - 6 of February 2021. The 11 full papers included in this book were carefully reviewed and selected from 132 submissions. The ICORES 2020 and 2021 book contains extended and revised version of proceedings papers dealing with operations research and enterprise systems.

Intelligence Analysis

Behavioral and Social Scientific Foundations

National Academies Press The U.S. intelligence community (IC) is a complex human enterprise whose success depends on how well the people in it perform their work. Although often aided by sophisticated technologies, these people ultimately rely on their own intellect to identify, synthesize, and communicate the information on which the nation's security depends. The IC's success depends on having trained, motivated, and thoughtful people working within organizations able to understand, value, and coordinate their capabilities. Intelligence Analysis provides up-to-date scientific guidance for the intelligence community (IC) so that it might improve individual and group judgments, communication between analysts, and analytic processes. The papers in this volume provide the detailed evidentiary base for the National Research Council's report, Intelligence Analysis for Tomorrow: Advances from the Behavioral and Social Sciences. The opening chapter focuses on the structure, missions, operations, and characteristics of the IC while the following 12 papers provide in-depth reviews of key topics in three areas: analytic methods, analysts, and organizations. Informed by the IC's unique missions and constraints, each paper documents the latest advancements of the relevant science and is a stand-alone resource for the IC's leadership and workforce. The collection allows readers to focus on one area of interest (analytic methods, analysts, or organizations) or even one particular aspect of a category. As a collection, the volume provides a broad perspective of the issues involved in making difficult decisions, which is at the heart of intelligence analysis.

Fundamentals of Supply Chain Theory

John Wiley & Sons An authoritative, quantitative approach to supply chain management Addressing the need for the study of supply chain management to evolve at the same pace as it's real-world practice, Fundamentals of Supply Chain Theory presents the methodology and foundations of the topic and also demonstrates how recent developments build upon classic models. The authors

focus on strategic and tactical aspects of supply chain management, covering a broad range of topics from forecasting, inventory management, and facility location to process flexibility, contracting, and auctions. Key mathematical models for optimizing the design, operation, and evaluation of supply chains are presented as well as models currently emerging from the research frontier. Following a thorough introduction, the book delves into a discussion of centralized models, including: Forecasting and demand modeling Deterministic inventory models Stochastic inventory models Multi-Echelon inventory models Processes for dealing with uncertainty in inventory optimization and facility location Facility location models Process flexibility In addition, the authors present decentralized models that involve multiple parties with independent, conflicting objectives, covering topics such as: The bullwhip effect Supply chain contracts Auctions Each chapter concludes with a set of problems that challenge readers to understand, interpret, and extend the discussed models and algorithms. In addition, extensive appendices provide guidance on writing proofs and also outline helpful formulas related to probability theory, calculus, and algebra. Extensively class-tested to ensure an easy-to-follow presentation, Fundamentals of Supply Chain Theory is a suitable book for business and engineering courses on supply chain management at the graduate level. The book also serves as an authoritative reference for academics and practitioners working in the areas of operations research, business, management science, and industrial engineering. This book was named the 2011 Joint Publishers Book of the Year by the Institute of Industrial Engineers. You can also follow Fundamentals of Supply Chain Theory on Twitter.

Inventory Rationing

A New Modeling Approach Using Markov Chain Theory

Springer The last decades have seen an increasing diversity of customer expectations and growing competitive pressure for a wide variety of industries. Customer segmentation and subsequent inventory rationing provide a way to cope with those customer demands while maintaining a competitive offer. The general idea resembles the yield management practised in the airline or hotel industries: Demand fulfilment for low priority customers might be refused or delayed in order to reserve stock for more important clients. This dissertation thesis from Karin Möllering provides a comprehensive introduction to inventory rationing. It gives an overview of the different approaches studied and identifies state-of-the-art rules. In a second step, the book particularly focuses on an easy-to-implement but highly efficient rationing strategy. For this strategy, a mathematical model is developed that allows for optimization under different objectives. Potential readership includes scholars of inventory control and management science, students interested in these areas as well as practitioners involved in formulating and implementing rationing strategies.

Encyclopedia of Information Science and Technology, Fourth Edition

IGI Global In recent years, our world has experienced a profound shift and progression in available computing and knowledge sharing innovations. These emerging advancements have developed at a rapid pace, disseminating into and affecting numerous aspects of contemporary society. This has created a pivotal need for an innovative compendium encompassing the latest trends, concepts, and issues surrounding this relevant discipline area. During the past 15 years, the Encyclopedia of Information Science and Technology has become recognized as one of the landmark sources of the latest knowledge and discoveries in this discipline. The Encyclopedia of Information Science and Technology, Fourth Edition is a 10-volume set which includes 705 original and previously unpublished research articles covering a full range of perspectives, applications, and techniques contributed by thousands of experts and researchers from around the globe. This authoritative encyclopedia is an all-encompassing, well-established reference source that is ideally designed to disseminate the most forward-thinking and diverse research findings. With critical perspectives on the impact of information science management and new technologies in modern settings, including but not limited to computer science, education, healthcare, government, engineering, business, and natural and physical sciences, it is a pivotal and relevant source of knowledge that will benefit every professional within the field of information science and technology and is an invaluable addition to every academic and corporate library.

Stochastic Systems

Theory and Applications

World Scientific General theory and basic methods of linear and nonlinear stochastic systems (StS), based on the equations for characteristic functions and functionals. Special attention is paid to methods based on canonical expansions and integral canonical representations.

Foundations and Applications of Complexity Economics

Springer Nature This book presents a survey of the aspects of economic complexity, with a focus on foundational, interdisciplinary ideas. The long-awaited follow up to his 2011 volume *Complex Evolutionary Dynamics in Urban-Regional and Ecologic-Economic Systems: From Catastrophe to Chaos and Beyond*, this volume draws together the threads of Rosser's earlier work on complexity theory and its wide applications in economics and an expanded list of related disciplines. The book begins with a full account of the broader categories of complexity in economics--dynamic, computational, hierarchical, and structural--before shifting to more detailed analysis. The next two chapters address problems associated with computational complexity, especially those of computability, and discuss the Godel Incompleteness Theorem with a focus on reflexivity. The middle chapters discuss the relationship between entropy, econophysics, evolution, and economic complexity, respectively, with applications in urban and regional dynamics, ecological economics, general equilibrium theory, as well as financial market dynamics. The final chapter works to bring together these themes into a broader framework and expose some of the limits concerning analysis of deeper foundational issues. With applications in all disciplines characterized by interconnected nonlinear adaptive systems, this book is appropriate for graduate students, professors and practitioners in economics and related disciplines such as regional science, mathematics, physics, biology, environmental sciences, philosophy, and psychology.

Foundations and Methods of Stochastic Simulation

A First Course

Springer Science & Business Media This graduate-level text covers modeling, programming and analysis of simulation experiments and provides a rigorous treatment of the foundations of simulation and why it works. It introduces object-oriented programming for simulation, covers both the probabilistic and statistical basis for simulation in a rigorous but accessible manner (providing all necessary background material); and provides a modern treatment of experiment design and analysis that goes beyond classical statistics. The book emphasizes essential foundations throughout, rather than providing a compendium of algorithms and theorems and prepares the reader to use simulation in research as well as practice. The book is a rigorous, but concise treatment, emphasizing lasting principles but also providing specific training in modeling, programming and analysis. In addition to teaching

readers how to do simulation, it also prepares them to use simulation in their research; no other book does this. An online solutions manual for end of chapter exercises is also provided.

An Introduction to Stochastic Modeling

Academic Press *An Introduction to Stochastic Modeling* provides information pertinent to the standard concepts and methods of stochastic modeling. This book presents the rich diversity of applications of stochastic processes in the sciences. Organized into nine chapters, this book begins with an overview of diverse types of stochastic models, which predicts a set of possible outcomes weighed by their likelihoods or probabilities. This text then provides exercises in the applications of simple stochastic analysis to appropriate problems. Other chapters consider the study of general functions of independent, identically distributed, nonnegative random variables representing the successive intervals between renewals. This book discusses as well the numerous examples of Markov branching processes that arise naturally in various scientific disciplines. The final chapter deals with queueing models, which aid the design process by predicting system performance. This book is a valuable resource for students of engineering and management science. Engineers will also find this book useful.

Production and Operations Analytics

Eighth Edition

Waveland Press Nahmias and Olsen skillfully blend comprehensive coverage of topics with careful integration of mathematics. The authors' decades of experience in the field contributed to the success of previous editions; the eighth edition continues the long tradition of excellence. Clearly written, reasonably priced, with an abundance of expertly formulated practice problems and updated examples, this textbook is essential reading for analyzing and improving all facets of operations. Some of the material in the newest edition has been reorganized. For example, the first chapter introduces service strategy, the product/process matrix and flexible manufacturing systems, benchmarking, the productivity frontier, the innovation curve, and lean production as a strategy. The focus is slightly more international. The analysis of capacity growth planning now appears in the chapter on supply chain analytics. Aggregate planning details were added to chapter 3, including chase and level strategies in an appendix to the chapter. There is an expanded discussion on risk pooling in the chapter on supply chain strategy. The mechanics behind lean production are included in the chapter

on push and pull production systems. The chapter on quality and assurance downplays sampling in favor of discussions of quality management, process capability, and the waste elimination side of lean. The separate chapter on facilities layout and location was eliminated and the information redistributed throughout the text. The authors reinforce the learning process through key points at the beginning of each chapter to guide the reader, snapshots that provide useful examples of applications to businesses, and historical notes that provide a context for the topics discussed. *Production and Operations Analytics, 8/e* provides the tools for adapting to the dynamic global marketplace.

Bandit Algorithms

Cambridge University Press A comprehensive and rigorous introduction for graduate students and researchers, with applications in sequential decision-making problems.

Stochastic Processes in Magnetic Resonance

World Scientific This book describes methods for calculating magnetic resonance spectra which are observed in the presence of random processes. The emphasis is on the stochastic Liouville equation (SLE), developed mainly by Kubo and applied to magnetic resonance mostly by J H Freed and his co-workers. Following an introduction to the use of density matrices in magnetic resonance, a unified treatment of Bloch-Redfield relaxation theory and chemical exchange theory is presented. The SLE formalism is then developed and compared to the other relaxation theories. Methods for solving the SLE are explained in detail, and its application to a variety of problems in electron paramagnetic resonance (EPR) and nuclear magnetic resonance (NMR) is studied. In addition, experimental aspects relevant to the applications are discussed. Mathematical background material is given in appendices.

Level Crossing Methods in Stochastic Models

Springer Science & Business Media From 1972 to 1974, I was working on a PhD thesis entitled Multiple Server Queues with Service Time Depending on Waiting Time. The method of analysis was the embedded Markov chain technique, described in the papers [82] and [77]. My analysis involved lengthy, tedious derivations of systems of integral equations for the probability density function (pdf) of the waiting time. After pondering for many months whether there might be a faster, easier way to derive the integral equations, I finally discovered the basic theorems for such a method in August, 1974. The theorems establish a connection between

sample-path level-crossing rates of the virtual wait process and the pdf of the waiting time. This connection was not found anywhere else in the literature at the time. I immediately developed a comprehensive new methodology for deriving the integral equations based on these theorems, and called it system point theory. (Subsequently it was called system point method, or system point level crossing method: SPLC or simply LC.) I rewrote the entire PhD thesis from November 1974 to March 1975, using LC to reach solutions. The new thesis was called System Point Theory in Exponential Queues. On June 12, 1975 I presented an invited talk on the new methodology at the Fifth Conference on Stochastic Processes and their Applications at the University of Maryland. Many queueing theorists were present.

Recent Developments In Computational Finance: Foundations, Algorithms And Applications

World Scientific Computational finance is an interdisciplinary field which joins financial mathematics, stochastics, numerics and scientific computing. Its task is to estimate as accurately and efficiently as possible the risks that financial instruments generate. This volume consists of a series of cutting-edge surveys of recent developments in the field written by leading international experts. These make the subject accessible to a wide readership in academia and financial businesses. The book consists of 13 chapters divided into 3 parts: foundations, algorithms and applications. Besides surveys of existing results, the book contains many new previously unpublished results.

Foundations of Data Science

Cambridge University Press Covers mathematical and algorithmic foundations of data science: machine learning, high-dimensional geometry, and analysis of large networks.

Intelligent Control and Smart Energy Management

Renewable Resources and Transportation

Springer Nature

Lectures on Stochastic Programming

Modeling and Theory

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.

The Magic Ring

Systems Thinking Approach to Control Systems

Springer Nature This book presents a new understanding on how control systems truly operate, and explains how to recognize, simulate, and improve control systems in all fields of activity. It also reveals the pervasive, ubiquitous and indispensable role of control processes in our life and the need to develop a “control-oriented thinking”—based on uncomplicated but effective models derived from systems thinking—that is, a true “discipline of control.” Over the book’s thirteen chapters, Piero Mella shows that there are simple control systems (rather than complex ones) that can easily help us to manage complexity without drawing upon more sophisticated control systems. It begins by reviewing the basic language of systems thinking and the models it allows users to create.

It then introduces the control process, presenting the theoretical structure of three simple control systems we all can observe in order to gain fundamental knowledge from them about the basic structure of a control system. Then, it presents the anatomy of the simplest “magic ring” and the general theoretical model of any control system. This is followed by an introduction to a general typology of control systems and a broader view of control systems by investigating multi-lever control systems and multi-objective systems. The book undertakes the concepts through various environments, increasingly broader in scope to suggest to readers how to recognize therein control systems manifestations in everyday life and in natural phenomena. Updated for the 2nd edition, new chapters explore control systems regulating the biological environment and the organizations, with an in-depth study of the control of quality, productivity, production, stocks and costs. Finally, it concludes by dealing with the learning process, problem-solving, and designing the logical structure of control systems.

Foundations of Machine Learning, second edition

MIT Press A new edition of a graduate-level machine learning textbook that focuses on the analysis and theory of algorithms. This book is a general introduction to machine learning that can serve as a textbook for graduate students and a reference for researchers. It covers fundamental modern topics in machine learning while providing the theoretical basis and conceptual tools needed for the discussion and justification of algorithms. It also describes several key aspects of the application of these algorithms. The authors aim to present novel theoretical tools and concepts while giving concise proofs even for relatively advanced topics. Foundations of Machine Learning is unique in its focus on the analysis and theory of algorithms. The first four chapters lay the theoretical foundation for what follows; subsequent chapters are mostly self-contained. Topics covered include the Probably Approximately Correct (PAC) learning framework; generalization bounds based on Rademacher complexity and VC-dimension; Support Vector Machines (SVMs); kernel methods; boosting; on-line learning; multi-class classification; ranking; regression; algorithmic stability; dimensionality reduction; learning automata and languages; and reinforcement learning. Each chapter ends with a set of exercises. Appendixes provide additional material including concise probability review. This second edition offers three new chapters, on model selection, maximum entropy models, and conditional entropy models. New material in the appendixes includes a major section on Fenchel duality, expanded coverage of concentration inequalities, and an entirely new entry on information theory. More than half of the exercises are new to this edition.

Brownian Motion

Cambridge University Press This eagerly awaited textbook covers everything the graduate student in probability wants to know about Brownian motion, as well as the latest research in the area. Starting with the construction of Brownian motion, the book then proceeds to sample path properties like continuity and nowhere differentiability. Notions of fractal dimension are introduced early and are used throughout the book to describe fine properties of Brownian paths. The relation of Brownian motion and random walk is explored from several viewpoints, including a development of the theory of Brownian local times from random walk embeddings. Stochastic integration is introduced as a tool and an accessible treatment of the potential theory of Brownian motion clears the path for an extensive treatment of intersections of Brownian paths. An investigation of exceptional points on the Brownian path and an appendix on SLE processes, by Oded Schramm and Wendelin Werner, lead directly to recent research themes.

Evolutionary Foundations of Economic Science

How Can Scientists Study Evolving Economic Doctrines from the Last Centuries?

Springer This book aims to discern and distinguish the essential features of basic economic theories and compare them with new theories that have arisen in recent years. The book focuses on seminal economic ideas and theories developed mainly in the 1930s to 1950s because their emergence eventually led to new branches of economics. The book describes an alternative analytical framework spreading through the interdisciplinary fields of socioeconophysics and sociodynamics. The focus is on a set of branching or critical points that separate what has gone before from what has followed. W. Brian Arthur used the term “redomaining” when he referred to technological innovation. In the present volume the author aims to re domain economic theories suited for a new social order. Major technological innovations accompany not only changes in the economy and the market but changes in their meaning as well. In particular, the evolution of trading technology has changed the meaning of the “invisible hand.” At the end of the last century, the advent of socioeconophysics became a decisive factor in the emergence of a new economic science. This emergence has coincided with changes in the implications of the economy and the market, which consequently require a redomaining of economic science. In

this new enterprise, the joint efforts of many scientists outside traditional economics have brought brilliant achievements such as power law distribution and network analysis, among others. However, the more diverse the backgrounds of economic scientists, the less integrated the common views among them may be, resulting in a sometimes perplexing potpourri of economic terminology. This book helps to mitigate those differences, shedding light on current alternative economic theories and how they have evolved.

Eye Movement Research

An Introduction to its Scientific Foundations and Applications

Springer Nature This edited volume presents fundamentals as well as applications of oculomotor methods in industrial and clinical settings. The topical spectrum covers 1.) basics and background material, 2.) methods such as recording techniques, markov models, Lévy flights, pupillometry and many more, as well as 3.) a broad range of applications in clinical and industrial settings. The target audience primarily comprises research experts and practitioners, but the book may also be beneficial for graduate students.

Foundations of Dynamic Economic Analysis

Optimal Control Theory and Applications

Cambridge University Press Foundations of Dynamic Economic Analysis presents a modern and thorough exposition of the fundamental mathematical formalism used to study optimal control theory, i.e., continuous time dynamic economic processes, and to interpret dynamic economic behavior. The style of presentation, with its continual emphasis on the economic interpretation of mathematics and models, distinguishes it from several other excellent texts on the subject. This approach is aided dramatically by introducing the dynamic envelope theorem and the method of comparative dynamics early in the exposition. Accordingly, motivated and economically revealing proofs of the transversality conditions come about by use of the dynamic envelope theorem. Furthermore, such sequencing of the material naturally leads to the development of the primal-dual method of comparative dynamics and dynamic

duality theory, two modern approaches used to tease out the empirical content of optimal control models. The stylistic approach ultimately draws attention to the empirical richness of optimal control theory, a feature missing in virtually all other textbooks of this type.

Foundations in Grammatical Evolution for Dynamic Environments

Springer Dynamic environments abound, encompassing many real-world problems in fields as diverse as finance, engineering, biology and business. A vibrant research literature has emerged which takes inspiration from evolutionary processes to develop problem-solvers for these environments. 'Foundations in Grammatical Evolution for Dynamic Environments' is a cutting edge volume illustrating current state of the art in applying grammar-based evolutionary computation to solve real-world problems in dynamic environments. The book provides a clear introduction to dynamic environments and the types of change that can occur. This is followed by a detailed description of evolutionary computation, concentrating on the powerful Grammatical Evolution methodology. It continues by addressing fundamental issues facing all Evolutionary Algorithms in dynamic problems, such as how to adapt and generate constants, how to enhance evolvability and maintain diversity. Finally, the developed methods are illustrated with application to the real-world dynamic problem of trading on financial time-series. The book was written to be accessible to a wide audience and should be of interest to practitioners, academics and students, who are seeking to apply grammar-based evolutionary algorithms to solve problems in dynamic environments. 'Foundations in Grammatical Evolution for Dynamic Environments' is the second book dedicated to the topic of Grammatical Evolution.

Stochastic Methods and Their Applications to Communications

Stochastic Differential Equations Approach

Wiley-Blackwell *Stochastic Methods & their Applications to Communications* presents a valuable approach to the modelling, synthesis and numerical simulation of random processes with applications in communications and related fields. The authors provide a detailed account of random processes from an engineering point of view and illustrate the concepts with examples taken from the communications area. The discussions mainly focus on the analysis and synthesis of Markov models of random processes as applied to modelling such phenomena as interference and fading in communications. Encompassing both theory and practice, this original text provides a unified approach to the analysis and generation of continuous, impulsive and mixed random processes based on the Fokker-Planck equation for Markov processes. Presents the cumulated analysis of Markov processes Offers a SDE (Stochastic Differential Equations) approach to the generation of random processes with specified characteristics Includes the modelling of communication channels and interferences using SDE Features new results and techniques for the solution of the generalized Fokker-Planck equation Essential reading for researchers, engineers, and graduate and upper year undergraduate students in the field of communications, signal processing, control, physics and other areas of science, this reference will have wide ranging appeal.

Reliability Engineering and Services

Wiley Offers a holistic approach to guiding product design, manufacturing, and after-sales support as the manufacturing industry transitions from a product-oriented model to service-oriented paradigm This book provides fundamental knowledge and best industry practices in reliability modelling, maintenance optimization, and service parts logistics planning. It aims to develop an integrated product-service system (IPSS) synthesizing design for reliability, performance-based maintenance, and spare parts inventory. It also presents a lifecycle reliability-inventory optimization framework where reliability, redundancy, maintenance, and service parts are jointly coordinated. Additionally, the book aims to report the latest advances in reliability growth planning, maintenance contracting and spares inventory logistics under non-stationary demand condition. Reliability Engineering and Service provides in-depth chapter coverage of topics such as: Reliability Concepts and Models; Mean and Variance of Reliability Estimates; Design for Reliability; Reliability Growth Planning; Accelerated Life Testing and Its Economics; Renewal Theory and Superimposed Renewals; Maintenance and Performance-Based Logistics; Warranty Service Models; Basic Spare Parts Inventory Models; Repairable Inventory Systems; Integrated Product-Service Systems (IPPS), and Resilience Modeling and Planning Guides engineers to design reliable products at a low cost Assists service engineers in providing superior after-sales support Enables managers to respond to the changing market and

customer needs Uses end-of-chapter case studies to illustrate industry best practice Lifecycle approach to reliability, maintenance and spares provisioning Reliability Engineering and Service is an important book for graduate engineering students, researchers, and industry-based reliability practitioners and consultants.

Güterwagenmanagement

Analyse wesentlicher Potenziale des Eisenbahngüterverkehrs anhand von Simulationen

Springer-Verlag Das Transportvolumen im Güterverkehr hat sich in den vergangenen 30 Jahren annähernd verdreifacht. Für diesen Anstieg sind unter anderem der Wegfall der europäischen Grenzen und die fortschreitende Arbeitsteilung verantwortlich. Auch in Zukunft wird das Transportvolumen weiter wachsen. Bis 2030 wird erneut ein Wachstum von 50 % erwartet. Dieses Wachstum betrifft alle Verkehrsträger. Aufgrund der angestiegenen Transportdistanzen sowie der ökologischen Vorteile nimmt auch die Bedeutung des Schienengüterverkehrs stark zu. Damit der Schienengüterverkehr diese Herausforderungen meistern kann, müssen die Prozesse effizient und effektiv gestaltet werden. Die Dissertation von Alexander Weyers untersucht die wesentlichen Einflussfaktoren des Schienengüterverkehrs. Als Einflussfaktoren werden die Flottengröße, die Anzahl verschiedenartiger Güterwagen, die Nachfrage nach Güterwagen, die Lagerung von Güterwagen sowie die Servicezeit von Güterwagen untersucht. Für jeden Einflussfaktor werden die Auswirkungen auf die wesentlichen Kennzahlen des Güterwagenmanagements berechnet. Diese Berechnungen erfolgen anhand von Simulationsstudien, die den europäischen Schienengüterverkehr mit unterschiedlichen Parameterkonstellationen nachbilden. Das Buch wendet sich an Dozenten und Studenten der Betriebswirtschaftslehre mit den Schwerpunkten Logistik und Verkehr sowie an interessierte Führungskräfte, die sich mit dem Thema Flottenplanung auseinandersetzen.

Active Balancing of Bike Sharing Systems

Springer Nature This book reports on an operational management approach to improving bike-sharing systems by compensating for fluctuating demand patterns. The aim is to redistribute bikes within the system, allowing it to be “actively” balanced. The book describes a mathematical model, as well as data-driven and simulation-based approaches. Further, it shows how these elements can

be combined in a decision-making support system for service providers. In closing, the book uses real-world data to evaluate the method developed and demonstrates that it can successfully anticipate changes in demand, thus supporting efficient scheduling of transport vehicles to manually relocate bikes between stations.

Advanced Derivatives Pricing and Risk Management Theory, Tools and Hands-on Programming Application

Academic Press Book and CDROM include the important topics and cutting-edge research in financial derivatives and risk management.

Principles of Inventory Management

When You Are Down to Four, Order More

Springer Science & Business Media Inventories are prevalent everywhere in the commercial world, whether it be in retail stores, manufacturing facilities, government stockpile material, Federal Reserve banks, or even your own household. This textbook examines basic mathematical techniques used to sufficiently manage inventories by using various computational methods and mathematical models. The text is presented in a way such that each section can be read independently, and so the order in which the reader approaches the book can be inconsequential. It contains both deterministic and stochastic models along with algorithms that can be employed to find solutions to a variety of inventory control problems. With exercises at the end of each chapter and a clear, systematic exposition, this textbook will appeal to advanced undergraduate and first-year graduate students in operations research, industrial engineering, and quantitative MBA programs. It also serves as a reference for professionals in both industry and government worlds. The prerequisite courses include introductory optimization methods, probability theory (non-measure theoretic), and stochastic processes.

The Algorithmic Foundations of Differential Privacy

The problem of privacy-preserving data analysis has a long history spanning multiple disciplines. As electronic data about individuals becomes increasingly detailed, and as technology enables ever more powerful collection and curation of these data, the need increases for a robust, meaningful, and mathematically rigorous definition of privacy, together with a computationally rich class of algorithms that satisfy this definition. Differential Privacy is such a definition. The Algorithmic Foundations of Differential Privacy starts out by motivating and discussing the meaning of differential privacy, and proceeds to explore the fundamental techniques for achieving differential privacy, and the application of these techniques in creative combinations, using the query-release problem as an ongoing example. A key point is that, by rethinking the computational goal, one can often obtain far better results than would be achieved by methodically replacing each step of a non-private computation with a differentially private implementation. Despite some powerful computational results, there are still fundamental limitations. Virtually all the algorithms discussed herein maintain differential privacy against adversaries of arbitrary computational power -- certain algorithms are computationally intensive, others are efficient. Computational complexity for the adversary and the algorithm are both discussed. The monograph then turns from fundamentals to applications other than query-release, discussing differentially private methods for mechanism design and machine learning. The vast majority of the literature on differentially private algorithms considers a single, static, database that is subject to many analyses. Differential privacy in other models, including distributed databases and computations on data streams, is discussed. The Algorithmic Foundations of Differential Privacy is meant as a thorough introduction to the problems and techniques of differential privacy, and is an invaluable reference for anyone with an interest in the topic.