problem involves estimation of an unknown mean value of a random process, this random process being stationary except for its mean, i.e., it is the problem of estimating a drift parameter in a stationary process. Furthermore, this parameter can be in the drift function, system parameters, bounds on the solution of an auxiliary problem, information theory (e.g., capacity theorems for noisy channels or for channels with memory, theorems on functions of a complex variable, etc.). Since 1958 many mathematicians have studied the problem of equivalence of various infinite-dimensional Gaussian statistical models (stationary processes) in terms of the asymptotic equivalence of the fundamental characteristics of these processes (whitening filters, maximum likelihood estimates, least squares estimates, confidence intervals, measures of information, etc.). It is natural to ask: What are the most important classes of stochastic processes? By written one of the leading experts in the field, this volume presents to the reader lucid explanations of the fundamental concepts and basic results in each of these three major areas of the theory of stochastic processes. The book contains the most recent advances on this topic, and provides a comprehensive treatment of the subject. The first part of the book provides an introduction to the theory of stationary processes, including the applications of multivariate spectral models. The text describes finite parameter models, the distribution theory of spectral models.


Lectures on the Theory of Stochastic Processes-Anato1y S. Skorokhod 2019-01-14

Noncommutative Stochastic Processes-Rolf Gohm 2004-01-28 Quantum probability and the theory of operator algebras are both concerned with the study of noncommutative dynamical systems. Focusing on stationary processes with discrete-time parameter, this book presents (without many prerequisites) some basic problems of interest to both fields, on topics including extensions and dilations of completely positive maps, Markov property and algebras, and the applications arising from the interplay of these topics. Much of the material is new, but many interesting questions are accessible even to the reader equipped only with basic knowledge of quantum probability and operator algebras.

Estimation of Stochastic Processes with Stationary Increments and Countigoreted Sequences-Makyan Lar 2019-09-20 Estimation of Stochastic Processes is a self-contained, systematic, and well-documented guide to the theory and estimation techniques for stochastic processes with stationary increments. It focuses on the estimation of functionals of unknown values for stochastic processes with stationary increments, including ARIMA processes, seasonal time series, and a class of countigoreted sequences. Furthermore, this book presents solutions to estimation problems, and provides guidelines on how to choose the best approach for a given problem. The emphasis of this book is on methods and techniques that are based on spectral properties of the data, which are essential for understanding the behavior of the processes.


Stochastic Transport Processes in Discrete Biological Systems-Eckart Fehrtd 2013-03-13: These books are in part based on a course for advanced students in the applications of stochastic processes held in 1978 at the University of Konstanz. These notes contain the results of two courses on the stochastic description of ion transport in biological systems. The notes are written for an audience of biologists, chemists, and physicists, and assume an advanced knowledge of calculus, probability theory, and statistics. The purpose of these books is to introduce the reader to the latest developments in the field of stochastic processes, and to provide an overview of the current state of the art in this area.

Markov Chains with Stationary Transition Probabilities-Lai Lai 2013-08-08: The theory of Markov chains, although a special case of a Markov chain, is here developed for its own sake and on its own merits. In general, the hypothesis of a denumerable state space, which is the defining hypothesis of what we call a "chain," here generates more complicated questions and demands more precise and definite answers. For example, the principal limit theorem (II. 1, 1, 2) is not the object of the present investigation. Moreover, the study is not limited to the usual limit theorems but includes the strong Markov property (II. 11). All this is always applicable. While probability theory has advanced enough that a degree of sofistication is needed even in the limited context of this book, it is still possible here to keep the proportion of definitions to theorems relatively low. From the standpoint of the general theory of stochastic processes, a continuous parameter Markov chain appears to be the first essentially discontinuous process that has been studied in some detail. It is common that the sample functions of such a chain have discontinuities worse than jumps, and that their basi discretizations play a central role in the theory, of which the theory of Markov chains is a very important part. In this context the basic concepts of separability and Markov property have been used as a guide to select the discrete models, which are usually applied at an early stage of the discussion to establish a certain smoothness of the sample functions, are here applied constantly as indispensable tools.

Introduction to the Theory of Random Processes-Nikolai Vladimirovich Krylov 2010-01-01 This book concentrates on some general facts and ideas of the theory of stochastic processes. The topics include the Wiener process, stationary processes, infinitely divisible processes, and Ito stochastic equations. Basic of discrete time martingales are also presented and then used in one way or another throughout the book. Another common feature of the main body of the book is the use of stochastic integration with respect to random orthogonal measures. In particular, it is used for spectral representation of trajectories of stationary processes, and for proving that Gaussian stationary processes with rational spectral densities are components of solutions to stochastic ordinary differential equations. In the infinite dimensionally divisible processes, we consider the existence of a unique and continuous process with the corresponding properties. For this reason, the concept of transport in discrete systems has turned out to be more appropriate than continuous models.

Markov Processes and Statistical Applications-Anatolij V. Skorochod 2002-01: This book develops for a case where the spectral information is incomplete and the relations that determine the least favorable spectral densities for the optimal estimations are obtained. From the standpoint of the general theory of stochastic processes, a continuous parameter Markov chain appears to be the first essentially discontinuous process that has been studied in some detail. It is common that the sample functions of such a chain have discontinuities worse than jumps, and their basi discretizations play a central role in the theory, of which the theory of Markov chains is a very important part. In this context the basic concepts of separability and Markov property have been used as a guide to select the discrete models, which are usually applied at an early stage of the discussion to establish a certain smoothness of the sample functions, are here applied constantly as indispensable tools.

The Theory of Stochastic Processes-D.R. Cox 1977-02-01: The random walk; Markov chains; Markov processes with discrete states in continuous time; Markov processes in continuous time with continuous state space; Non-markovian processes; Stochastic processes: time domain; Stochastic processes: frequency domain, Point processes; Appedixes; Index.

Stochastic Processes and Long Range Dependence-Gnady Samorodnitsky 2016-11-09 This monograph is a joint work with Richard V. Guurevich, where we present an overview of nonstationary stochastic processes with long memory. The text is organized around the concept of nonstationary Gaussian processes for which the least favorable spectral densities are of special importance. The least favorable spectral densities are determined by the present work on the subject of both stationary and nonstationary processes. The book is organized around the concept of nonstationary Gaussian processes for which the least favorable spectral densities are of special importance. The least favorable spectral densities are determined by the present work on the subject of both stationary and nonstationary processes.


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makes the material accessible, highlighting simple applications and examples. A solutions manual with fully worked answers of all end-of-chapter problems, and Mathematica® and R programs illustrating many processes discussed in the book, can be downloaded from crcpress.com.

Stochastic Processes and Their Applications - Frank Beichelt 2001-10-18 This book introduces stochastic processes and their applications for students in engineering, industrial statistics, science, operations research, business, and finance. It provides the theoretical foundations for modeling time-dependent random phenomena encountered in these disciplines. Through numerous science and engineering-based examples and exercises, the author presents the subject in a comprehensible, practically oriented way, but he also includes some important proofs and theoretically challenging examples and exercises that will appeal to more mathematically minded readers. Solutions to most of the exercises are included either in an appendix or within the text.

Introduction to Stochastic Processes with R - Robert P. Dobrow 2016-03-07 An introduction to stochastic processes through the use of R. Introduction to Stochastic Processes with R is an accessible and well-balanced presentation of the theory of stochastic processes, with an emphasis on real-world applications of probability theory in the natural and social sciences. The use of simulation, by means of the popular statistical freeware R, makes theoretical results come alive with practical, hands-on demonstrations. Written by a highly-qualified expert in the field, the author presents numerous examples from a wide array of disciplines, which are used to illustrate concepts and highlight computational and theoretical results. Developing readers' problem-solving skills and mathematical maturity, Introduction to Stochastic Processes with R features: Over 200 examples and 600 end-of-chapter exercises A tutorial for getting started with R, and appendices that contain review material in probability and matrix algebra Discussions of many timely and interesting supplemental topics including Markov chain Monte Carlo, random walk on graphs, card shuffling, Black-Scholes options pricing, applications in biology and genetics, cryptography, martingales, and stochastic calculus Introductions to mathematics as needed in order to suit readers at many mathematical levels A companion website that includes relevant data files as well as all R code and scripts used throughout the book. Introduction to Stochastic Processes with R is an ideal textbook for an introductory course in stochastic processes. The book is aimed at undergraduate and beginning graduate-level students in the science, technology, engineering, and mathematics disciplines. The book is also an excellent reference for applied mathematicians and statisticians who are interested in a review of the topic.

Stochastic Processes: Theory and Methods - D N Shanbhag 2001 J. Neyman, one of the pioneers in laying the foundations of modern statistical theory, stressed the importance of stochastic processes in a paper written in 1960 in the following terms: currently in the period of dynamic indeterminism in science, there is hardly a serious piece of research, if treated realistically, that does not involve operations on stochastic processes. Arising from the need to solve practical problems, several major advances have taken place in the theory of stochastic processes and their applications. Books by Doob (1953; J. Wiley and Sons), Feller (1957, 1966; J. Wiley and Sons) and Loeve (1960; D. van Nostrand and Co., Inc.) among others, have created growing awareness and interest in the use of stochastic processes in scientific and technological studies. The literature on stochastic processes is very extensive and is distributed in several books and journals.