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This book covers the classical theory of Markov chains on general state-spaces as well as many recent developments. The theoretical results are illustrated by simple examples, many of which are taken from Markov Chain Monte Carlo methods. The book is self-contained, while all the results are carefully and concisely proven.

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Introduction This 2nd edition is a thoroughly revised and augmented version of the book with the same title published in 1999. The author begins with the elementary theory of Markov chains and very progressively brings the reader to more advanced topics.

Markov Chains | SpringerLink - link.springer.com

So we made it a trilogy: Markov Chains Brownian Motion and Diffusion Approximating Countable Markov Chains familiarly - MC, B & D, and ACM. I wrote the first two books for beginning graduate students with some knowledge of probability; if you can follow Sections 10.4 to 10.9 of Markov Chains you're in. The first two books are quite independent of one another, and completely independent of the ...

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Markov Chains - Springer Markov chains exhibit the so-called Markov property or memoryless property. Memoryless property in words can be put as: “ The future depends on the past only through the present. We are interested in finding a stationary distribution, π (μ (\mathbf{x})), starting from an initial distribution say, μ (\mathbf{x} ...

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Markov chains are a particularly powerful and widely used tool for analyzing a variety of stochastic (probabilistic) systems over time. This monograph will present a series of Markov models, starting from the basic models and then building up to higher-order models.

Markov Chains: Models, Algorithms and Applications - Springer

Markov Chains With Stationary Transition Probabilities. Authors (view affiliations) Kai Lai Chung; Book. 44 Citations; 1.8k Downloads; Part of the Grundlehren der mathematischen Wissenschaften book series (GL, volume 104) Log in to check access. Buy eBook. USD 69.99 Instant download; Readable on all devices; Own it forever; Local sales tax included if applicable; Buy Physical Book Learn about ...

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This book provides an undergraduate-level introduction to discrete and continuous-time Markov chains and their applications, with a particular focus on the first step analysis technique and its applications to average hitting times and ruin probabilities.

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In this book, the author begins with the elementary theory of Markov chains and very progressively brings the reader to the more advanced topics. He gives a useful review of probability that makes the book self-contained, and provides an appendix with detailed proofs

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of all the prerequisites from calculus, algebra, and number theory.

Markov Chains - Springer

Joseph A. (2020) Markov Chains. In: Markov Chain Monte Carlo Methods in Quantum Field Theories.

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The theory of Markov chains, although a special case of Markov processes, is here developed for its own sake and presented 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 clear-cut questions

Markov Chains with Stationary Transition ... - Springer

A great attention will be paid to the applications of the theory of the Markov chains and many classical as well as new results will be faced in the book. This textbook is intended for a basic course on stochastic processes at an advanced undergraduate level and the background needed will be a first course in probability theory. A big emphasis is given to the computational approach and to ...

An excursion into Markov chains | Marco Ferrante | Springer

A Markov chain is a stochastic model describing a sequence of possible events in which the probability of each event depends only on the state attained in the previous event. A

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countably infinite sequence, in which the chain moves state at discrete time steps, gives a discrete-time Markov chain (DTMC). A continuous-time process is called a continuous-time Markov chain (CTMC).

Markov chain - Wikipedia

Understanding Markov Chains: Examples and Applications (Springer Undergraduate Mathematics Series) £25.49 Usually dispatched within 6 days.

Understanding Markov Chains: Examples and Applications ...

In probability, a (discrete-time) Markov chain (DTMC) is a sequence of random variables, known as a stochastic process, in which the value of the next variable depends only on the value of the current variable, and not any variables in the past. For instance, a machine may have two states, A and E.

Discrete-time Markov chain - Wikipedia

Suppose that \mathbb{P} is a probability measure on the probability space $(S, \mathcal{F}, \mathbb{P})$, h is a measurable function from S to \mathbb{R} , and one is interested in the calculation of the expectation $\mathbb{E}[h(X)] = \int h(x) d\mathbb{P}(x)$.

Markov Chain Monte Carlo | SpringerLink - link.springer.com

A game of snakes and ladders or any other game whose moves are determined entirely by dice is a Markov chain, indeed, an absorbing Markov chain. This is in contrast to card games

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such as blackjack, where the cards represent a 'memory' of the past moves. To see the difference, consider the probability for a certain event in the game.

This book covers the classical theory of Markov chains on general state-spaces as well as many recent developments. The theoretical results are illustrated by simple examples, many of which are taken from Markov Chain Monte Carlo methods. The book is self-contained, while all the results are carefully and concisely proven. Bibliographical notes are added at the end of each chapter to provide an overview of the literature. Part I lays the foundations of the theory of Markov chain on general states-space. Part II covers the basic theory of irreducible Markov chains on general states-space, relying heavily on regeneration techniques. These two parts can serve as a text on general state-space applied Markov chain theory. Although the choice of topics is quite different from what is usually covered, where most of the emphasis is put on countable state space, a graduate student should be able to read almost all these developments without any mathematical background deeper than that needed to study countable state space (very little measure theory is required). Part III covers advanced topics on the theory of irreducible Markov chains. The emphasis is on geometric and subgeometric convergence rates and also on computable bounds. Some results appeared for a first time in a book and others are original. Part IV are selected topics on Markov chains, covering mostly hot recent developments.

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Primarily an introduction to the theory of stochastic processes at the undergraduate or beginning graduate level, the primary objective of this book is to initiate students in the art of stochastic modelling. However it is motivated by significant applications and progressively brings the student to the borders of contemporary research. Examples are from a wide range of domains, including operations research and electrical engineering. Researchers and students in these areas as well as in physics, biology and the social sciences will find this book of interest.

This book provides an undergraduate-level introduction to discrete and continuous-time Markov chains and their applications, with a particular focus on the first step analysis technique and its applications to average hitting times and ruin probabilities. It also discusses classical topics such as recurrence and transience, stationary and limiting distributions, as well as branching processes. It first examines in detail two important examples (gambling processes and random walks) before presenting the general theory itself in the subsequent chapters. It also provides an introduction to discrete-time martingales and their relation to ruin probabilities and mean exit times, together with a chapter on spatial Poisson processes. The concepts presented are illustrated by examples, 138 exercises and 9 problems with their solutions.

Continuous time parameter Markov chains have been useful for modeling various random phenomena occurring in queueing theory, genetics, demography, epidemiology, and competing populations. This is the first book about those aspects of the theory of continuous

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time Markov chains which are useful in applications to such areas. It studies continuous time Markov chains through the transition function and corresponding q -matrix, rather than sample paths. An extensive discussion of birth and death processes, including the Stieltjes moment problem, and the Karlin-McGregor method of solution of the birth and death processes and multidimensional population processes is included, and there is an extensive bibliography. Virtually all of this material is appearing in book form for the first time.

New up-to-date edition of this influential classic on Markov chains in general state spaces. Proofs are rigorous and concise, the range of applications is broad and knowledgeable, and key ideas are accessible to practitioners with limited mathematical background. New commentary by Sean Meyn, including updated references, reflects developments since 1996.

The theory of Markov chains, although a special case of Markov processes, is here developed for its own sake and presented 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 clear-cut questions and demands more precise and definitive answers. For example, the principal limit theorem (§ 1. 6, II. 10), still the object of research for general Markov processes, is here in its neat final form; and the strong Markov property (§ 11. 9) is here always applicable. While probability theory has advanced far enough that a degree of sophistication 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

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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 these baser discontinuities play a central role in the theory, of which the mystery remains to be completely unraveled. In this connection the basic concepts of separability and measurability, which are usually applied only at an early stage of the discussion to establish a certain smoothness of the sample functions, are here applied constantly as indispensable tools.

Besides the investigation of general chains the book contains chapters which are concerned with eigenvalue techniques, conductance, stopping times, the strong Markov property, couplings, strong uniform times, Markov chains on arbitrary finite groups (including a crash-course in harmonic analysis), random generation and counting, Markov random fields, Gibbs fields, the Metropolis sampler, and simulated annealing. With 170 exercises.

Markov chains are a particularly powerful and widely used tool for analyzing a variety of stochastic (probabilistic) systems over time. This monograph will present a series of Markov models, starting from the basic models and then building up to higher-order models. Included in the higher-order discussions are multivariate models, higher-order multivariate models, and higher-order hidden models. In each case, the focus is on the important kinds of applications that can be made with the class of models being considered in the current chapter. Special attention is given to numerical algorithms that can efficiently solve the models. Therefore, *Markov Chains: Models, Algorithms and Applications* outlines recent developments of Markov chain models for modeling queueing sequences, Internet, re-

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manufacturing systems, reverse logistics, inventory systems, bio-informatics, DNA sequences, genetic networks, data mining, and many other practical systems.

Provides a more accessible introduction than other books on Markov processes by emphasizing the structure of the subject and avoiding sophisticated measure theory Leads the reader to a rigorous understanding of basic theory

Here is a work that adds much to the sum of our knowledge in a key area of science today. It is concerned with the estimation of discrete-time semi-Markov and hidden semi-Markov processes. A unique feature of the book is the use of discrete time, especially useful in some specific applications where the time scale is intrinsically discrete. The models presented in the book are specifically adapted to reliability studies and DNA analysis. The book is mainly intended for applied probabilists and statisticians interested in semi-Markov chains theory, reliability and DNA analysis, and for theoretical oriented reliability and bioinformatics engineers.

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