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| Descrizione fisica | 1 online resource (260 p.) |
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| Nota di bibliografia | Includes bibliographical references and index. |
| Nota di contenuto | Cover; Title Page; Copyright; Contents; Preface; List of Figures; Nomenclature; Introduction; Chapter 1 First steps; 1.1 Preliminaries; 1.2 First properties of Markov chains; 1.2.1 Markov chains, finite-dimensional marginals, and laws; 1.2.2 Transition matrix action and matrix notation; 1.2.3 Random recursion and simulation; 1.2.4 Recursion for the instantaneous laws, invariant laws; 1.3 Natural duality: algebraic approach; 1.3.1 Complex eigenvalues and spectrum; 1.3.2 Doeblin condition and strong irreducibility; 1.3.3 Finite state space Markov chains; 1.4 Detailed examples<br>1.4.1 Random walk on a network1.4.2 Gambler's ruin; 1.4.3 Branching process: evolution of a population; 1.4.4 Ehrenfest's Urn; 1.4.5 Renewal process; 1.4.6 Word search in a character chain; 1.4.7 Product chain; Exercises; Chapter 2 Past, present, and future; 2.1 Markov property and its extensions; 2.1.1 Past -field, filtration, and translation operators; 2.1.2 Markov property; 2.1.3 Stopping times and strong Markov property; 2.2 Hitting times and distribution; 2.2.1 Hitting times, induced chain, and hitting distribution; 2.2.2 ""One step forward"" method, Dirichlet problem<br>2.3 Detailed examples2.3.1 Gambler's ruin; 2.3.2 Unilateral hitting time |

for a random walk; 2.3.3 Exit time from a box; 2.3.4 Branching process; 2.3.5 Word search; Exercises; Chapter 3 Transience and recurrence; 3.1 Sample paths and state space; 3.1.1 Communication and closed irreducible classes; 3.1.2 Transience and recurrence, recurrent class decomposition; 3.1.3 Detailed examples; 3.2 Invariant measures and recurrence; 3.2.1 Invariant laws and measures; 3.2.2 Canonical invariant measure; 3.2.3 Positive recurrence, invariant law criterion; 3.2.4 Detailed examples; 3.3 Complements
3.3.1 Hitting times and superharmonic functions3.3.2 Lyapunov functions; 3.3.3 Time reversal, reversibility, and adjoint chain; 3.3.4 Birth-and-death chains; Exercises; Chapter 4 Long-time behavior; 4.1 Path regeneration and convergence; 4.1.1 Pointwise ergodic theorem, extensions; 4.1.2 Central limit theorem for Markov chains; 4.1.3 Detailed examples; 4.2 Long-time behavior of the instantaneous laws; 4.2.1 Period and aperiodic classes; 4.2.2 Coupling of Markov chains and convergence in law; 4.2.3 Detailed examples; 4.3 Elements on the rate of convergence for laws
4.3.1 The Hilbert space framework4.3.2 Dirichlet form, spectral gap, and exponential bounds; 4.3.3 Spectral theory for reversible matrices; 4.3.4 Continuous-time Markov chains; Exercises; Chapter 5 Monte Carlo methods; 5.1 Approximate solution of the Dirichlet problem; 5.1.1 General principles; 5.1.2 Heat equation in equilibrium; 5.1.3 Heat equation out of equilibrium; 5.1.4 Parabolic partial differential equations; 5.2 Invariant law simulation; 5.2.1 Monte Carlo methods and ergodic theorems; 5.2.2 Metropolis algorithm, Gibbs law, and simulated annealing
5.2.3 Exact simulation and backward recursion

Sommario/riassunto

Markov Chains: Analytic and Monte Carlo Computations introduces the main notions related to Markov chains and provides explanations on how to characterize, simulate, and recognize them. Starting with basic notions, this book leads progressively to advanced and recent topics in the field, allowing the reader to master the main aspects of the classical theory. This book also features: Numerous exercises with solutions as well as extended case studies.A detailed and rigorous presentation of Markov chains with discrete time and state space.An appendix present