1. Record Nr. UNISA996503552703316

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Titolo	Stationary Processes and Discrete Parameter Markov Processes [[electronic resource] /] / by Rabi Bhattacharya, Edward C. Waymire
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2022
ISBN	3-031-00943-6
Edizione	[1st ed. 2022.]
Descrizione fisica	1 online resource (449 pages)
Collana	Graduate Texts in Mathematics, , 2197-5612 ; ; 293
Disciplina	780
Soggetti	Stochastic processes Markov processes Distribution (Probability theory) Probabilities Stochastic Processes Markov Process Distribution Theory Probability Theory Processos estocàstics Llibres electrònics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Symbol Definition List -- 1. Fourier Analysis: A Brief -- 2. Weakly Stationary Processes and their Spectral Measures -- 3. Spectral Representation of Stationary Processes -- 4. Birkhoff's Ergodic Theorem -- 5. Subadditive Ergodic Theory -- 6. An Introduction to Dynamical Systems -- 7. Markov Chains -- 8. Markov Processes with General State Space -- 9. Stopping Times and the Strong Markov Property -- 10. Transience and Recurrence of Markov Chains -- 11. Birth–Death Chains -- 12. Hitting Probabilities & Absorption -- 13. Law of Large Numbers and Invariant Probability for Markov Chains by Renewal Decomposition -- 14. The Central Limit Theorem for Markov Chains by Renewal Decomposition -- 15. Martingale Central Limit Theorem -- 16. Stationary Ergodic Markov Processes: SLLN & FCLT -- 17. Linear Markov Processes -- 18. Markov Processes Generated by

Iterations of I.I.D. Maps -- 19. A Splitting Condition and Geometric Rates of Convergence to Equilibrium -- 20. Irreducibility and Harris Recurrent Markov Processes -- 21. An Extended Perron–Frobenius Theorem and Large Deviation Theory for Markov Processes -- 22. Special Topic: Applications of Large Deviation Theory -- 23. Special Topic: Associated Random Fields, Positive Dependence, FKG Inequalities -- 24. Special Topic: More on Coupling Methods and Applications -- 25. Special Topic: An Introduction to Kalman Filter -- A. Spectral Theorem for Compact Self-Adjoint Operators and Mercer's Theorem -- B. Spectral Theorem for Bounded Self-Adjoint Operators -- C. Borel Equivalence for Polish Spaces -- D. Hahn–Banach, Separation, and Representation Theorems in Functional Analysis -- References -- Author Index -- Subject Index.

Sommario/riassunto

This textbook explores two distinct stochastic processes that evolve at random: weakly stationary processes and discrete parameter Markov processes. Building from simple examples, the authors focus on developing context and intuition before formalizing the theory of each topic. This inviting approach illuminates the key ideas and computations in the proofs, forming an ideal basis for further study. After recapping the essentials from Fourier analysis, the book begins with an introduction to the spectral representation of a stationary process. Topics in ergodic theory follow, including Birkhoff's Ergodic Theorem and an introduction to dynamical systems. From here, the Markov property is assumed and the theory of discrete parameter Markov processes is explored on a general state space. Chapters cover a variety of topics, including birth–death chains, hitting probabilities and absorption, the representation of Markov processes as iterates of random maps, and large deviation theory for Markov processes. A chapter on geometric rates of convergence to equilibrium includes a splitting condition that captures the recurrence structure of certain iterated maps in a novel way. A selection of special topics concludes the book, including applications of large deviation theory, the FKG inequalities, coupling methods, and the Kalman filter. Featuring many short chapters and a modular design, this textbook offers an in-depth study of stationary and discrete-time Markov processes. Students and instructors alike will appreciate the accessible, example-driven approach and engaging exercises throughout. A single, graduate-level course in probability is assumed.