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interested in modern network analysis, data science, machine learning, and statistics. Harry Crane is Associate Professor and Co-Director of the Graduate Program in Statistics and Biostatistics and an Associate Member of the Graduate Faculty in Philosophy at Rutgers University. Professor Crane's research interests cover a range of mathematical and applied topics in network science, probability theory, statistical inference, and mathematical logic. In addition to his technical work on edge and relational exchangeability, relative exchangeability, and graph-valued Markov processes, Prof. Crane's methods have been applied to domain-specific cybersecurity and counterterrorism problems at the Foreign Policy Research Institute and RAND's Project AIR FORCE.

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Long-memory processes are known to play an important part in many areas of science and technology, including physics, geophysics, hydrology, telecommunications, economics, finance, climatology, and network engineering. In the last 20 years enormous progress has been made in understanding the probabilistic foundations and statistical principles of such processes. This book provides a timely and comprehensive review, including a thorough discussion of mathematical and probabilistic foundations and statistical methods, emphasizing their practical motivation and mathematical justification. Proofs of the main theorems are provided and data examples illustrate practical aspects. This book will be a valuable resource for researchers and graduate students in statistics, mathematics, econometrics and other quantitative areas, as well as for practitioners and applied researchers who need to analyze data in which long memory, power laws, self-similar scaling or fractal properties are relevant.

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In recent years there has been an explosion of network data — that is, measurements that are either of or from a system conceptualized as a network — from seemingly all corners of science. The combination of an increasingly pervasive interest in scientific analysis at a systems level and the ever-growing capabilities for high-throughput data collection in various fields has fueled this trend. Researchers from biology and bioinformatics to physics, from computer science to the information sciences, and from economics to sociology are more and more engaged in the collection and statistical analysis of data from a network-centric perspective. Accordingly, the contributions to statistical methods and modeling in this area have come from a similarly broad spectrum of areas, often independently of each other. Many books already have been written addressing network data and network problems in specific individual disciplines.

However, there is at present no single book that provides a modern treatment of a core body of knowledge for statistical analysis of network data that cuts across the various disciplines and is organized rather according to a statistical taxonomy of tasks and techniques. This book seeks to fill that gap and, as such, it aims to contribute to a growing trend in recent years to facilitate the exchange of knowledge across the pre-existing boundaries between those disciplines that play a role in what is coming to be called “network science.”

Networks are ubiquitous in science and have become a focal point for discussion in everyday life. Formal statistical models for the analysis of network data have emerged as a major topic of interest in diverse areas of study, and most of these involve a form of graphical representation. Probability models on graphs date back to 1959. Along with empirical studies in social psychology and sociology from the 1960s, these early works generated an active network community and a substantial literature in the 1970s. This effort moved into the statistical literature in the late 1970s and

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1980s, and the past decade has seen a burgeoning network literature in statistical physics and computer science. The growth of the World Wide Web and the emergence of online networking communities such as Facebook, MySpace, and LinkedIn, and a host of more specialized professional network communities has intensified interest in the study of networks and network data. Our goal in this review is to provide the reader with an entry point to this burgeoning literature. We begin with an overview of the historical development of statistical network modeling and then we introduce a number of examples that have been studied in the network literature. Our subsequent discussion focuses on a number of prominent static and dynamic network models and their interconnections. We emphasize formal model descriptions, and pay special attention to the interpretation of parameters and their estimation. We end with a description of some open problems and challenges for machine learning and statistics.

This snapshot of the current frontier of statistics and network analysis focuses on the foundational topics of modeling, sampling, and design. Primarily for graduate students and researchers in statistics and closely related fields, emphasis is not only on what has been done, but on what remains to be done.

Now updated in a valuable new edition—this user-friendly book focuses on understanding the "why" of mathematical statistics. Probability and Statistical Inference, Second Edition introduces key probability and statistical concepts through non-trivial, real-world examples and promotes the development of intuition rather than simple application. With its coverage of the recent advancements in computer-intensive methods, this update successfully provides the comprehensive tools needed to develop a broad understanding of the theory of statistics and its probabilistic foundations. This outstanding new edition continues to encourage readers to recognize and fully understand the why, not just the how, behind the

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concepts, theorems, and methods of statistics. Clear explanations are presented and applied to various examples that help to impart a deeper understanding of theorems and methods—from fundamental statistical concepts to computational details. Additional features of this Second Edition include: A new chapter on random samples Coverage of computer-intensive techniques in statistical inference featuring Monte Carlo and resampling methods, such as bootstrap and permutation tests, bootstrap confidence intervals with supporting R codes, and additional examples available via the book's FTP site Treatment of survival and hazard function, methods of obtaining estimators, and Bayes estimating Real-world examples that illuminate presented concepts Exercises at the end of each section Providing a straightforward, contemporary approach to modern-day statistical applications, *Probability and Statistical Inference, Second Edition* is an ideal text for advanced undergraduate- and graduate-level courses in probability and statistical inference. It also serves as a valuable reference for practitioners in any discipline who wish to gain further insight into the latest statistical tools.

*Handbook of Probabilistic Models* carefully examines the application of advanced probabilistic models in conventional engineering fields. In this comprehensive handbook, practitioners, researchers and scientists will find detailed explanations of technical concepts, applications of the proposed methods, and the respective scientific approaches needed to solve the problem. This book provides an interdisciplinary approach that creates advanced probabilistic models for engineering fields, ranging from conventional fields of mechanical engineering and civil engineering, to electronics, electrical, earth sciences, climate, agriculture, water resource, mathematical sciences and computer sciences. Specific topics covered include minimax probability machine regression, stochastic finite element method, relevance vector machine, logistic regression, Monte Carlo simulations,

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random matrix, Gaussian process regression, Kalman filter, stochastic optimization, maximum likelihood, Bayesian inference, Bayesian update, kriging, copula-statistical models, and more. Explains the application of advanced probabilistic models encompassing multidisciplinary research Applies probabilistic modeling to emerging areas in engineering Provides an interdisciplinary approach to probabilistic models and their applications, thus solving a wide range of practical problems

This book highlights cutting-edge research in the field of network science, offering scientists, researchers, students and practitioners a unique update on the latest advances in theory and a multitude of applications. It presents the peer-reviewed proceedings of the IX International Conference on Complex Networks and their Applications (COMPLEX NETWORKS 2020). The carefully selected papers cover a wide range of theoretical topics such as network models and measures; community structure, network dynamics; diffusion, epidemics and spreading processes; resilience and control as well as all the main network applications, including social and political networks; networks in finance and economics; biological and neuroscience networks and technological networks.

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