Networks An Introduction Mark Newman Mybrandore

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Recognize - Construct - Visualize - Analyze - Interpret
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Network Science

CAREY MATIAS

A Survey of Statistical Network Models
Cambridge University Press
This book aims to explain the basics of graph theory that are needed at an introductory level for students in computer or information sciences. To motivate students and to show that even these basic notions can be extremely useful, the book also aims to provide an introduction to the modern field of network science. Mathematics is often unnecessarily difficult for students, at times even intimidating. For this reason, explicit attention is paid in the first chapters to mathematical notations and proof techniques, emphasizing that the notations form the biggest obstacle, not the mathematical concepts themselves. This approach allows to gradually prepare students for using tools that are necessary to put graph theory to work: complex networks. In the second part of the book the student learns about random networks, small worlds, the structure of the Internet and the Web, peer-to-peer systems, and social networks. Again, everything is discussed at an elementary level, but such that in the end students indeed have the feeling that they: 1.Have learned how to read and understand the basic mathematics related to graph theory. 2.Understand how basic graph theory can be applied to optimization problems such as routing in communication networks. 3.Know a bit more about this sometimes mystical field of small worlds and random networks. There is an accompanying web site www.distributed-systems.net/gtcn from where supplementary material can be

obtained, including exercises, Mathematica notebooks, data for analyzing graphs, and generators for various complex networks.

Graph Algorithms OUP Oxford

An architect of network theory summarizes his team's endeavor to create a blueprint of the world's networks, citing the scientific elements of the Internet, economies, terrorist organizations, and other knowledge-based groups. Reprint.

Statistical Analysis of Network Data with R Princeton University Press

A variety of different social, natural and technological systems can be described by the same mathematical framework. This holds from the Internet to food webs and to boards of company directors. In all these situations a graph of the elements of the system and their interconnections displays a universal feature. There are only few elements with many connections, and many elements with few connections. This book presents the experimental evidence of these "Scale-free networks" and provides students and researchers with a corpus of theoretical results and algorithms to analyse and understand these features. The content of this book and the exposition makes it a clear textbook for beginners, and a reference book for the experts.

Computational Physics CRC Press

Network science offers a powerful language to represent and study complex systems composed of interacting elements — from the Internet to social and biological systems. A Guide to Temporal Networks presents recent theoretical and modelling progress in the emerging field of temporally varying networks and provides connections between the different areas of knowledge required to address this multi-disciplinary subject. After an introduction to key concepts on networks and stochastic dynamics, the authors guide the reader through a coherent selection of mathematical and computational tools for network dynamics. Perfect for students and professionals, this book is a gateway to an active field of research developing between the disciplines of applied mathematics, physics and computer science, with applications in others including social sciences, neuroscience and biology.This second edition extensively expands upon the coverage of the first edition as the authors expertly present recent theoretical and modelling progress in the emerging field of temporal networks, providing the keys to (and connections between) the different areas of knowledge required to address this multi-disciplinary problem.

Nexus: Small Worlds and the Groundbreaking Theory of Networks SAGE

Excellent reference describes line technique; drawing the figure, face, and hands; humorous illustration; pen drawing for advertisers; landscape and architectural illustration. Drawings by Dürer, Holbein, Doré, Rackham, Beardsley, Klinger, more. 161 figures.

Practical Examples in Apache Spark and Neo4j NetworksAn Introduction

This text is a very concise modern introduction to complex networks based on lectures for university students and non-specialists. The text fills the gap between popular science books and comprehensive reference volumes. The book describes the current state of the art in complex networks and will be useful for teaching and self-study.

Harvard University Press

This book provides an introduction to Monte Carlo simulations in classical

statistical physics and is aimed both at students beginning work in the field and at more experienced researchers who wish to learn more about Monte Carlo methods. The material covered includes methods for both equilibrium and out of equilibrium systems, and common algorithms like the Metropolis and heat-bath algorithms are discussed in detail, as well as more sophisticated ones such as continuous time Monte Carlo, cluster algorithms, multigrid methods, entropic sampling and simulated tempering. Data analysis techniques are also explained starting with straightforward measurement and error-estimation techniques and progressing to topics such as the single and multiple histogram methods and finite size scaling. The last few chapters of the book are devoted to implementation issues, including discussions of such topics as lattice representations, efficient implementation of data structures, multispin coding, parallelization of Monte Carlo algorithms, and random number generation. At the end of the book the authors give a number of example programmes demonstrating the applications of these techniques to a variety of well-known models.

Glass Ceilings and Bottomless Pits Maarten Van Steen

The availability of large data sets has allowed researchers to uncover complex properties such as large-scale fluctuations and heterogeneities in many networks, leading to the breakdown of standard theoretical frameworks and models. Until recently these systems were considered as haphazard sets of points and connections. Recent advances have generated a vigorous research effort in understanding the effect of complex connectivity patterns on dynamical phenomena. This book presents a comprehensive account of these effects. A vast number of systems, from the brain to ecosystems, power grids and the internet, can be represented as large complex networks. This book will interest graduate students and researchers in many disciplines, from physics and statistical mechanics to mathematical biology and information science. Its modular approach allows readers to readily access the sections of most interest to them, and complicated maths is avoided so the text can be easily followed by non-experts in the subject.

The Art and Technique of Pen Drawing Cambridge University Press

The scientific study of networks, including computer networks, social networks, and biological networks, has received an enormous amount of interest in the last few years. The rise of the Internet and the wide availability of inexpensive computers have made it possible to gather and analyze network data on a large scale, and the development of a variety of new theoretical tools has allowed us to extract new knowledge from many different kinds of networks. The study of networks is broadly interdisciplinary and important developments have occurred in many fields, including mathematics, physics, computer and information sciences, biology, and the social sciences. This book brings together for the first time the most important breakthroughs in each of these fields and presents them in a coherent fashion, highlighting the strong interconnections between work in different areas. Subjects covered include the measurement and structure of networks in many branches of science, methods for analyzing network data, including methods

developed in physics, statistics, and sociology, the fundamentals of graph theory, computer algorithms, and spectral methods, mathematical models of networks, including random graph models and generative models, and theories of dynamical processes taking place on networks.

Reasoning About a Highly Connected World John Wiley & Sons

The text covers random graphs from the basic to the advanced, including numerous exercises and recommendations for further reading.

Dynamical Systems on Networks Cambridge University Press

Discover how graph algorithms can help you leverage the relationships within your data to develop more intelligent solutions and enhance your machine learning models. You'll learn how graph analytics are uniquely suited to unfold complex structures and reveal difficult-to-find patterns lurking in your data. Whether you are trying to build dynamic network models or forecast real-world behavior, this book illustrates how graph algorithms deliver value—from finding vulnerabilities and bottlenecks to detecting communities and improving machine learning predictions. This practical book walks you through hands-on examples of how to use graph algorithms in Apache Spark and Neo4j—two of the most common choices for graph analytics. Also included: sample code and tips for over 20 practical graph algorithms that cover optimal pathfinding, importance through centrality, and community detection. Learn how graph analytics vary from conventional statistical analysis Understand how classic graph algorithms work, and how they are applied Get guidance on which algorithms to use for different types of questions Explore algorithm examples with working code and sample datasets from Spark and Neo4j See how connected feature extraction can increase machine learning accuracy and precision Walk through creating an ML workflow for link prediction combining Neo4j and Spark

Social Network Analysis South End Press

Big data, genomics, and quantitative approaches to network-based analysis are combining to advance the frontiers of medicine as never before. With contributions from leading experts, Network Medicine introduces this rapidly evolving field of research, which promises to revolutionize the diagnosis and treatment of human diseases.

Quantitative Analysis of Ecological Networks "O'Reilly Media, Inc."

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 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.

Complex Network Analysis in Python OUP Oxford

NetworksAn IntroductionOUP Oxford

Six Degrees: The Science of a Connected Age Now Publishers Inc

Network thinking and network analysis are rapidly expanding features of ecological research. Network analysis of ecological systems include representations and modelling of the interactions in an ecosystem, in which species or factors are joined by pairwise connections. This book provides an overview of ecological network analysis including generating processes, the relationship between structure and dynamic function, and statistics and models for these networks. Starting with a general introduction to the composition of networks and their characteristics, it includes details on such topics as measures of network complexity, applications of spectral graph theory, how best to include indirect species interactions, and multilayer, multiplex and multilevel networks. Graduate students and researchers who want to develop and understand ecological networks in their research will find this volume inspiring and helpful. Detailed guidance to those already working in network ecology but looking for advice is also included.

Monte Carlo Methods in Statistical Physics Cambridge University Press

Analyzing the behavior of complex networks is an important element in the design of new man-made structures such as communication systems and biologically engineered molecules. Because any complex network can be represented by a graph, and therefore in turn by a matrix, graph theory has become a powerful tool in the investigation of network performance. This self-contained 2010 book provides a concise introduction to the theory of graph spectra and its applications to the study of complex networks. Covering a range of types of graphs and topics important to the analysis of complex systems, this guide provides the mathematical foundation needed to understand and apply spectral insight to real-world systems. In particular, the general properties of both the adjacency and Laplacian spectrum of graphs are derived and applied to complex networks. An ideal resource for researchers and students in communications networking as well as in physics and mathematics.

From the Genome to the Internet Cambridge University Press

In the last 20 years interest in network phenomena has grown immensely among anthropologists, psychologists, political scientists, economists and lawyers. Empirical observation shows that network arrangements can be found in many branches of business. This is often linked to rapid changes in today's markets and technologies, but it is not the only reason.

Legal institutions have been at the centre of private law since the industrial revolution but today contracts and corporations cannot cope with the risks and opportunities posed by networks. Legal practice needs solutions which go beyond the classical traditions of thinking in the dichotomy of contract and corporation. This volume is the outcome of a conference held in Fribourg, Switzerland, which focused on the legal treatment of contractual networks, in particular questions of network expectations, the fragility of network institutions, and the question of how law can minimise network specific risks towards third parties. The contributors, among them many of the world's leading scholars in this field, include Roger Brownsword, Simon Deakin, Gunther Teubner, Hugh Collins and Marc Amstutz. The book will be of interest to scholars of contract, corporate law, and legal theory.

Networks, Crowds, and Markets Springer Science & Business Media

The ego-net approach to social network analysis, which takes discrete individual actors and their contacts as its starting point, is one of the most widely used approaches in the field. This is the first textbook to take readers through each stage of ego-net research, from conception, through research design and data gathering to analysis. It starts with the basics, assuming no prior knowledge of social network analysis, but then moves on to introduce cutting edge innovations, covering both new statistical approaches to ego-net analysis and also the most recent thinking on mixing methods (quantitative and qualitative) to achieve depth and rigour. It is an absolute must for anybody wishing to explore the importance of networks.

Handbook of Graphs and Networks Springer

The study of network theory is a highly interdisciplinary field, which has emerged as a major topic of interest in various disciplines ranging from physics and mathematics, to biology and sociology. This book promotes the diverse nature of the study of complex networks by balancing the needs of students from very different backgrounds. It references the most commonly used concepts in network theory, provides examples of their applications in solving practical problems, and clear indications on how to analyse their results. In the first part of the book, students and researchers will discover the quantitative and analytical tools necessary to work with complex networks, including the most basic concepts in network and graph theory, linear and matrix algebra, as well as the physical concepts most frequently used for studying networks. They will also find instruction on some key skills such as how to proof analytic results and how to manipulate empirical network data. The bulk of the text is focused on instructing readers on the most useful tools for modern practitioners of network theory. These include degree distributions, random networks, network fragments, centrality measures, clusters and communities, communicability, and local and global properties of networks. The combination of theory, example and method that are presented in this text, should ready the student to conduct their own analysis of networks with confidence and allow teachers to select appropriate examples and problems to teach this subject in the classroom.

The Structure and Dynamics of Networks American Mathematical Soc.

This volume is a tutorial for the study of dynamical systems on networks. It discusses both methodology and models, including spreading models for social and biological contagions. The authors focus especially on “simple” situations that are analytically tractable, because they are insightful and provide useful springboards for the study of more complicated scenarios. This tutorial, which also includes key pointers to the literature, should be helpful for junior and senior undergraduate students, graduate students, and researchers from mathematics, physics, and engineering who seek to study dynamical systems on networks but who may not have prior experience with graph theory or networks. Mason A. Porter is Professor of Nonlinear and Complex Systems at the Oxford Centre for Industrial and Applied Mathematics, Mathematical Institute, University of Oxford, UK. He is also a member of the CABDyN Complexity Centre and a Tutorial Fellow of Somerville College. James P. Gleeson is Professor of Industrial and Applied Mathematics, and co-Director of MACSI, at the University of Limerick, Ireland.

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