Networks Crowds And Markets Reasoning About A Highly Connected World

Networks of relationships help determine the careers that people choose, the jobs they obtain, the products they buy, and how they vote. The many aspects of our lives that are governed by social networks make it critical to understand how they impact behavior, which network structures are likely to emerge in a society, and why we organize ourselves as we do. In Social and Economic Networks, Matthew Jackson offers a comprehensive introduction to social and economic networks, drawing on the latest findings in economics, sociology, computer science, physics, and mathematics. He provides empirical background on networks and the regularities that they exhibit, and discusses random graph-based models and strategic models of network formation. He helps readers to understand behavior in networked societies, with a detailed analysis of learning and diffusion in networks, decision making by individuals who are influenced by their social neighbors, game theory and markets on networks, and a host of related subjects. Jackson also describes the varied statistical and modeling techniques used to analyze social networks. Each chapter includes exercises to aid students in their analysis of how networks function. This book is an indispensable resource for students and researchers in economics, mathematics, physics, sociology, and business.

A practical introduction to network science for students across business, cognitive science, neuroscience, sociology, biology, engineering and other disciplines.

Over the past decade there has been a growing public fascination with the complex connectedness of modern society. This connectedness is found in many incarnations: in the rapid growth of the Internet, in the ease with which global communication takes place, and in the ability of news and information as well as epidemics and financial crises to spread with surprising speed and intensity. These are phenomena that involve networks, incentives, and the aggregate behavior of groups of people; they are based on the links that connect us and the ways in which our decisions can have subtle consequences for others. This introductory undergraduate textbook takes an interdisciplinary look at economics, sociology, computing and information science, and applied mathematics to understand networks and behavior. It describes the emerging field of study that is growing at the interface of these areas, addressing fundamental questions about how the social, economic, and technological worlds are connected"--Provided by publisher.

A revolutionary new theory showing how we can predict human behavior-from a radical genius and bestselling author Can we scientifically predict our future? Scientists and pseudo scientists have been pursuing this mystery for hundreds and perhaps thousands of years. But now, astonishing new research is revealing patterns in human behavior previously thought to be purely random. Precise, orderly, predictable patterns... Albert Laszlo Barabasi, already the world's preeminent researcher on the science of networks, describes his work on this profound mystery in Bursts, a stunningly original investigation into human nature. His approach relies on the digital reality of our world, from mobile phones to the Internet and email, because it has turned society into a huge research laboratory. All those electronic trails of time stamped texts, voicemails, and internet searches add up to a previously unavailable massive data set of statistics that track our movements, our decisions, our lives. Analysis of these trails is offering deep insights into the rhythm of how we do everything. His finding? We work and fight and play in short flourishes of activity followed by next to nothing. The pattern isn't random, it's "bursty." Randomness does not rule our lives in the way scientists have assumed up until now. Illustrating this revolutionary science, Barabasi artfully weaves together the story of a 16th century burst of human activity-a bloody medieval crusade launched in his homeland, Transylvania-with the modern tale of a contemporary artist hunted by the FBI through our post 9/11 surveillance society. These narratives illustrate how predicting human behavior has long been the obsession, sometimes the duty, of those in power. Barabási's astonishingly wide range of examples from seemingly unrelated areas include how dollar bills move around the U.S., the pattern everyone follows in writing email, the spread of epidemics, and even the flight patterns of albatross. In all these phenomena a virtually identical, mathematically described bursty pattern emerges. Bursts reveals what this amazing new research is showing us about where individual spontaneity ends and predictability in human behavior begins. The way you think about your own potential to do something truly extraordinary will never be the same.

The theory of random graphs began in the late 1950s in several papers by Erdos and Renyi. In the late twentieth century, the notion of six degrees of separation, meaning that any two people on the planet can be connected by a short chain of people who know each other, inspired Strogatz and Watts to define the small world random graph in which each site is connected to k close neighbors, but also has long-range connections. At a similar time, it was observed in human social and sexual networks and on the Internet that the number of neighbors of an individual or computer has a power law distribution. This inspired Barabasi and Albert to define the preferential attachment model, which has these properties. These two papers have led to an explosion of research. The purpose of this book is to use a wide variety of mathematical argument to obtain insights into the properties of these graphs. A unique feature is the interest in the dynamics of process taking place on the graph in addition to their geometric properties, such as connectedness and diameter.

Many complex systems in civil and military operations are highly automated with the intention of supporting human performance in difficult cognitive tasks. The complex systems can involve teams or individuals working on real-time supervisory control, command or information management tasks where a number of constraints must be satisfied. Decision Making in Complex Environments addresses the role of the human, the technology and the processes in complex socio-technical and technological systems. The aim of the book is to apply a multi-disciplinary perspective to the examination of the human factors in complex decision making. It contains more than 30 contributions on key subjects such as military human factors, team decision making issues, situation awareness, and technology support. In addition to the major application area of military human factors there are chapters on business, medical, governmental and aeronautical decision making. The book provides a unique blend of expertise from psychology, human factors, industry, commercial environments, the military, computer science, organizational psychology and training that should be valuable to academics and practitioners alike.

Graph-structured data is ubiquitous throughout the natural and social sciences, from telecommunication networks to quantum chemistry. Building relational inductive biases into deep learning architectures is crucial for creating systems that can learn, reason, and generalize from this kind of data. Recent years have seen a surge in research on graph representation learning, including techniques for deep graph embeddings, generalizations of convolutional neural networks to graph-structured data, and neural message-passing approaches inspired by belief propagation. These advances in graph representation learning have led to new state-of-the-art results in numerous domains, including chemical synthesis, 3D vision, recommender systems, question answering, and social network analysis. This book provides a synthesis and overview of graph representation learning. It begins with a discussion of the goals of graph representation learning as well as key methodological foundations in graph theory and network analysis. Following this, the book introduces and reviews methods for learning node embeddings, including random-walk-based methods and applications to knowledge graphs. It then provides a technical synthesis and introduction to the highly successful graph neural network (GNN) formalism, which has become a dominant and fast-growing paradigm for deep learning with graph data. The book concludes with a synthesis of recent advancements in deep generative models for graphs—a nascent but quickly growing subset of graph representation learning.

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.

Construct, analyze, and visualize networks with networkx, a Python language module. Network analysis is a powerful tool you can apply to a multitude of datasets and situations. Discover how to work with all kinds of networks, including social, product, temporal, spatial, and semantic networks. Convert almost any real-world data into a complex network--such as recommendations on co-using cosmetic products, muddy hedge fund connections, and online friendships. Analyze and visualize the network, and make business decisions based on your analysis. If you're a curious Python programmer, a data scientist, or a CNA specialist interested in mechanizing mundane tasks, you'll increase your productivity exponentially. Complex network analysis used to be done by hand or with non-programmable network analysis tools, but not anymore! You can now automate and program these tasks in Python. Complex networks are collections of connected items, words, concepts, or people. By exploring their structure and individual elements, we can learn about their meaning, evolution, and resilience. Starting with simple networks, convert real-life and synthetic network graphs into networkx data structures. Look at more sophisticated networks and learn more powerful machinery to handle centrality calculation, blockmodeling, and clique and community detection. Get familiar with presentation-quality network visualization tools, both programmable and interactive--such as Gephi, a CNA explorer. Adapt the patterns from the case studies to your problems. Explore big networks with NetworKit, a high-performance networkx substitute. Each part in the book gives you an overview of a class of networks, includes a practical study of networkx functions and techniques, and concludes with case studies from various fields, including social networking, anthropology, marketing, and sports analytics. Combine your CNA and Python programming skills to become a better network analyst, a more accomplished data scientist, and a more versatile programmer. What You Need: You will need a Python 3.x installation with the following additional modules: Pandas (>=0.18), NumPy (>=1.10), matplotlib (>=1.5), networkx (>=1.11), python-louvain (>=0.5), NetworKit (>=3.6), and generalizesimilarity. We recommend using the Anaconda distribution that comes with all these modules, except for python-louvain, NetworKit, and generalizedsimilarity, and works on all major modern operating systems.

With the proliferation of social media and on-line communities in networked world a large gamut of data has been collected and stored in databases. The rate at which such data is stored is growing at a phenomenal rate and pushing the classical methods of data analysis to their limits. This book presents an integrated framework of recent empirical and theoretical research on social network analysis based on a wide range of techniques from various disciplines like data mining, social sciences, mathematics, statistics, physics, network science, machine learning with visualization techniques and security. The book illustrates the potential of multi-disciplinary techniques in various real life problems and intends to motivate researchers in social network analysis to design more effective tools by integrating swarm intelligence and data mining.

"This book provides a rigorous and comprehensive coverage of transportation models and planning methods and is a must-have to anyone in the transportation community, including students, teachers, and practitioners." Moshe Ben-Akiva, Massachusetts Institute of Technology.

Written by high performance computing (HPC) experts, Introduction to High Performance Computing for Scientists and Engineers provides a solid introduction to current mainstream computer architecture, dominant parallel programming models, and useful optimization strategies for scientific HPC. From working in a scientific computing center, the author Engineering Rules is a riveting global history of the people, processes, and organizations that created and maintain this nearly invisible infrastructure of today's economy, which is just as important as the state or the global market.

Illustrated throughout in full colour, this pioneering text is the only book you need for an introduction to network science. A graduate-level, mathematically rigorous introduction to strategic behavior in a networked world. This introductory graduate-level text uses tools from game theory and graph theory to examine the role of network structures and network effects in economic and information markets. The goal is for students to develop an intuitive and mathematically rigorous understanding of how strategic agents interact in a connected world. The text synthesizes some of the central results in the field while also simplifying their treatment to make them more accessible to nonexperts. Thus, students at the introductory level will gain an understanding of key ideas in the field that are usually only taught at the advanced graduate level. The book introduces basic concepts from game theory and graph theory as well as some fundamental algorithms for exploring graphs. These tools are then applied to analyze strategic interactions over social networks, to explore different types of markets and mechanisms for networks, and to study the role of beliefs and higher-level beliefs (beliefs about beliefs). Specific topics discussed include coordination and contagion on social networks, traffic networks, matchings and matching markets, exchange networks, auctions, voting, web search, models of belief and knowledge, and how beliefs affect auctions and markets. An appendix offers a "Primer on Probability." Mathematically rigorous, the text assumes a level of mathematical maturity (comfort with definitions and proofs) in the reader.

These lecture notes provide a mathematical introduction to multi-agent dynamical systems, including their analysis via algebraic graph theory and their application to engineering design problems. The focus is on fundamental dynamical phenomena over interconnected network systems, including consensus and disagreement in averaging systems, stable equilibria in compartmental flow networks, and synchronization in coupled oscillators and networked control systems. The theoretical results are complemented by numerous examples arising from the analysis of physical and natural systems and from the design of network

estimation, control, and optimization systems.

Networks pervade social and economic life, and they play a prominent role in explaining a huge variety of social and economic phenomena. Standard economic theory did not give much credit to the role of networks until the early 1990s, but since then the study of the theory of networks has blossomed. At the heart of this research is the idea that the pattern of connections between individual rational agents shapes their actions and determines their rewards. The importance of connections has in turn motivated the study of the very processes by which networks are formed. In Connections, Sanjeev Goyal puts contemporary thinking about networks and economic activity into context. He develops a general framework within which this body of research can be located. In the first part of the book he demonstrates that location in a network has significant effects on individual rewards and that, given this, it is natural that individuals will seek to form connections to move the network in their favor. This idea motivates the second part of the book, which develops a general theory of network formation founded on individual incentives. Goyal assesses the robustness of current research findings and identifies the substantive open questions. Written in a style that combines simple examples with formal models and complete mathematical proofs, Connections is a concise and self-contained treatment of the economic theory of networks, one that should become the natural source of reference for graduate students in economics and related disciplines.

Integrates social media, social network analysis, and data mining to provide an understanding of the potentials of social media mining.

Never HIGHLIGHT a Book Again Includes all testable terms, concepts, persons, places, and events. Cram101 Just the FACTS101 studyguides gives all of the outlines, highlights, and quizzes for your textbook with optional online comprehensive practice tests. Only Cram101 is Textbook Specific. Accompanies: 9780872893795. This item is printed on demand.

Multilayer networks is a rising topic in Network Science which characterizes the structure and the function of complex systems formed by several interacting networks. Multilayer networks research has been propelled forward by the wide realm of applications in social, biological and infrastructure networks and the large availability of network data, as well as by the significance of recent results, which have produced important advances in this rapidly growing field. This book presents a comprehensive account of this emerging field. It provides a theoretical introduction to the main results of multilayer network science.

What does the Web look like? How can we find patterns, communities, outliers, in a social network? Which are the most central nodes in a network? These are the questions that motivate this work. Networks and graphs appear in many diverse settings, for example in social networks, computer-communication networks (intrusion detection, traffic management), protein-protein interaction networks in biology, document-text bipartite graphs in text retrieval, person-account graphs in financial fraud detection, and others. In this work, first we list several surprising patterns that real graphs tend to follow. Then we give a detailed list of generators that try to mirror these patterns. Generators are important, because they can help with "what if" scenarios, extrapolations, and anonymization. Then we provide a list of powerful tools for graph analysis, and specifically spectral methods (Singular Value Decomposition (SVD)), tensors, and case studies like the famous "pageRank" algorithm and the "HITS" algorithm for ranking web search results. Finally, we conclude with a survey of tools and observations from related fields like sociology, which provide complementary viewpoints. Table of Contents: Introduction / Patterns in Static Graphs / Patterns in Evolving Graphs / Patterns in Weighted Graphs / Discussion: The Structure of Specific Graphs / Discussion: Power Laws and Deviations / Summary of Patterns / Graph Generators / Preferential Attachment and Variants / Incorporating Geographical Information / The RMat / Graph Generation by Kronecker Multiplication / Summary and Practitioner's Guide / SVD, Random Walks, and Tensors / Tensors / Community Detection / Influence/Virus Propagation and Immunization / Case Studies / Social Networks / Other Related Work / Conclusions

This 1982 book is an account of an alternative way of thinking about evolution and the theory of games.

Are all film stars linked to Kevin Bacon? Why do the stock markets rise and fall sharply on the strength of a vague rumour? How does gossip spread so quickly? Are we all related through six degrees of separation? There is a growing awareness of the complex networks that pervade modern society. We see them in the rapid growth of the Internet, the ease of global communication, the swift spread of news and information, and in the way epidemics and financial crises develop with startling speed and intensity. This introductory book on the new science of networks takes an interdisciplinary approach, using economics, sociology, computing, information science and applied mathematics to address fundamental questions about the links that connect us, and the ways that our decisions can have consequences for others.

This book contains a selection of articles from The 2014 World Conference on Information Systems and Technologies (WorldCIST'14), held between the 15th and 18th of April in Funchal, Madeira, Portugal, a global forum for researchers and practitioners to present and discuss recent results and innovations, current trends, professional experiences and challenges of modern Information Systems and Technologies research, technological development and applications. The main topics covered are: Information and Knowledge Management; Organizational Models and Information Systems; Intelligent and Decision Support Systems; Software Systems, Architectures, Applications and Tools; Computer Networks, Mobility and Pervasive Systems; Radar Technologies; Human-Computer Interaction; Health Informatics and Information Technologies in Education.

Social network analysis is used widely in the social and behavioral sciences, as well as in economics, marketing, and industrial engineering. The social network perspective focuses on relationships among social entities and is an important addition to standard social and behavioral research, which is primarily concerned with attributes of the social units. Social Network Analysis: Methods and Applications reviews and discusses methods for the analysis of social networks with a focus on applications of these methods to many substantive examples. It is a reference book that can be used by those who want a comprehensive review of network methods, or by researchers who have gathered network data and want to find the most appropriate method by which to analyze it. It is also intended for use as a textbook as it is the first book to provide comprehensive coverage of the methodology and applications of the field.

August 6, 2009 Author, Jon Kleinberg, was recently cited in the New York Times for his statistical analysis research in the Internet age. Algorithm Design introduces algorithms by looking at the real-world problems that motivate them. The book teaches students a range of design and analysis techniques for problems that arise in computing applications. The text encourages an understanding of the algorithm design process and an appreciation of the role of algorithms in the broader field of computer science.

In this fascinating book, New Yorker business columnist James Surowiecki explores a deceptively simple idea: Large groups of people are smarter than an elite few, no matter how brilliant—better at solving problems, fostering innovation, coming to wise decisions, even predicting the future. With boundless erudition and in delightfully clear prose, Surowiecki ranges across fields as diverse as popular culture, psychology, ant biology, behavioral economics, artificial intelligence, military history, and politics to show how this simple idea offers important lessons for how we live our lives, select our leaders, run our companies, and think about our world.

In the race to compete in today's fast-moving markets, large enterprises are busy adopting new technologies for creating new products,

processes, and business models. But one obstacle on the road to digital transformation is placing too much emphasis on technology, and not enough on the types of processes technology enables. What if different lines of business could build their own services and applications—and decision-making was distributed rather than centralized? This report explores the concept of a digital business platform as a way of empowering individual business sectors to act on data in real time. Much innovation in a digital enterprise will increasingly happen at the edge, whether it involves business users (from marketers to data scientists) or IoT devices. To facilitate the process, your core IT team can provide these sectors with the digital tools they need to innovate quickly. This report explores: Key cultural and organizational changes for developing business capabilities through cross-functional product teams A platform for integrating applications, data sources, business partners, clients, mobile apps, social networks, and IoT devices Creating internal API programs for building innovative edge services in low-code or no-code environments Tools including Integration Platform as a Service, Application Platform as a Service, and Integration Software as a Service The challenge of integrating microservices and serverless architectures Event-driven architectures for processing and reacting to events in real time You'll also learn about a complete pervasive integration solution as a core component of a digital business platform to serve every audience in your organization.

This volume bears on wireless network modeling and performance analysis. The aim is to show how stochastic geometry can be used in a more or less systematic way to analyze the phenomena that arise in this context. It first focuses on medium access control mechanisms used in ad hoc networks and in cellular networks. It then discusses the use of stochastic geometry for the quantitative analysis of routing algorithms in mobile ad hoc networks. The appendix also contains a concise summary of wireless communication principles and of the network architectures considered in the two volumes.

#NOT a real book (Just a screed) Does all the hype surrounding social media make sense? Isn't it time that somebody tried to deconstruct all this bullshit? What are social media? Are they the same websites we used to call social networks? Why did we start calling them social media? What is social media marketing? Are companies doing it right? Does it make sense to send your website visitors to Twitter and Facebook? Do people really want to "engage" with brands? Do companies really want to have "conversations" with their customers? What is the value of a Facebook "like"? What is "organic reach"? What happens now that the free lunch is over? - - - The 15 Questions: 1. What are social networks? 2. What are social media? 3. What is social media marketing? 4. Are companies doing it right? 5. Why are companies sending people over to social media? 6. Does it make sense? 7. Do people really want to engage with brands? 8. Do companies really want to engage with their companies? 9. Are social media useful for customer service? 10. What is the value of a Facebook "like"? 11. What does "earned media" mean? 12. What is "organic reach"? 13. Is the free lunch over? 14. What happens now? 15. What is the dumbest social media stunt ever? - - - Download it now: it's a smart 15 minutes' read.

In recent years there has been an explosion of network data – that is, measu- ments that are either of or from a system conceptualized as a network – from se- ingly all corners of science. The combination of an increasingly pervasive interest in scienti c analysis at a systems level and the ever-growing capabilities for hi- throughput data collection in various elds 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 c- lection 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 speci c 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 ll 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.

Feng-hsiung Hsu provides a behind-the-scenes look at the two matches between the Deep Blue chess machine and world champion Garry Kasparov, and discusses his quest to develop the machine at IBM's T.J. Watson Research Center.

Here is a fresh, intriguing, and, above all, authoritative book about how our sometimes hidden positions in various social structures—our human networks—shape how we think and behave, and inform our very outlook on life. Inequality, social immobility, and political polarization are only a few crucial phenomena driven by the inevitability of social structures. Social structures determine who has power and influence, account for why people fail to assimilate basic facts, and enlarge our understanding of patterns of contagion—from the spread of disease to financial crises. Despite their primary role in shaping our lives, human networks are often overlooked when we try to account for our most important political and economic practices. Matthew O. Jackson brilliantly illuminates the complexity of the social networks in which we are—often unwittingly—positioned and aims to facilitate a deeper appreciation of why we are who we are. Ranging across disciplines—psychology, behavioral economics, sociology, and business—and rich with historical analogies and anecdotes, The Human Network provides a galvanizing account of what can drive success or failure in life.

Discover how graph databases can help you manage and query highly connected data. With this practical book, you'll learn how to design and implement a graph database that brings the power of graphs to bear on a broad range of problem domains. Whether you want to speed up your response to user queries or build a database that can adapt as your business evolves, this book shows you how to apply the schema-free graph model to real-world problems. Learn how different organizations are using graph databases to outperform their competitors. With this book's data modeling, query, and code examples, you'll quickly be able to implement your own solution. Model data with the Cypher query language and property graph model Learn best practices and common pitfalls when modeling with graphs Plan and implement a graph database solution in test-driven fashion Explore real-world examples to learn how and why

organizations use a graph database Understand common patterns and components of graph database architecture Use analytical techniques and algorithms to mine graph database information

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