Networks An Introduction Mark Newman Mybrandore

NetworksLectures on Complex NetworksIntroduction to Human Geography: A Disciplinary ApproachNetworks, Crowds, and MarketsNetwork Science In EducationComplex NetworksNetwork ScienceGuide To Temporal Networks, A (Second Edition)Introduction to Networks Companion GuideThe Structure of Complex NetworksThe Structure and Dynamics of NetworksWorking-Class Network SocietyData Science and Complex NetworksUnderstanding IPTVGraph Theory and Complex NetworksNetwork MedicineMicrophysics of Clouds and PrecipitationMultilayer NetworksComputational PhysicsSocial and Economic NetworksIntroduction to Languages and the Theory of ComputationLinkedThe Economics of NetworksEvolution of NetworksA First Course in Network TheoryNetworksHandbook of Graphs and NetworksNetworks in Cell BiologySix Degrees: The Science of a Connected AgeNetworksThe Wealth of NetworksStatistical Analysis of Network Data with RA First Course in Network ScienceComplex Network Analysis in PythonCausation and CounterfactualsNexus: Small Worlds and the Groundbreaking Theory of NetworksScale-Free NetworksDynamical Processes on Complex NetworksFundamentals of Brain Network Analysis

Networks

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.

Lectures on Complex Networks

A collection of important recent work on thecounterfactual analysis of causation.

Introduction to Human Geography: A Disciplinary Approach

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.

Networks, Crowds, and Markets

From the Internet to networks of friendship, disease transmission, and even terrorism, the concept--and the reality--of networks has come to pervade modern society. But what exactly is a network? What different types of networks are there? Why are they interesting, and what can they tell us? In recent years, scientists from a range of fields--including mathematics, physics, computer science, sociology, and biology--have been pursuing these questions and building a new "science of networks." This book brings together for the first time a set of seminal articles representing research from across these disciplines. It is an ideal sourcebook for the key research in this fast-growing field. The book is organized into four sections, each preceded by an editors' introduction summarizing its contents and general theme. The first section sets the stage by discussing some of the historical antecedents of contemporary research in the area. From there the book moves to the empirical side of the science of networks before turning to the foundational modeling ideas that have been the focus of much subsequent activity. The book closes by taking the reader to the cutting edge of network science--the

relationship between network structure and system dynamics. From network robustness to the spread of disease, this section offers a potpourri of topics on this rapidly expanding frontier of the new science.

Network Science In Education

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.

Complex Networks

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

Network Science

In the 1980's, James Gleick's Chaos introduced the world to complexity. Now, Albert-László Barabási's Linked reveals the next major scientific leap: the study of networks. We've long suspected that we live in a small world, where everything is connected to everything else. Indeed, networks are pervasive--from the human brain to the Internet to the economy to our group of friends. These linkages, it turns out, aren't random. All networks, to the great surprise of scientists, have an underlying order and follow simple laws. Understanding the structure and behavior of these networks will help us do some amazing things, from designing the optimal organization of a firm to stopping a disease outbreak before it spreads catastrophically.In Linked, Barabási, a physicist whose work has revolutionized the study of networks, traces the development of this rapidly unfolding science and introduces us to the scientists carrying out this pioneering work. These "new

cartographers" are mapping networks in a wide range of scientific disciplines, proving that social networks, corporations, and cells are more similar than they are different, and providing important new insights into the interconnected world around us. This knowledge, says Barabási, can shed light on the robustness of the Internet, the spread of fads and viruses, even the future of democracy. Engaging and authoritative, Linked provides an exciting preview of the next century in science, guaranteed to be transformed by these amazing discoveries.From Linked:This book has a simple message: think networks. It is about how networks emerge, what they look like, and how they evolve. It aims to develop a web-based view of nature, society, and technology, providing a unified framework to better understand issues ranging from the vulnerability of the Internet to the spread of diseases. Networks are present everywhere. All we need is an eye for themWe will see the challenges doctors face when they attempt to cure a disease by focusing on a single molecule or gene, disregarding the complex interconnected nature of the living matter. We will see that hackers are not alone in attacking networks: we all play Goliath, firing shots at a fragile ecological network that, without further support, could soon replicate our worst nightmares by turning us into an isolated group of speciesLinked is meant to be an eye-opening trip that challenges you to walk across disciplines by stepping out of the box of reductionism. It is an invitation to explore link by link the next scientific revolution: the new science of networks.

Guide To Temporal Networks, A (Second Edition)

Fundamentals of Brain Network Analysis is a comprehensive and accessible introduction to methods for unraveling the extraordinary complexity of neuronal connectivity. From the perspective of graph theory and network science, this book introduces, motivates and explains techniques for modeling brain networks as graphs of nodes connected by edges, and covers a diverse array of measures for quantifying their topological and spatial organization. It builds intuition for key concepts and methods by illustrating how they can be practically applied in diverse areas of neuroscience, ranging from the analysis of synaptic networks in the nematode worm to the characterization of large-scale human brain networks constructed with magnetic resonance imaging. This text is ideally suited to neuroscientists wanting to develop expertise in the rapidly developing field of neural connectomics, and to physical and computational scientists wanting to understand how these quantitative methods can be used to understand brain organization. Extensively illustrated throughout by graphical representations of key mathematical concepts and their practical applications to analyses of nervous systems Comprehensively covers graph theoretical analyses of structural and functional brain networks, from microscopic to macroscopic scales, using examples based on a wide variety of experimental methods in neuroscience Designed to inform and empower scientists at all levels of experience, and from any specialist background, wanting to use modern methods of network science to understand the

organization of the brain

Introduction to Networks Companion Guide

Networks constitute the backbone of complex systems, from the human brain to computer communications, transport infrastructures to online social systems and metabolic reactions to financial markets. Characterising their structure improves our understanding of the physical, biological, economic and social phenomena that shape our world. Rigorous and thorough, this textbook presents a detailed overview of the new theory and methods of network science. Covering algorithms for graph exploration, node ranking and network generation, among others, the book allows students to experiment with network models and real-world data sets, providing them with a deep understanding of the basics of network theory and its practical applications. Systems of growing complexity are examined in detail, challenging students to increase their level of skill. An engaging presentation of the important principles of network science makes this the perfect reference for researchers and undergraduate and graduate students in physics, mathematics, engineering, biology, neuroscience and the social sciences.

The Structure of Complex Networks

Describes how patterns of information, knowledge, and cultural production are changing. The author shows that the way information and knowledge are made available can either limit or enlarge the ways people create and express themselves. He describes the range of legal and policy choices that confront.

The Structure and Dynamics of Networks

Introduction to Languages and the Theory of Computation is an introduction to the theory of computation that emphasizes formal languages, automata and abstract models of computation, and computability; it also includes an introduction to computational complexity and NP-completeness. Through the study of these topics, students encounter profound computational questions and are introduced to topics that will have an ongoing impact in computer science. Once students have seen some of the many diverse technologies contributing to computer science, they can also begin to appreciate the field as a coherent discipline. A distinctive feature of this text is its gentle and gradual introduction of the necessary mathematical tools in the context in which they are used. Martin takes advantage of the clarity and precision of mathematical language but also provides discussion and examples that make the language intelligible to those just learning to read and speak it. The material is designed to be accessible to students who do not have a strong background in discrete mathematics, but it is also appropriate for students who have had some exposure to discrete math but whose skills in this

area need to be consolidated and sharpened.

Working-Class Network Society

This book provides a comprehensive yet short description of the basic concepts of Complex Network theory. In contrast to other books the authors present these concepts through real case studies. The application topics span from Foodwebs, to the Internet, the World Wide Web and the Social Networks, passing through the International Trade Web and Financial time series. The final part is devoted to definition and implementation of the most important network models. The text provides information on the structure of the data and on the quality of available datasets. Furthermore it provides a series of codes to allow immediate implementation of what is theoretically described in the book. Readers already used to the concepts introduced in this book can learn the art of coding in Python by using the online material. To this purpose the authors have set up a dedicated web site where readers can download and test the codes. The whole project is aimed as a learning tool for scientists and practitioners, enabling them to begin working instantly in the field of Complex Networks.

Data Science and Complex Networks

Key introductory text for graduate students and researchers in physics, biology and biochemistry.

Understanding IPTV

The book integrates approaches from mathematics, physics and computer sciences to analyse the organisation of complex networks. Every organisational principle of networks is defined, quantified and then analysed for its influences on the properties and functions of molecular, biological, ecological and social networks.

Graph Theory and Complex Networks

This book explains the fundamentals of computational physics and describes the techniques that every physicist should know, such as finite difference methods, numerical quadrature, and the fast Fourier transform. The book offers a complete introduction to the topic at the undergraduate level, and is also suitable for the advanced student or researcher. The book begins with an introduction to Python, then moves on to a step-by-step description of the techniques of computational

physics, with examples ranging from simple mechanics problems to complex calculations in quantum mechanics, electromagnetism, statistical mechanics, and more.

Network Medicine

Around the globe, there is an increasingly urgent need to provide opportunities for learners to embrace complexity; to develop the many skills and habits of mind that are relevant to today's complex and interconnected world; and to make learning more connected to our rapidly changing workplace and society. This presents an opportunity to (1) leverage new paradigms for understanding the structure and function of teaching and learning communities, and (2) to promote new approaches to developing methods, curricular materials, and resources. Network science - the study of connectivity - can play an important role in these activities, both as an important subject in teaching and learning and as a way to develop interconnected curricula. Since 2010, an international community of network science researchers and educators has come together to raise the global level of network literacy by applying ideas from network science to teaching and learning. Network Science in Education - which refers to both this community and to its activities - has evolved in response to the escalating activity in the field of network science and the need for people to be able to access the field through education channels. Network Science In Education: Transformational Approaches in Teaching

and Learning appeals to both instructors and professionals, while offering case studies from a wide variety of activities that have been developed around the globe: the creation of entirely new courses and degree programs; tools for K-20 learners, teachers, and the general public; and in-depth analysis of selected programs. As network-based pedagogy and the community of practice continues to grow, we hope that the book's readers will join this vibrant network education community to build on these nascent ideas and help deepen the understanding of networks for all learners.

Microphysics of Clouds and Precipitation

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.

Multilayer Networks

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.

Computational Physics

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.

Social and Economic Networks

Introduction to Networks Companion Guide is the official supplemental textbook for the Introduction to Networks course in the Cisco® Networking Academy® CCNA® Routing and Switching curriculum. The course introduces the architecture, structure, functions, components, and models of the Internet and computer networks. The principles of IP addressing and fundamentals of Ethernet concepts, media, and operations are introduced to provide a foundation for the curriculum. By the end of the course, you will be able to build simple LANs, perform basic configurations for routers and switches, and implement IP addressing schemes. The Companion Guide is designed as a portable desk reference to use anytime, anywhere to reinforce the material from the course and organize your time. The book's features help you focus on important concepts to succeed in this course: Chapter Objectives–Review core concepts by answering the focus questions listed at the beginning of each chapter. Key Terms–Refer to the lists of networking

vocabulary introduced and highlighted in context in each chapter. Glossary–Consult the comprehensive Glossary with more than 195 terms. Summary of Activities and Labs–Maximize your study time with this complete list of all associated practice exercises at the end of each chapter. Check Your Understanding–Evaluate your readiness with the end-of-chapter questions that match the style of questions you see in the online course quizzes. The answer key explains each answer. Related Title: Introduction to Networks Lab Manual ISBN-10: 1-58713-312-1 ISBN-13: 978-1-58713-312-1 How To–Look for this icon to study the steps you need to learn to perform certain tasks. Interactive Activities–Reinforce your understanding of topics with more than 50 different exercises from the online course identified throughout the book with this icon. Videos–Watch the videos embedded within the online course. Packet Tracer Activities–Explore and visualize networking concepts using Packet Tracer exercises interspersed throughout the chapters. Hands-on Labs–Work through all 66 course labs and Class Activities that are included in the course and published in the separate Lab Manual. This book is part of the Cisco Networking Academy Series from Cisco Press®. Books in this series support and complement the Cisco Networking Academy curriculum.

Introduction to Languages and the Theory of Computation

Driven by a combination of technological improvements and commercial pressure, interest in IPTV services has increasingly grown. IPTV refers to the use of the

Internet protocol required for delivery of television content. IPTV represents an emerging technology that could change the manner in which homes receive entertainment, personal computers operate, and people use cell phones. Beginning with a comprehensive introduction, Understanding IPTV examines concepts, applications, and possible impacts of IPTV. The book covers market drivers and developing IPTV infrastructure. It explains television concepts, including several popular compression standards, and considers the TCP/IP protocol suite. It also identifies so-called "last mile" solutions and details the operation and utilization of hardware and software components required to view television content delivered over different types of IP networks. The author addresses the industry players and alliances, providing an understanding of companies that are working with the technology. Concluding with examples of the use of IPTV, he illustrates the potential of this evolving technology. Exploring the current state of the IPTV market, business opportunities, and trial services worldwide, Understanding IPTV discusses the advantages that IPTV offers network operators and the new revenue streams that may emerge. It presents different IPTV technologies and the products that manufacturers are bringing to the market.

Linked

Illustrated throughout in full colour, this pioneering text is the only book you need for an introduction to network science.

The Economics of Networks

Complex interacting networks are observed in systems from such diverse areas as physics, biology, economics, ecology, and computer science. For example, economic or social interactions often organize themselves in complex network structures. Similar phenomena are observed in traffic flow and in communication networks as the internet. In current problems of the Biosciences, prominent examples are protein networks in the living cell, as well as molecular networks in the genome. On larger scales one finds networks of cells as in neural networks, up to the scale of organisms in ecological food webs. This book defines the field of complex interacting networks in its infancy and presents the dynamics of networks and their structure as a key concept across disciplines. The contributions present common underlying principles of network dynamics and their theoretical description and are of interest to specialists as well as to the non-specialized reader looking for an introduction to this new exciting field. Theoretical concepts include modeling networks as dynamical systems with numerical methods and new graph theoretical methods, but also focus on networks that change their topology as in morphogenesis and self-organization. The authors offer concepts to model network structures and dynamics, focussing on approaches applicable across disciplines.

Evolution of Networks

As Chaos explained the science of disorder, Nexus reveals the new science of connection and the odd logic of six degrees of separation. "If you ever wanted to know how many links connect you and the Pope, or why when the U.S. Federal Reserve Bank sneezes the global economy catches cold, read this book," writes John L. Casti (Santa Fe Institute). This "cogent and engaging" (Nature) work presents the fundamental principles of the emerging field of "small-worlds" theory—the idea that a hidden pattern is the key to how networks interact and exchange information, whether that network is the information highway or the firing of neurons in the brain. Mathematicians, physicists, computer scientists, and social scientists are working to decipher this complex organizational system, for it may yield a blueprint of dynamic interactions within our physical as well as social worlds. Highlighting groundbreaking research behind network theory, "Mark Buchanan's graceful, lucid, nontechnical and entertaining prose" (Mark Granovetter) documents the mounting support among various disciplines for the small-worlds idea and demonstrates its practical applications to diverse problems—from the volatile global economy or the Human Genome Project to the spread of infectious disease or ecological damage. Nexus is an exciting introduction to the hidden geometry that weaves our lives so inextricably together.

A First Course in Network Theory

We live in a world of networks, where everything is amazingly close to everything else. The notion of 'network' turns out to be central to our times: the Internet and WWW are changing our lives; our physical existence is based on various biological networks; we are involved in all-enveloping networks of economic and social relations. Only in the 1990s did physicists begin to explore real networks, both natural and artificial, as evolving systems with intriguingly complex and effective architectures. Progress has been so immediate and astounding that we actually face a new science based on a new set of concepts, and, one may even say, on a new philosophy: the natural philosophy of a small world. Old ideas from mathematics, statistical physics, biology, computer science, and so on take on quite new forms in applications to real evolving networks. - What is common to all networks? - What are the general principles of the organization and evolution of networks? - How do the laws of nature work in communication, biological, and social networks? - What are networks? This book, written by physicists, answers these questions and presents a general insight into the world of networks.

Networks

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.

Handbook of Graphs and Networks

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.

Networks in Cell Biology

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.

Six Degrees: The Science of a Connected Age

Networks have permeated everyday life through everyday realities like the Internet, social networks, and viral marketing. As such, network analysis is an important growth area in the quantitative sciences, with roots in social network analysis going back to the 1930s and graph theory going back centuries. Measurement and analysis are integral components of network research. As a result, statistical methods play a critical role in network analysis. This book is the first of its kind in network research. It can be used as a stand-alone resource in which multiple R packages are used to illustrate how to conduct a wide range of network analyses, from basic manipulation and visualization, to summary and characterization, to modeling of network data. The central package is igraph, which provides extensive capabilities for studying network graphs in R. This text builds on Eric D. Kolaczyk's book Statistical Analysis of Network Data (Springer, 2009).

Networks

The Wealth of Networks

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.

Statistical Analysis of Network Data with R

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.

A First Course in Network Science

Many different systems both in nature and in technology can be described by means of networks of interconnected components. Despite their different aspects, all of them share similar mathematical properties. In this book we explain how to recognize these features and why these different systems develop this common structure.

Complex Network Analysis in Python

Networks have a widespread economic significance. They structure the way that market traders interact and configure relations within and between social groups, urban centres and nation states. This work on the economics of networks is suitable for researchers in microeconomics, spatial and business economics.

Causation and Counterfactuals

Cloud physics has achieved such a voluminous literature over the past few decades that a significant quantitative study of the entire field would prove unwieldy. This book concentrates on one major aspect: cloud microphysics, which involves the processes that lead to the formation of individual cloud and

precipitation particles. Common practice has shown that one may distinguish among the following addi tional major aspects: cloud dynamics, which is concerned with the physics respon sible for the macroscopic features of clouds; cloud electricity, which deals with the electrical structure of clouds and the electrification processes of cloud and precipi tation particles; and cloud optics and radar meteorology, which describe the effects of electromagnetic waves interacting with clouds and precipitation. Another field intimately related to cloud physics is atmospheric chemistry, which involves the chemical composition ofthe atmosphere and the life cycle and characteristics of its gaseous and particulate constituents. In view of the natural interdependence of the various aspects of cloud physics, the subject of microphysics cannot be discussed very meaningfully out of context. Therefore, we have found it necessary to touch briefly upon a few simple and basic concepts of cloud dynamics and thermodynamics, and to provide an account of the major characteristics of atmospheric aerosol particles. We have also included a separate chapter on some of the effects of electric fields and charges on the precipitation-forming processes.

Nexus: Small Worlds and the Groundbreaking Theory of 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.

Scale-Free Networks

An examination of how the availability of low-end information and communication technology has provided a basis for the emergence of a working-class network society in China. The idea of the "digital divide," the great social division between information haves and have-nots, has dominated policy debates and scholarly analysis since the 1990s. In Working-Class Network Society, Jack Linchuan Qiu describes a more complex social and technological reality in a newly mobile, urbanizing China. Qiu argues that as inexpensive Internet and mobile phone services become available and are closely integrated with the everyday work and life of low-income communities, they provide a critical seedbed for the emergence of a new working class of "network labor" crucial to China's economic boom.

Between the haves and have-nots, writes Qiu, are the information "have-less": migrants, laid-off workers, micro-entrepreneurs, retirees, youth, and others, increasingly connected by cybercafés, prepaid service, and used mobile phones. A process of class formation has begun that has important implications for working-class network society in China and beyond. Qiu brings class back into the scholarly discussion, not as a secondary factor but as an essential dimension in our understanding of communication technology as it is shaped in the vast, industrializing society of China. Basing his analysis on his more than five years of empirical research conducted in twenty cities, Qiu examines technology and class, networked connectivity and public policy, in the context of massive urban reforms that affect the new working class disproportionately. The transformation of Chinese society, writes Qiu, is emblematic of the new technosocial reality emerging in much of the Global South.

Dynamical Processes on Complex Networks

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.

Fundamentals of Brain Network Analysis

The study of networks, including computer networks, social networks, and biological networks, has attracted enormous 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 an unprecedented scale, and the development of new theoretical tools has allowed us to extract knowledge from networks of many different kinds. The study of networks is broadly interdisciplinary and central developments have occurred in many fields, including mathematics, physics, computer and information sciences, biology, and the social sciences. This book brings together 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. Topics covered include the measurement of networks; methods for analyzing network data, including methods developed in physics, statistics, and sociology; fundamentals of graph theory; computer algorithms; mathematical models of networks, including random graph models and generative models; and theories of dynamical processes taking place on networks.

ROMANCE ACTION & ADVENTURE MYSTERY & THRILLER BIOGRAPHIES & HISTORY CHILDREN'S YOUNG ADULT FANTASY HISTORICAL FICTION HORROR LITERARY FICTION NON-FICTION SCIENCE FICTION