Mathematical Foundations Of Computer Networking

This distinctly accessible introduction to wavelets provides computer graphics professionals and researchers with the mathematical foundations for understanding and applying this powerful tool. Wavelets are rapidly becoming a core technique in computer graphics, with applications for Image editing and compression Automatic level-of-detail control for editing and rendering curves and surfaces Surface reconstruction from contours Physical simulation for global illumination and animation Stressing intuition and clarity, this book offers a solid understanding of the theory of wavelets and their proven applications in computer graphics. Although previous introductions to wavelets have presented an elegant mathematical framework, that framework is too restrictive to apply to many problems in graphics. In contrast, this book focuses on a generalized theory that naturally accommodates the kinds of objects that commonly arise in computer graphics, including images, open curves, and surfaces of arbitrary topology. This book also contains a foreword by Ingrid Daubechies and an appendix covering the necessary background material in linear algebra.

This book constitutes the refereed post-proceedings of the Second International Conference on Theoretical and Mathematical Foundations of Computer Science,

ICTMF 2011, held in Singapore in May 2011. The conference was held together with the Second International Conference on High Performance Networking, Computing, and Communication systems, ICHCC 2011, which proceedings are published in CCIS 163. The 84 revised selected papers presented were carefully reviewed and selected for inclusion in the book. The topics covered range from computational science, engineering and technology to digital signal processing, and computational biology to game theory, and other related topices.

Mathematical Foundations of Computer NetworkingPearson Education

This volume constitutes the refereed proceedings of the International Conference on High Performance Networking, Computing and Communication Systems, and the International Conference on Theoretical and Mathematical Foundations of Computer Science (ICHCC -ICTMF 2009), held in Sanya, Hainan Island, China, in December 2009. The 15 revised full papers presented were carefully reviewed and selected out of 60 submissions. They range on the various aspects of advances in High Performance Networking, Computing, Communication Systems and Mathematical Foundations.

This volume contains the papers presented at the 29th Symposium on Mat- matical Foundations of Computer Science, MFCS 2004, held in Prague, Czech Republic, August 22–27, 2004. The conference was organized by the Institute for

Theoretical Computer Science (ITI) and the Department of Theoretical Com-terScienceandMathematicalLogic(KTIML)oftheFacultyofMathematicsand Physics of Charles University in Prague. It was supported in part by the Eu- pean Association for Theoretical Computer Science (EATCS) and the European Research Consortium for Informatics and Mathematics (ERCIM). Traditionally, the MFCS symposia encourage high-quality research in all branches of theoretical computer science. Ranging in scope from automata, f- mal languages, data structures, algorithms and computational geometry to c-plexitytheory,modelsofcomputation,andapplicationsincludingcomputational biology, cryptography, security and arti?cial intelligence, the conference o?ers a unique opportunity to researchers from diverse areas to meet and present their results to a general audience. The scienti?c program of this year's MFCS took place in the lecture halls of the recently reconstructed building of the Faculty of Mathematics and P- sics in the historical center of Prague, with the famous Prague Castle and other celebratedhistoricalmonumentsinsight.Theviewfromthewindowswasach-lengingcompetitionforthespeakersinthe?ghtfortheattentionoftheaudience. But we did not fear the result: Due to the unusually tough competition for this year's MFCS, the admitted presentations certainly attracted considerable in- rest. The

conference program (and the proceedings) consisted of 60 contributed papers selected by the Program Committee from a total of 167 submissions.
"To design future networks that are worthy of society's trust, we must put the 'discipline' of computer networking on a much stronger foundation. This book rises above the considerable minutiae of today's networking technologies to emphasize the long-standing mathematical underpinnings of the field." -Professor Jennifer Rexford, Department of Computer Science, Princeton University "This book is exactly the one I have been waiting for the last couple of years. Recently, I decided most students were already very familiar with the way the net works but were not being taught the fundamentals-the math. This book contains the knowledge for people who will create and understand future communications systems." -Professor Jon Crowcroft, The Computer Laboratory, University of Cambridge The Essential Mathematical Principles Required to Design, Implement, or Evaluate Advanced Computer Networks Students, researchers, and professionals in computer networking require a firm conceptual understanding of its foundations. Mathematical Foundations of Computer Networking provides an intuitive yet rigorous introduction to these essential mathematical principles and techniques. Assuming a basic grasp of calculus, this book offers sufficient detail to serve as the only reference many readers will

need. Each concept is described in four ways: intuitively; using appropriate mathematical notation; with a numerical example carefully chosen for its relevance to networking; and with a numerical exercise for the reader. The first part of the text presents basic concepts, and the second part introduces four theories in a progression that has been designed to gradually deepen readers' understanding. Within each part, chapters are as self-contained as possible. The first part covers probability; statistics; linear algebra; optimization; and signals, systems, and transforms. Topics range from Bayesian networks to hypothesis testing, and eigenvalue computation to Fourier transforms. These preliminary chapters establish a basis for the four theories covered in the second part of the book: queueing theory, game theory, control theory, and information theory. The second part also demonstrates how mathematical concepts can be applied to issues such as contention for limited resources, and the optimization of network responsiveness, stability, and throughput.

This open access book constitutes the proceedings of the 23rd International Conference on Foundations of Software Science and Computational Structures, FOSSACS 2020, which took place in Dublin, Ireland, in April 2020, and was held as Part of the European Joint Conferences on Theory and Practice of Software, ETAPS 2020. The 31 regular papers presented in this volume were carefully

reviewed and selected from 98 submissions. The papers cover topics such as categorical models and logics; language theory, automata, and games; modal, spatial, and temporal logics; type theory and proof theory; concurrency theory and process calculi; rewriting theory; semantics of programming languages; program analysis, correctness, transformation, and verification; logics of programming; software specification and refinement; models of concurrent, reactive, stochastic, distributed, hybrid, and mobile systems; emerging models of computation; logical aspects of computational complexity; models of software security; and logical foundations of data bases.?

From foundations to state-of-the-art; the tools and philosophy you need to build network models.

This book covers elementary discrete mathematics for computer science and engineering. It emphasizes mathematical definitions and proofs as well as applicable methods. Topics include formal logic notation, proof methods; induction, well-ordering; sets, relations; elementary graph theory; integer congruences; asymptotic notation and growth of functions; permutations and combinations, counting principles; discrete probability. Further selected topics may also be covered, such as recursive definition and structural induction; state machines and invariants; recurrences; generating functions.

“To design future networks that are worthy of society’s trust, we must put the ‘discipline’ of computer networking on a much stronger foundation. This book rises above the considerable minutiae of today’s networking technologies to emphasize the long-standing mathematical underpinnings of the field.” –Professor Jennifer Rexford, Department of Computer Science, Princeton University “This book is exactly the one I have been waiting for the last couple of years. Recently, I decided most students were already very familiar with the way the net works but were not being taught the fundamentals–the math. This book contains the knowledge for people who will create and understand future communications systems." –Professor Jon Crowcroft, The Computer Laboratory, University of Cambridge The Essential Mathematical Principles Required to Design, Implement, or Evaluate Advanced Computer Networks Students, researchers, and professionals in computer networking require a firm conceptual understanding of its foundations. Mathematical Foundations of Computer Networking provides an intuitive yet rigorous introduction to these essential mathematical principles and techniques. Assuming a basic grasp of calculus, this book offers sufficient detail to serve as the only reference many readers will need. Each concept is described in four ways: intuitively; using appropriate mathematical notation; with a numerical example carefully chosen for its

relevance to networking; and with a numerical exercise for the reader. The first part of the text presents basic concepts, and the second part introduces four theories in a progression that has been designed to gradually deepen readers' understanding. Within each part, chapters are as self-contained as possible. The first part covers probability; statistics; linear algebra; optimization; and signals, systems, and transforms. Topics range from Bayesian networks to hypothesis testing, and eigenvalue computation to Fourier transforms. These preliminary chapters establish a basis for the four theories covered in the second part of the book: queueing theory, game theory, control theory, and information theory. The second part also demonstrates how mathematical concepts can be applied to issues such as contention for limited resources, and the optimization of network responsiveness, stability, and throughput.

This edition offers a pedagogically rich and intuitive introduction to discrete mathematics structures. It meets the needs of computer science majors by being both comprehensive and accessible.

Appropriate for a first course on computer networking, this textbook describes the architecture and function of the application, transport, network, and link layers of the internet protocol stack, then examines audio and video networking applications, the underpinnings of encryption and network security, and the key

issues of network management. Th

This book provides an introduction to the mathematical and algorithmic foundations of data science, including machine learning, high-dimensional geometry, and analysis of large networks. Topics include the counterintuitive nature of data in high dimensions, important linear algebraic techniques such as singular value decomposition, the theory of random walks and Markov chains, the fundamentals of and important algorithms for machine learning, algorithms and analysis for clustering, probabilistic models for large networks, representation learning including topic modelling and non-negative matrix factorization, wavelets and compressed sensing. Important probabilistic techniques are developed including the law of large numbers, tail inequalities, analysis of random projections, generalization guarantees in machine learning, and moment methods for analysis of phase transitions in large random graphs. Additionally, important structural and complexity measures are discussed such as matrix norms and VC-dimension. This book is suitable for both undergraduate and graduate courses in the design and analysis of algorithms for data.

This book constitutes the refereed proceedings of the 30th International Symposium on Mathematical Foundations of Computer Science, MFCS 2005, held in Gdansk, Poland in August/September 2005. The 62 revised full papers

presented together with full papers or abstracts of 7 invited talks were carefully reviewed and selected from 137 submissions. All current aspects in theoretical computer science are addressed, ranging from quantum computing, approximation, automata, circuits, scheduling, games, languages, discrete mathematics, combinatorial optimization, graph theory, networking, algorithms, and complexity to programming theory, formal methods, and mathematical logic.
An introduction to computational complexity theory, its connections and interactions with mathematics, and its central role in the natural and social sciences, technology, and philosophy Mathematics and Computation provides a broad, conceptual overview of computational complexity theory—the mathematical study of efficient computation. With important practical applications to computer science and industry, computational complexity theory has evolved into a highly interdisciplinary field, with strong links to most mathematical areas and to a growing number of scientific endeavors. Avi Wigderson takes a sweeping survey of complexity theory, emphasizing the field's insights and challenges. He explains the ideas and motivations leading to key models, notions, and results. In particular, he looks at algorithms and complexity, computations and proofs, randomness and interaction, quantum and arithmetic computation, and cryptography and learning, all as parts of a cohesive whole with numerous cross-influences. Wigderson illustrates the immense breadth of the field, its beauty and richness, and its diverse and growing interactions with other areas of mathematics. He

ends with a comprehensive look at the theory of computation, its methodology and aspirations, and the unique and fundamental ways in which it has shaped and will further shape science, technology, and society. For further reading, an extensive bibliography is provided for all topics covered. Mathematics and Computation is useful for undergraduate and graduate students in mathematics, computer science, and related fields, as well as researchers and teachers in these fields. Many parts require little background, and serve as an invitation to newcomers seeking an introduction to the theory of computation. Comprehensive coverage of computational complexity theory, and beyond High-level, intuitive exposition, which brings conceptual clarity to this central and dynamic scientific discipline Historical accounts of the evolution and motivations of central concepts and models A broad view of the theory of computation's influence on science, technology, and society Extensive bibliography

This book constitutes the refereed proceedings of the 27th International Symposium on Mathematical Foundations of Computer Science, MFCS 2002, held in Warsaw, Poland in August 2002. The 48 revised full papers presented together with 5 invited papers were carefully reviewed and selected from 108 submissions. All relevant aspects of theoretical computer science are addressed, ranging from discrete mathematics, combinatorial optimization, graph theory, algorithms, and complexity to programming theory, formal methods, and mathematical logic.

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.

Numerical Modeling in Science and Engineering Myron B. Allen, George F. Pinder, and Ismael Herrera Emphasizing applications, this treatment combines three traditionally distinct disciplines—continuum mechanics, differential equations, and numerical analysis—to provide a unified treatment of numerical modeling of physical systems. Covers basic equations of macroscopic systems, numerical methods, steady state

systems, dissipative systems, nondissipative systems, and high order, nonlinear, and coupled systems. 1988 (0 471-80635-8) 418 pp. Mathematical Modeling and Digital Simulation for Engineers and Scientists Second Edition Jon M. Smith Totally updated, this Second Edition reflects the many developments in simulation and computer modeling theory and practice that have occurred over the past decade. It includes a new section on the use of modern numerical methods for generating chaos and simulating random processes, a section on simulator verification, and provides applications of these methods for personal computers. Readers will find a wealth of practical fault detection and isolation techniques for simulator verification, fast functions evaluation techniques, and nested parenthetical forms and Chebyshev economization techniques. 1987 (0 471-08599-5) 430 pp. Numerical Analysis 1987 David F. Griffiths and George Alistair Watson An invaluable guide to the direction of current research in many areas of numerical analysis, this volume will be of great interest to anyone involved in software design, curve and surface fitting, the numerical solution of ordinary, partial, and integro-differential equations, and the real-world application of numerical techniques. 1988 (0 470-21012-5) 300 pp.

This volume constitutes the refereed proceedings of the 36th International Symposium on Mathematical Foundations of Computer Science, MFCS 2011, held in Warsaw, Poland, in August 2011. The 48 revised full papers presented together with 6 invited talks were carefully reviewed and selected from 129 submissions. Topics covered

include algorithmic game theory, algorithmic learning theory, algorithms and data structures, automata, grammars and formal languages, bioinformatics, complexity, computational geometry, computer-assisted reasoning, concurrency theory, cryptography and security, databases and knowledge-based systems, formal specifications and program development, foundations of computing, logic in computer science, mobile computing, models of computation, networks, parallel and distributed computing, quantum computing, semantics and verification of programs, and theoretical issues in artificial intelligence.

This book covers the design and optimization of computer networks applying a rigorous optimization methodology, applicable to any network technology. It is organized into two parts. In Part 1 the reader will learn how to model network problems appearing in computer networks as optimization programs, and use optimization theory to give insights on them. Four problem types are addressed systematically – traffic routing, capacity dimensioning, congestion control and topology design. Part 2 targets the design of algorithms that solve network problems like the ones modeled in Part 1. Two main approaches are addressed – gradient-like algorithms inspiring distributed network protocols that dynamically adapt to the network, or cross-layer schemes that coordinate the cooperation among protocols; and those focusing on the design of heuristic algorithms for long term static network design and planning problems. Following a hands-on approach, the reader will have access to a large set of examples in real-life

technologies like IP, wireless and optical networks. Implementations of models and algorithms will be available in the open-source Net2Plan tool from which the user will be able to see how the lessons learned take real form in algorithms, and reuse or execute them to obtain numerical solutions. An accompanying link to the author's own Net2plan software enables readers to produce numerical solutions to a multitude of real-life problems in computer networks (www.net2plan.com).

Cryptography, as done in this century, is heavily mathematical. But it also has roots in what is computationally feasible. This unique textbook text balances the theorems of mathematics against the feasibility of computation. Cryptography is something one actually "does", not a mathematical game one proves theorems about. There is deep math; there are some theorems that must be proved; and there is a need to recognize the brilliant work done by those who focus on theory. But at the level of an undergraduate course, the emphasis should be first on knowing and understanding the algorithms and how to implement them, and also to be aware that the algorithms must be implemented carefully to avoid the "easy" ways to break the cryptography. This text covers the algorithmic foundations and is complemented by core mathematics and arithmetic.

This text for the first or second year undergraduate in mathematics, logic, computer science, or social sciences, introduces the reader to logic, proofs, sets, and number theory. It also serves as an excellent independent study reference and resource for

instructors. Adapted from Foundations of Logic and Mathematics: Applications to Science and Cryptography © 2002 Birkh?user, this second edition provides a modern introduction to the foundations of logic, mathematics, and computers science, developing the theory that demonstrates construction of all mathematics and theoretical computer science from logic and set theory. The focuses is on foundations, with specific statements of all the associated axioms and rules of logic and set theory, and provides complete details and derivations of formal proofs. Copious references to literature that document historical development is also provided. Answers are found to many questions that usually remain unanswered: Why is the truth table for logical implication so unintuitive? Why are there no recipes to design proofs? Where do these numerous mathematical rules come from? What issues in logic, mathematics, and computer science still remain unresolved? And the perennial question: In what ways are we going to use this material? Additionally, the selection of topics presented reflects many major accomplishments from the twentieth century and includes applications in game theory and Nash's equilibrium, Gale and Shapley's match making algorithms, Arrow's Impossibility Theorem in voting, to name a few. From the reviews of the first edition: "...All the results are proved in full detail from first principles...remarkably, the arithmetic laws on the rational numbers are proved, step after step, starting from the very definitions!...This is a valuable reference text and a useful companion for anybody wondering how basic mathematical concepts can be rigorously developed within set

theory." —MATHEMATICAL REVIEWS "Rigorous and modern in its theoretical aspect, attractive as a detective novel in its applied aspects, this paper book deserves the attention of both beginners and advanced students in mathematics, logic and computer sciences as well as in social sciences." —Zentralblatt MATH

Mathematical Foundations for Signal Processing, Communications, and Networking describes mathematical concepts and results important in the design, analysis, and optimization of signal processing algorithms, modern communication systems, and networks. Helping readers master key techniques and comprehend the current research literature, the book offers a comprehensive overview of methods and applications from linear algebra, numerical analysis, statistics, probability, stochastic processes, and optimization. From basic transforms to Monte Carlo simulation to linear programming, the text covers a broad range of mathematical techniques essential to understanding the concepts and results in signal processing, telecommunications, and networking. Along with discussing mathematical theory, each self-contained chapter presents examples that illustrate the use of various mathematical concepts to solve different applications. Each chapter also includes a set of homework exercises and readings for additional study. This text helps readers understand fundamental and advanced results as well as recent research trends in the interrelated fields of signal processing, telecommunications, and networking. It provides all the necessary mathematical background to prepare students for more advanced courses and train

specialists working in these areas.
* Recommended by T.Basar, SC series ed. * This text addresses a new, active area of research and fills a gap in the literature. * Bridges mathematics, engineering, and computer science; considers stochastic and optimization aspects of congestion control in Internet data transfers. * Useful as a supplementary text & reference for grad students with some background in control theory; also suitable for researchers.
This book constitutes the refereed proceedings of the 28th International Symposium on Mathematical Foundations of Computer Science, MFCS 2003, held in Bratislava, Slovakia in August 2003. The 55 revised full papers presented together with 7 invited papers were carefully reviewed and selected from 137 submissions. All current aspects in theoretical computer science are addressed, ranging from discrete mathematics, combinatorial optimization, graph theory, networking, algorithms, and complexity to programming theory, formal methods, and mathematical logic.
Discrete mathematics is fundamental to computer science, and this up-to-date text assists undergraduates in mastering the ideas and mathematical language to address problems that arise in the field's many applications. It consists of 4 units of study: counting and listing, functions, decision trees and recursion, and basic concepts of graph theory.
In this book we attempt to develop the fundamental results of resistive network analysis, based upon a sound mathematical structure. The axioms upon which our

development is based are Ohm's Law, Kirchhoff's Voltage Law, and Kirchhoff's Current Law. In order to state these axioms precisely, and use them in the development of our network analysis, an elaborate mathematical structure is introduced, involving concepts of graph theory, linear algebra, and one dimensional algebraic topology. The graph theory and one dimensional algebraic topology used are developed from first principles; the reader needs no background in these subjects. However, we do assume that the reader has some familiarity with elementary linear algebra. It is now stylish to teach elementary linear algebra at the sophomore college level, and we feel that the require ment that the reader should be familiar with elementary linear algebra is no more demanding than the usual requirement in most electrical engineering texts that the reader should be familiar with calculus. In this book, however, no calculus is needed. Although no formal training in circuit theory is needed for an understanding of the book, such experience would certainly help the reader by presenting him with familiar examples relevant to the mathematical abstractions introduced. It is our intention in this book to exhibit the effect of the topological properties of the network upon the branch voltages and branch currents, the objects of interest in network analysis.

The requirement of causality in system theory is inevitably accompanied by the appearance of certain mathematical operations, namely the Riesz proj- tion,theHilberttransform,andthespectralfactorizationmapping.Aclassical exampleillustratingthisisthedeterminationoftheso-calledWiener?lter(the linear, minimum

means square error estimation ?lter for stationary stochastic sequences [88]). If the ?lter is not required to be causal, the transfer function of the Wiener ?lter is simply given by H(?)=? (?)/? (?),where ? (?) xy xx xx and ? (?) are certain given functions. However, if one requires that the - xy timation ?lter is causal, the transfer function of the optimal ?lter is given by 1 ? (?) xy H(?)= P ,?? (??,?] . + [?] (?) [?] (?) xx + xx? Here [?] and [?] represent the so called spectral factors of ? ,and xx + xx? xx P is the so called Riesz projection. Thus, compared to the non-causal ?lter, + two additional operations are necessary for the determination of the causal ?lter, namely the spectral factorization mapping ? ? ([?] ,[?]),and xx xx + xx? the Riesz projection P .

This book constitutes the refereed proceedings of the 34th International Symposium on Mathematical Foundations of Computer Science, MFCS 2009, held in Novy Smokovec, High Tatras, Slovakia, in August 2009. The 56 revised full papers presented together with 7 invited lectures were carefully reviewed and selected from 148 submissions. All current aspects in theoretical computer science and its mathematical foundations are addressed, including algorithmic game theory, algorithmic tearning theory, algorithms and data structures, automata, grammars and formal languages, bioinformatics, complexity, computational geometry, computer-assisted reasoning, concurrency theory, cryptography and security, databases and knowledge-based systems, formal

specifications and program development, foundations of computing, logic in computer science, mobile computing, models of computation, networks, parallel and distributed computing, quantum computing, semantics and verification of programs, theoretical issues in artificial intelligence.

From the exciting history of its development in ancient times to the present day, Introduction to Cryptography with Mathematical Foundations and Computer Implementations provides a focused tour of the central concepts of cryptography. Rather than present an encyclopedic treatment of topics in cryptography, it delineates cryptographic concepts in chronological order, developing the mathematics as needed. Written in an engaging yet rigorous style, each chapter introduces important concepts with clear definitions and theorems. Numerous examples explain key points while figures and tables help illustrate more difficult or subtle concepts. Each chapter is punctuated with "Exercises for the Reader;" complete solutions for these are included in an appendix. Carefully crafted exercise sets are also provided at the end of each chapter, and detailed solutions to most odd-numbered exercises can be found in a designated appendix. The computer implementation section at the end of every chapter guides students through the process of writing their own programs. A supporting website provides an extensive set of sample programs as well as downloadable platform-

independent applet pages for some core programs and algorithms. As the reliance on cryptography by business, government, and industry continues and new technologies for transferring data become available, cryptography plays a permanent, important role in day-to-day operations. This self-contained sophomore-level text traces the evolution of the field, from its origins through present-day cryptosystems, including public key cryptography and elliptic curve cryptography.

This book presents the proceedings of the 20th International Symposium on Mathematical Foundations of Computer Science, MFCS'95, held in Prague, Czech Republic in August/September 1995. The book contains eight invited papers and two abstracts of invited talks by outstanding scientists as well as 44 revised full research papers selected from a total of 104 submissions. All relevant aspects of theoretical computer science are addressed, particularly the mathematical foundations; the papers are organized in sections on structural complexity, algorithms, complexity theory, graphs in models of computation, lower bounds, formal languages, unification, rewriting and type theory, distributed computation, concurrency, semantics, model checking, and formal calculi.

2009 CHOICE AWARD OUTSTANDING ACADEMIC TITLE Information and communications security is a hot topic in private industry as well as in

government agencies. This book provides a complete conceptual treatment of securing information and transporting it over a secure network in a manner that does not require a strong mathematical background. It stresses why information security is important, what is being done about it, how it applies to networks, and an overview of its key issues. It is written for anyone who needs to understand these important topics at a conceptual rather than a technical level.

Investigates automata networks as algebraic structures and develops their theory in line with other algebraic theories, such as those of semigroups, groups, rings, and fields. The authors also investigate automata networks as products of automata, that is, as compositions of automata obtained by cascading without feedback or with feedback of various restricted types or, most generally, with the feedback dependencies controlled by an arbitrary directed graph. They survey and extend the fundamental results in regard to automata networks, including the main decomposition theorems of Letichevsky, of Krohn and Rhodes, and of others.

Anyone with a computer has heard of viruses, had to deal with several, and has been struggling with spam, spyware, and disk crashes. This book is intended as a starting point for those familiar with basic concepts of computers and computations and who would like to extend their knowledge into the realm of

computer and network security. Its comprehensive treatment of all the major areas of computer security aims to give readers a complete foundation in the field of Computer Security. Exercises are given throughout the book and are intended to strengthening the reader’s knowledge - answers are also provided. Written in a clear, easy to understand style, aimed towards advanced undergraduates and non-experts who want to know about the security problems confronting them everyday. The technical level of the book is low and requires no mathematics, and only a basic concept of computers and computations. Foundations of Computer Security will be an invaluable tool for students and professionals alike.