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An Introduction to Formal Languages and Automata Cambridge University Press
This elementary presentation exposes readers to both the process of rigor and the rewards inherent in taking an axiomatic approach to the study of functions of a real variable. The aim is to challenge and improve mathematical intuition rather than to verify it. The philosophy of this book is to focus attention on questions which give analysis its inherent fascination. Each chapter begins with the discussion of some motivating examples and concludes with a series of questions.
The Nature of Computation Princeton University Press
This book contains a collection of sixteen survey papers on recent developments in algorithms, formal languages, and computational complexity. These are the three areas in which Professor Ronald V. Book has made significant contributions, and the objective of the editors and the contributors is to honor Professor Book on his sixtieth birthday. Audience: Researchers and graduate students with interests in design and analysis of algorithms, in language theory, and in computational complexity.
Analysis of Boolean Functions CRC Press
Recently, a variety of results on the complexity status of the graph isomorphism problem has been obtained. These results belong to the so-called structural part of Complexity Theory. Our idea behind this book is to summarize such results which might otherwise not be easily accessible in the literature, and also, to give the reader an understanding of the aims and topics in Structural Complexity Theory, in general. The text is basically self contained; the only prerequisite for reading it is some elementary knowledge from Complexity Theory and Probability Theory. It can be used to teach a seminar or a monographic graduate course, but also parts of it (especially Chapter 1) provide a source of examples for a standard graduate course on Complexity Theory. Many people have helped us in different ways III the process of writing this book. Especially, we would like to thank V. Arvind, R.V. Book, E. Mayordomo, and the referee who gave very constructive comments. This book project was especially made possible by a DAAD grant in the "Acciones Integrada" program. The third author has been supported by the ESPRIT project ALCOM-II.
Introduction to the Theory of Computation Princeton University Press
This first part presents chapters on models of computation, complexity theory, data structures, and efficient computation in many recognized sub-disciplines of Theoretical Computer Science.
Encyclopedia of Microcomputers Springer Science & Business Media
Quantum phase transitions, driven by quantum fluctuations, exhibit intriguing features offering the possibility of potentially new applications, e.g. in quantum information sciences. Major advances have been made in both theoretical and experimental investigations of the nature and behavior of quantum phases and transitions in cooperatively interacting many-body quantum systems. For modeling purposes, most of the current innovative and successful research in this field has been obtained by either directly or indirectly using the insights provided by quantum (or transverse field) Ising models because of the separability of the cooperative interaction from the tunable transverse field or tunneling term in the relevant Hamiltonian. Also, a number of condensed matter systems can be modeled accurately in this approach, hence granting the possibility to compare advanced models with actual experimental results. This work introduces these quantum Ising models and analyses them both theoretically and numerically in great detail. With its tutorial approach the book addresses above all young researchers who wish to enter the field and are in search of a suitable and self-contained text, yet it will also serve as a valuable reference work for all active researchers in this area.
The Complexity Theory Companion Prentice Hall
This book contains a revised version of the dissertation the author wrote at the Department of Computer Science of the University of Chicago. The thesis was submitted to the Faculty of Physical Sciences in conformity with the requirements for the PhD degree in June 1999. It was honored with the 1999 ACM Doctoral Dissertation Award in May 2000. Summary Computational complexity is the study of the inherent di culty of compu- tional problems and the power of the tools we may use to solve them. It aims to describe how many resources we need to compute the solution as a function of the problem size. Typical resources include time on sequential and parallel architectures and memory space. As we want to abstract away from details of input representation and speci cs of the computer model, we end up with classes of problems that we can solve within certain robust resource bounds such as polynomial time, parallel logarithmic time, and logarithmic space. Research in complexity theory boils down to determining the relationships between these classes { inclusions and separations. In this dissertation, we focus on the role of randomness and look at various properties of hard problems in order to obtain separations. We also investigate the power of nondeterminism and alternation, as well as space versus time

issues. Randomness provides a resource that seems to help in various situations.
Advances in Algorithms, Languages, and Complexity Springer
Optimization is an essential technique for solving problems in areas as diverse as accounting, computer science and engineering. Assuming only basic linear algebra and with a clear focus on the fundamental concepts, this textbook is the perfect starting point for first- and second-year undergraduate students from a wide range of backgrounds and with varying levels of ability. Modern, real-world examples motivate the theory throughout. The authors keep the text as concise and focused as possible, with more advanced material treated separately or in starred exercises. Chapters are self-contained so that instructors and students can adapt the material to suit their own needs and a wide selection of over 140 exercises gives readers the opportunity to try out the skills they gain in each section. Solutions are available for instructors. The book also provides suggestions for further reading to help students take the next step to more advanced material.
Algorithms and Complexity Cambridge University Press
This revised and extensively expanded edition of Computability and Complexity Theory comprises essential materials that are core knowledge in the theory of computation. The book is self-contained, with a preliminary chapter describing key mathematical concepts and notations. Subsequent chapters move from the qualitative aspects of classical computability theory to the quantitative aspects of complexity theory. Dedicated chapters on undecidability, NP-completeness, and relative computability focus on the limitations of computability and the distinctions between feasible and intractable. Substantial new content in this edition includes: a chapter on nonuniformity studying Boolean circuits, advice classes and the important result of Karp Lipton. a chapter studying properties of the fundamental probabilistic complexity classes a study of the alternating Turing machine and uniform circuit classes. an introduction of counting classes, proving the famous results of Valiant and Vazirani and of Toda a thorough treatment of the proof that IP is identical to PSPACE With its accessibility and well-devised organization, this text/reference is an excellent resource and guide for those looking to develop a solid grounding in the theory of computing. Beginning graduates, advanced undergraduates, and professionals involved in theoretical computer science, complexity theory, and computability will find the book an essential and practical learning tool. Topics and features: Concise, focused materials cover the most fundamental concepts and results in the field of modern complexity theory, including the theory of NP-completeness, NP-hardness, the polynomial hierarchy, and complete problems for other complexity classes Contains information that otherwise exists only in research literature and presents it in a unified, simplified manner Provides key mathematical background information, including sections on logic and number theory and algebra Supported by numerous exercises and supplementary problems for reinforcement and self-study purposes
Introduction to Random Graphs Cambridge University Press
This volume provides a survey of the subject in the form of a collection of articles written by experts, that together provides a comprehensive guide to research. The editors'aim has been to provide an accessible description of the current stae of complexity theory, and to demonstrate the breadth of techniques and results that make this subject so exciting. Thus, papers run the gamut from sublogarithmic space to exponential time, and from new combinatorial techniques to interactive proof systems.
Information, Physics, and Computation Cambridge University Press
Computational complexity is one of the most beautiful fields of modern mathematics, and it is increasingly relevant to other sciences ranging from physics to biology. But this beauty is often buried underneath layers of unnecessary formalism, and exciting recent results like interactive proofs, phase transitions, and quantum computing are usually considered too advanced for the typical student. This book bridges these gaps by explaining the deep ideas of theoretical computer science in a clear and enjoyable fashion, making them accessible to non-computer scientists and to computer scientists who finally want to appreciate their field from a new point of view. The authors start with a lucid and playful explanation of the P vs. NP problem, explaining why it is so fundamental, and so hard to resolve. They then lead the reader through the complexity of mazes and games; optimization in theory and practice; randomized algorithms, interactive proofs, and pseudorandomness; Markov chains and phase transitions; and the outer reaches of quantum computing. At every turn, they use a minimum of formalism, providing explanations that are both deep and accessible. The book is intended for graduate and undergraduate students, scientists from other areas who have long wanted to understand this subject, and experts who want to fall in love with this field all over again.
Mathematics and Computation Springer
Now you can clearly present even the most complex computational theory topics to your students with Sipser's distinct, market-leading INTRODUCTION TO THE THEORY OF COMPUTATION, 3E. The number one choice for today's computational theory course, this highly anticipated revision retains the unmatched clarity and thorough coverage that make it a leading text for upper-level undergraduate and introductory graduate students. This edition continues author Michael Sipser's well-known, approachable style with timely revisions, additional exercises, and more memorable examples in key areas. A new first-of-its-kind theoretical treatment of deterministic context-free languages is ideal for a better understanding of parsing and LR(k) grammars. This edition's refined presentation ensures a trusted accuracy and clarity that make the challenging study of computational theory accessible and intuitive to students while maintaining the subject's rigor and formalism. Readers gain a solid understanding of the fundamental mathematical properties of computer hardware, software, and applications with a blend of practical and philosophical coverage and mathematical treatments, including advanced theorems and proofs. INTRODUCTION TO THE THEORY OF COMPUTATION, 3E's comprehensive coverage makes this an ideal ongoing reference tool for those studying theoretical computing. Important Notice: Media content

referenced within the product description or the product text may not be available in the ebook version.

Understanding Analysis Thomson/Course Technology

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

Think Perl 6 Cambridge University Press

This graduate-level text gives a thorough overview of the analysis of Boolean functions, beginning with the most basic definitions and proceeding to advanced topics.

Automata, Computability and Complexity Cambridge University Press

This textbook explains online computation in different settings, with particular emphasis on randomization and advice complexity. These settings are analyzed for various online problems such as the paging problem, the k-server problem, job shop scheduling, the knapsack problem, the bit guessing problem, and problems on graphs. This book is appropriate for undergraduate and graduate students of computer science, assuming a basic knowledge in algorithmics and discrete mathematics. Also researchers will find this a valuable reference for the recent field of advice complexity.

Introduction to Natural Language Processing Springer

Introduction to the Theory of ComputationThomson/Course Technology

Mathematical Foundations of Computer Science 1999 "O'Reilly Media, Inc."

"Intended as an upper-level undergraduate or introductory graduate text in computer science theory," this book lucidly covers the key concepts and theorems of the theory of computation. The presentation is remarkably clear; for example, the "proof idea," which offers the reader an intuitive feel for how the proof was constructed, accompanies many of the theorems and a proof. Introduction to the Theory of Computation covers the usual topics for this type of text plus it features a solid section on complexity theory--including an entire chapter on space complexity. The final chapter introduces more advanced topics, such as the discussion of complexity classes associated with probabilistic algorithms.

Algorithms and Complexity Oxford University Press on Demand

This book constitutes the proceedings of the 19th International Conference on Descriptional Complexity of Formal Systems, DCFS 2017, held in Milano, Italy, in July 2017. The 20 full papers presented together with 4 invited talks were carefully reviewed and selected from 26 submissions.Descriptional Complexity is a field in Computer Science that deals with the size of all kinds of objects that occur in computational models, such as turing machines, finite automata, grammars, splicing systems and others. The topics of this conference are related to all aspects of descriptional complexity.

Theory of Cryptography Elsevier

Formal methods is the term used to describe the specification and verification of software and software systems using mathematical logic. Various methodologies have been developed and incorporated into software tools. An important subclass is distributed systems. There are many books that look at particular methodologies for such systems, e.g. CSP, process algebra. This book offers a more balanced introduction for graduate students that describes the various approaches, their strengths and weaknesses, and when they are best used. Milner's CCS and its operational semantics are introduced, together with notions of behavioural equivalence based on bisimulation techniques and with variants of Hennessy-Milner modal logics. Later in the book, the presented theories are extended to take timing issues into account. The book has arisen from various courses taught in Iceland and Denmark and is designed to give students a broad introduction to the area, with exercises throughout.

The Probabilistic Method John Wiley & Sons

Introduces machine learning and its algorithmic paradigms, explaining the principles behind automated learning approaches and the considerations underlying their usage.

Computational Complexity Cambridge University Press

An Introduction to Formal Languages & Automata provides an excellent presentation of the material that is essential to an introductory theory of computation course. The text was designed to familiarize students with the foundations & principles of computer science & to strengthen the students' ability to carry out formal & rigorous mathematical argument. Employing a problem-solving approach, the text provides students insight into the course material by stressing intuitive motivation & illustration of ideas through straightforward explanations & solid mathematical proofs. By emphasizing learning through problem solving, students learn the material primarily through problem-type illustrative examples that show the motivation behind the concepts, as well as their connection to the theorems & definitions.