Products Of Automata Monographs In Theoretical Computer Science An Eatcs Series Volume 7

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The Logic of Partial Information Areski Nait Abdallah 2012-12-06 One must be able to say at all times - in stead of points, straight lines, and planes - tables, chairs and beer mugs. (David Hilbert) One service mathematics has rendered the human race. It has put common sense back where it belongs, on the topmost shelf next to the dusty canister labelled "discarded nonsense. " (Eric T. Bell) This book discusses reasoning with partial information. We investigate the proof theory, the model theory and some applications of reasoning with par tial information. We have as a goal a general theory for combining, in a principled way, logic formulae expressing partial information, and a logical tool for choosing among them for application and implementation purposes. We also would like to have a model theory for reasoning with partial infor mation that is a generalization of the usual Tarskian semantics for classical logic. We show the need to go beyond the view of logic as a geometry of static truths, and to see logic, both at the proof-theoretic and at the model-theoretic level, as a dynamics of processes. We see the dynamics of logic processes bear with classical logic, the same relation as the one existing between classical mechanics and Euclidean geometry.

Graph Algebras and Automata Andrei Kelarev 2003-07-08 Graph algebras possess the capacity to relate fundamental concepts of computer science, combinatorics, graph theory, operations research, and universal algebra. They are used to identify nontrivial connections across notions, expose conceptual properties, and mediate the application of methods from one area toward questions of the other four. After

The Complexity Theory Companion Lane A. Hemaspaandra 2013-03-14 Here is an accessible, algorithmically oriented guide to some of the most interesting techniques of complexity theory. The book shows that simple algorithms are at the heart of complexity theory. The book is organized by technique rather than by topic. Each chapter focuses on one technique: what it is, and what results and applications it yields.

Verification of Reactive Systems Klaus Schneider 2013-03-09 This book is a solid foundation of the most important formalisms used for specification and verification of reactive systems. In particular, the text presents all important results on m-calculus, w-automata, and temporal logics, shows the relationships between these formalisms and describes state-of-the-art verification procedures for them. It also discusses advantages and disadvantages of these formalisms, and shows up their strengths and weaknesses. Most results are given with detailed proofs, so that the presentation is almost self-contained. Includes all definitions without relying on other material Proves all theorems in detail Presents detailed algorithms in pseudo-code for verification as well as translations to other formalisms

Public-Key Cryptography Arto Salomaa 2013-04-17 Cryptography, secret writing, is enjoying a scientific renaissance following the seminal discovery in 1977 of public-key cryptography and applications in computers and communications. This book gives a broad overview of public-key cryptography - its essence and advantages, various public-key cryptosystems, and protocols - as well as a comprehensive introduction to classical cryptography and cryptoanalysis. The second edition has been revised and enlarged especially in its treatment of cryptographic protocols. From a review of the first edition: "This is a comprehensive review ... there can be no doubt that this will be accepted as a standard text. At the same time, it is clearly and entertainingly written ... and can certainly stand alone." Alex M. Andrew, Kybernetes, March 1992

Structural Complexity I Jose L. Balcazar 2012-12-06 In the six years since the first edition of this book was published, the field of Structural Complexity has grown quite a bit. However, we are keeping this volume at the same basic level that it had in the first edition, and the only new result incorporated as an appendix is the closure under complementation of nondeterministic space classes, which in the previous edition was posed as an open problem. This result was already included in our Volume II, but we feel that due to the basic nature of the result, it belongs to this volume. There are of course other important results obtained during these last six years. However, as they belong to new areas opened in the field they are outside the scope of this fundamental volume. Other changes in this second edition are the update of some Bibliograph ical Remarks and references, correction of many mistakes and typos, and a renumbering of the definitions and results. Experience has shown us that this new numbering is a lot more friendly, and several readers have confirmed this opinion. For the sake of the reader of Volume II, where all references to Volume I follow the old numbering, we have included here a table indicating the new number corresponding to each of the old ones.

Automata-Theoretic Aspects of Formal Power Series Arto Salomaa 2012-12-06 This book develops a theory of formal power series in noncommuting variables, the main emphasis being on results applicable to automata and formal language theory. This theory was initiated around 196O-apart from some scattered work done earlier in connection with free groups-by M. P. Schutzenberger to whom also belong some of the main results. So far there is no book in existence concerning this theory. This lack has had the unfortunate effect that formal power series have not been known and used by theoretical computer scientists to the extent they in our estimation should have been. As with most mathematical formalisms, the formalism of power series is capable of unifying and generalizing known results. However, it is also capable of establishing specific results which are difficult if not impossible to establish by other means. This is a point we hope to be able to make in this book. That formal power series constitute a powerful tool in automata and language theory depends on the fact that they in a sense lead to the arithmetization of automata and language theory. We invite the reader to prove, for instance, Theorem IV. 5. 3 or Corollaries III. 7. 8 and III. 7.- all specific results in language theory-by some other means. Although this book is mostly self-contained, the reader is assumed to have some background in algebra and analysis, as well as in automata and formal language theory.

Introduction to Process Algebra Wan Fokkink 2013-03-09 Automated and semi-automated manipulation of so-called labelled transition systems has become an important means in discovering flaws in software and hardware systems. Process algebra has been developed to express such labelled transition systems algebraically, which enhances the ways of manipulation by means of equational logic and term rewriting. The theory of process algebra has developed rapidly over the last twenty years, and verification tools have been developed on the basis of process algebra, often in cooperation with techniques related to model checking. This textbook gives a thorough introduction into the basics of process algebra and its applications.

Language and Automata Theory and Applications Adrian-Horia Dediu 2014-02-05 This book constitutes the refereed proceedings of the 8th International Conference on Language and Automata Theory and Applications, LATA 2014, held in Madrid, Spain in March 2014. The 45 revised full papers presented together with 4 invited talks were carefully reviewed and selected from 116 submissions. The papers cover the following topics: algebraic language theory; algorithms on automata and words; automata and logic; automata for system analysis and program verification; automata, concurrency and Petri nets; automatic structures; combinatorics on words; computability; computational complexity; descriptional complexity; DNA and other models of bio-inspired computing; foundations of finite state technology; foundations of XML; grammars (Chomsky hierarchy, contextual, unification, categorial, etc.); grammatical inference and algorithmic learning; graphs and graph transformation; language varieties and semigroups; parsing; patterns; quantum, chemical and optical computing; semantics; string and combinatorial issues in computational biology and bioinformatics; string processing algorithms; symbolic dynamics; term rewriting; transducers; trees, tree languages and tree automata; weighted automata.

Jewels are Forever Juhani Karhumäki 2012-12-06 Dedicated to Arto Salomaa, a towering figure of theoretical computer science, on the occasion of his 65th birthday, this book is a tribute to him on behalf of the theoretical computer science community. The contributions are written by internationally recognized scientists and cover most of Salomaa's many research areas. Due to its representative selection of classic and cutting edge trends in theoretical computer science, the book constitutes a comprehensive state-of-the-art survey. The contributions are in such central areas as automata theory, algorithms and complexity, and combinatorics of words. But not only that, they take up new areas such as semigroups and biocomputing. While some are survey articles of fundamental topics, most are original research papers.

Extremal Combinatorics Stasys Jukna 2013-03-09 This is a concise, up-to-date introduction to extremal combinatorics for non-specialists. Strong emphasis is made on theorems with particularly elegant and informative proofs which may be called the gems of the theory. A wide spectrum of the most powerful combinatorial tools is presented, including methods of extremal set theory, the linear algebra method, the probabilistic method and fragments of Ramsey theory. A thorough discussion of recent applications to computer science illustrates the inherent usefulness of these methods.

Semirings, Automata, Languages W. Kuich 2012-12-06 Automata theory is the oldest among the disciplines constituting the subject matter of this Monograph Series: theoretical computer science. Indeed, automata theory and the closely related theory of formal languages form nowadays such a highly developed and diversified body of knowledge that even an exposition of "reasonably important" results is not possible within one volume. The purpose of this book is to develop the theory of automata and formal languages, starting from ideas based on linear algebra. By what was said above, it should be obvious that we do not intend to be encyclopedic. However, this book contains the basics of regular and context-free languages (including some new results), as well as a rather complete theory of pushdown automata and variations (e. g. counter automata). The wellknown AFL theory is extended to power series ("AFP theory"). Additional new results include, for instance, a grammatical characterization of the cones and the principal cones of context-free languages, as well as new decidability results.

Development in Language Theory Giancarlo Mauri 2011-07-12 This book constitutes the refereed proceedings of the 15th International Conference on Developments in Language Theory, DLT 2011, held in Milano, Italy, in July 2011. The 34 regular papers presented were carefully reviewed and selected from numerous submissions. The volume also contains the papers or abstracts of 5 invited speakers, as well as a 2-page abstract for each of the 7 poster papers. The topics covered include grammars, acceptors and transducers for words, trees and graphs; algebraic theories of automata; codes; symbolic dynamics; algorithmic, combinatorial and algebraic properties of words and languages; decidability questions; applications of language theory, including: natural computing, image manipulation and compression, text algorithms, cryptography, concurrency, complexity theory and logic; cellular automata and multidimensional patterns; language theory aspects of quantum computing and bio-computing.

Computer-aided Verification 1990

Cellular Automata and Groups Tullio Ceccherini-Silberstein 2010-08-24 Cellular automata were introduced in the first half of the last century by John von Neumann who used them as theoretical models for self-reproducing machines. The authors present a self-contained exposition of the theory of cellular automata on groups and explore its deep connections with recent developments in geometric group theory, symbolic dynamics, and other branches of mathematics and theoretical computer science. The topics treated include in particular the Garden of Eden theorem for amenable groups, and the Gromov-Weiss surjunctivity theorem as well as the solution of the Kaplansky conjecture on the stable finiteness of group rings for sofic groups. The volume is entirely self-contained, with 10 appendices and more than 300 exercises, and appeals to a large audience including specialists as well as newcomers in the field. It provides a comprehensive account of recent progress in the theory of cellular automata based on the interplay between amenability, geometric and combinatorial group theory, symbolic dynamics and the algebraic theory of group rings which are treated here for the first time in book form.

Formal Description Techniques and Protocol Specification, Testing and Verification Stan Budkowski 2013-04-17 Formal Description Techniques and Protocol Specification, Testing and Verification addresses formal description techniques (FDTs) applicable to distributed systems and communication protocols. It aims to present the state of the art in theory, application, tools and industrialization of FDTs. Among the important features presented are: FDT-based system and protocol engineering; FDT-application to distributed systems; Protocol engineering; Practical experience and case studies. Formal Description Techniques and Protocol Specification, Testing and Verification comprises the proceedings of the Joint International Conference on Formal Description Techniques for Distributed Systems and Communication Protocols and Protocol Specification, Testing and Verification, sponsored by the International Federation for Information Processing, held in November 1998, Paris, France. Formal Description Techniques and Protocol Specification, Testing and Verification is suitable as a secondary text for a graduate-level course on Distributed Systems or Communication Protocols, and as a reference for researchers and practitioners in industry.

Formal Techniques in Real-Time and Fault-Tolerant Systems Jan Vytopil 1991-12-11 This book presents latest research results on problems and solutions in safety-critical system design. Logic, process algebra, and action/event models are applied to specification, modeling, analysis and verification of real-time and fault-tolerant systems.

Products of Automata F. Gécseg 1986

Theoretical Aspects of Computing – ICTAC 2018 Bernd Fischer 2018-10-13 This book constitutes the refereed proceedings of the 15th International Colloquium on Theoretical Aspects of Computing, ICTAC 2018, held in Stellenbosch, South Africa, in October 2018. The 25 revised full papers presented together with two short and two long invited talks were carefully reviewed and selected from 59 submissions. The ICTAC conference aims at bringing together researchers and practitioners from academia, industry and government to present research and exchange ideas and experience addressing challenges in both theoretical aspects of computing and the exploitation of theory through methods and tools for system development. ICTAC also specifically aims to promote research cooperation between developing and industrial countries.

Computing in Horn Clause Theories Peter Padawitz 2012-12-06 At least four research fields detennine the theoretical background of specification and deduction in computer science: recursion theory, automated theorem proving, abstract data types and tenn rewriting systems. As these areas approach each other more and more, the strong distinctions between functional and relational views, deductive and denotational approaches as well as between specification and programming are relieved in favour of their integration. The book will not expose the lines of this development; conversely, it starts out from the nucleus of Hom clause logic and brings forth both known and unknown results, most of which affect more than one of the fields mentioned above. Chapter 1 touches on historical issues of specification and prototyping and delimits the topics handled in this book from others

which are at the core of related work. Chapter 2 provides the fundamental notions and notations needed for the presentation and interpretation of many-sorted Horn clause theories with equality. Chapter 3 supplies a number of sample Hom clause specifications ranging from arithmetic through string manipulation to higher data structures and interpreters of programming languages. Some of these examples serve as a reference to illustrate definitions and results, others may throw a light on the strong link between specifications and programs, which are executed by applying deduction rules. Thus we have included examples of how to use program trans/ormation methods in specification design.

Coloured Petri Nets Kurt Jensen 1992 "Unlike most books on Petri nets, which try to illustrate all aspects of the formalism, this volume focuses on a specific subject: the analysis of CP-nets. - The style, exercises, and bibliographical remarks makes this book useful as a textbook for an advanced course on CP-nets, which should follow a course based on the first volume." (M. Pezzè in Computing Reviews, August 1996)

Fuzzy Semirings with Applications to Automata Theory Javed Ahsan 2012-03-14 The purpose of this book is to present an up to date account of fuzzy ideals of a semiring. The book concentrates on theoretical aspects and consists of eleven chapters including three invited chapters. Among the invited chapters, two are devoted to applications of Semirings to automata theory, and one deals with some generalizations of Semirings. This volume may serve as a useful hand book for graduate students and researchers in the areas of Mathematics and Theoretical Computer Science.

The Resolution Calculus Alexander Leitsch 2012-12-06 The History of the Book In August 1992 the author had the opportunity to give a course on resolution theorem proving at the Summer School for Logic, Language, and Information in Essex. The challenge of this course (a total of five two-hour lectures) con sisted in the selection of the topics to be presented. Clearly the first selection has already been made by calling the course "resolution theorem proving" instead of "automated deduction" . In the latter discipline a remarkable body of knowledge has been created during the last 35 years, which hardly can be presented exhaustively, deeply and uniformly at the same time. In this situ ation one has to make a choice between a survey and a detailed presentation with a more limited scope. The author decided for the second alternative, but does not suggest that the other is less valuable. Today resolution is only one among several calculi in computational logic and automated reasoning. How ever, this does not imply that resolution is no longer up to date or its potential exhausted. Indeed the loss of the "monopoly" is compensated by new appli cations and new points of view. It was the purpose of the course mentioned above to present such new developments of resolution theory. Thus besides the traditional topics of completeness of refinements and redundancy, aspects of termination (resolution decision procedures) and of complexity are treated on an equal basis.

Syntax-Directed Semantics Zoltan Fülöp 2012-12-06 This is a motivated presentation of recent results on tree transducers, applied to studying the general properties of formal models and for providing semantics to context-free languages. The authors consider top-down tree transducers, macro tree transducers, attributed tree transducers, and macro attributed tree transducers. A unified terminology is used to define them, and their transformational capacities are compared. This handbook on tree transducers will serve as a base for further research.

Handbook of Weighted Automata Manfred Droste 2009-09-18 The purpose of this Handbook is to highlight both theory and applications of weighted automata. Weighted finite automata are classical nondeterministic finite automata in which the transitions carry weights. These weights may model, e. g. , the cost involved when executing a transition, the amount of resources or time needed for this,or the probability or reliability of its successful execution. The behavior of weighted finite automata can then be considered as the function (suitably defined) associating with each word the weight of its execution. Clearly, weights can also be added to classical automata with infinite state sets like pushdown automata; this extension constitutes the general concept of weighted automata. To illustrate the diversity of weighted automata, let us consider the following scenarios. Assume that a quantitative system is modeled by a classical automaton in which the transitions carry as weights the amount of resources needed for their execution. Then the amount of resources needed for a path in this weighted automaton is obtained simply as the sum of the weights of its transitions. Given a word, we might be interested in the minimal amount of resources needed for its execution, i. e. , for the successful paths realizing the given word. In this example, we could also replace the "resources" by "profit" and then be interested in the maximal profit realized, correspondingly, by a given word.

Advances in Computing and Information - ICCI '90 Selim G. Akl 1990 This volume contains selected and invited papers presented at ICCI '90. Topics range over theory of comput- ing, algorithms and programming, data and software engineering, computer architecture, concurrency, parallelism, communication and networking.

Finiteness and Regularity in Semigroups and Formal Languages Aldo de Luca 2012-12-06 This is a rigorous and self-contained monograph on a central topic in theoretical computer science. For the first time in book form, original results in the last ten years are presented, some previously unpublished, using combinatorial and algebraic methods. These are mainly based on combinatorics on words and especially on the theory of "unavoidable regularities." Researchers will find important new results on semigroups and formal languages, as well as various applications for these methods.

Communication Complexity and Parallel Computing Juraj Hromkovič 2013-03-09 The communication complexity of two-party protocols is an only 15 years old complexity measure, but it is already considered to be one of the fundamen tal complexity measures of recent complexity theory. Similarly to Kolmogorov complexity in the theory of sequential computations, communication complex ity is used as a method for the study of the complexity of concrete computing problems in parallel information processing. Especially, it is applied to prove lower bounds that say what computer resources (time, hardware, memory size) are necessary to compute the given task. Besides the estimation of the compu tational difficulty of computing problems the proved lower bounds are useful for proving the optimality of algorithms that are already designed. In some cases the knowledge about the communication complexity of a given problem may be even helpful in searching for efficient algorithms to this problem. The study of communication complexity becomes a well-defined independen dent area of complexity theory. In addition to a strong relation to several funda mental complexity measures (and so to several fundamental problems of com plexity theory) communication complexity has contributed to the study and to the understanding of the nature of determinism, nondeterminism, and random ness in algorithmics. There already exists a non-trivial mathematical machinery to handle the communication complexity of concrete computing problems, which gives a hope that the approach based on communication complexity will be in strumental in the study of several central open problems of recent complexity theory.

Unifying Petri Nets Hartmut Ehrig 2001-12-14 Since their introduction nearly 40 years ago, research on Petri nets has diverged in many different directions. Various classes of Petri net, motivated either by theory or by applications, with its own specific features and methods of analysis, have been proposed and studies in depth. These successful developments have led to a very heterogeneous landscape of diverse models, and this, in turn, has stimulated research on concepts and approaches that contribute to unifying and structuring the diverse landscape. This state-of-the-art survey presents the most relevant approaches to unifying Petri nets in a systematic and coherent way. The 14 chapters written by leading researchers are organized in topical sections on application-oriented approaches, unifying frameworks, and theoretical approaches.

Process Algebra with Timing J.C.M. Baeten 2013-03-09 Timing issues are of growing importance for the conceptualization and design of computer-based systems. Timing may simply be essential for the correct behaviour of a system, e.g. of a controller. Even if timing is not essential for the correct behaviour of a system, there may be good reasons to introduce it in such a way that suitable timing becomes relevant for the correct behaviour of a complex system. This book is unique in presenting four algebraic theories about processes, each dealing with timing from a different point of view, in a coherent and systematic way. The timing of actions is either relative or absolute and the underlying time scale is either discrete or continuous.

CONCUR '98 Concurrency Theory Davide Sangiorgi 1998-08-19 This book constitutes the refereed proceedings of the 9th International Conference on Concurrency Theory, CONCUR'98, held in Nice, France, in September 1998. The 35 revised full papers presented were carefully selected from a total of 104 submissions. Also presented are five invited contributions. Among the topics covered are moduls of computation and semantic domains, process algebras, Petri Nets, event structures, real-time systems, hybrid systems, model checking, verification techniques, refinement, rewriting, typing systems and algorithms, etc..

Models of Massive Parallelism Max Garzon 2012-12-06 Locality is a fundamental restriction in nature. On the other hand, adaptive complex systems, life in particular, exhibit a sense of permanence and time lessness amidst relentless constant changes in surrounding environments that make the global properties of the physical world the most important problems in understanding their nature and structure. Thus, much of the differential and integral Calculus deals with the problem of passing from local information (as expressed, for example, by a differential equation, or the contour of a region) to global features of a system's behavior (an equation of growth, or an area). Fundamental laws in the exact sciences seek to express the observable global behavior of physical objects through equations about local interaction of their components, on the assumption that the continuum is the most accurate model of physical reality. Paradoxically, much of modern physics calls for a fundamen tal discrete component in our understanding of the physical world. Useful computational models must be eventually constructed in hardware, and as such can only be based on local interaction of simple processing elements.

Acta cybernetica 1988

Computer Science – Theory and Applications Alexander S. Kulikov 2016-06-02 This book constitutes the proceedings of the 11th International Computer Science Symposium in Russia, CSR 2016, held in St. Petersburg, Russia, in June 2016. The 28 full papers presented in this volume were carefully reviewed and selected from 71 submissions. In addition the book contains 4 invited lectures. The scope of the proposed topics is quite broad and covers a wide range of areas such as: include, but are not limited to: algorithms and data structures; combinatorial optimization; constraint solving; computational complexity; cryptography; combinatorics in computer science; formal languages and automata; computational models and concepts; algorithms for concurrent and distributed systems, networks; proof theory and applications of logic to computer science; model checking; automated reasoning; and deductive methods.

Mathematica Japonicae 1998

Incomplete Information: Structure, Inference, Complexity Stephane P. Demri 2013-04-18 This monograph presents a systematic, exhaustive and up-to-date overview of formal methods and theories for data analysis and inference inspired by the concept of rough set. Throughout, Demri studies structures with incomplete information from the logical, algebraic and computational perspective. The formalisms developed are non-invasive in that they only the actual information that is needed in the process of analysis without external sources of information being required. The book is self-contained to a large degree, providing detailed derivations of most of the technical results, and is intended for researchers, lecturers and graduate students.

Relations and Graphs Gunther Schmidt 2012-12-06 Relational methods can be found at various places in computer science, notably in data base theory, relationaltype theory, analysis of rewriting systems, and modern programming language design. In addition, they appear in algorithms analysis and in the bulk of discrete mathematics taught to computer scientists. This book is devoted to the background of these methods. It explains how to use relational and graph-theoretic methods systematically in computer science. A powerful formal framework of relational algebra is developed with respect to applications to a diverse range of problem areas. Results are first motivated by practical examples, often visualized by both Boolean 0-1-matrices and graphs, and then derived algebraically.

Products of Automata Ferenc Gecseg 2012-12-06 Both theoretical and practical considerations motivate the repre sentation of objects as certain compositions of simpler ones. In the theory of automata this observation has led to the concepts of pro ducts and complete systems of automata. In the general form of the products of automata all the component automata are fed back to one another. With this very broad notion of products, the realization of automata with large numbers of states by means of compositions of basic components is a highly involved process; this increases the possibility of errors. In order to decrease the complexity of feedbacks, a hierarchy of products called IXi-pro ducts was introduced some 10 years ago, where i runs over the set of all non-negative integers. In an IXcproduct the index set of the component automata is linearly ordered. The input of each automaton in the product may depend on the states of all automata preceding it, i. e. , all component automata steer all those automata which follow them in the product. Furthermore, at most the next i-I automata (including itself) may be fed back to the input of a given component automaton. Thus for iXcproducts the lengths of feedbacks are at most i. The aim of this monograph is to give a systematic account of iXi-Products. It consists of five chapters, a reference section, and an index. The first chapter contains the necessary concepts and results from universal algebra, automata, and sequential machines.

Information and Randomness Cristian Calude 2013-03-09 "Algorithmic information theory (AIT) is the result of putting Shannon's information theory and Turing's computability theory into a cocktail shaker and shaking vigorously", says G.J. Chaitin, one of the fathers of this theory of complexity and randomness, which is also known as Kolmogorov complexity. It is relevant for logic (new light is shed on Gödel's incompleteness results), physics (chaotic motion), biology (how likely is life to appear and evolve?), and metaphysics (how ordered is the universe?). This book, benefiting from the author's research and teaching experience in Algorithmic Information Theory (AIT), should help to make the detailed mathematical techniques of AIT accessible to a much wider audience.

Introduction to Circuit Complexity Heribert Vollmer 2013-04-17 An advanced textbook giving a broad, modern view of the computational complexity theory of boolean circuits, with extensive references, for theoretical computer scientists and mathematicians.