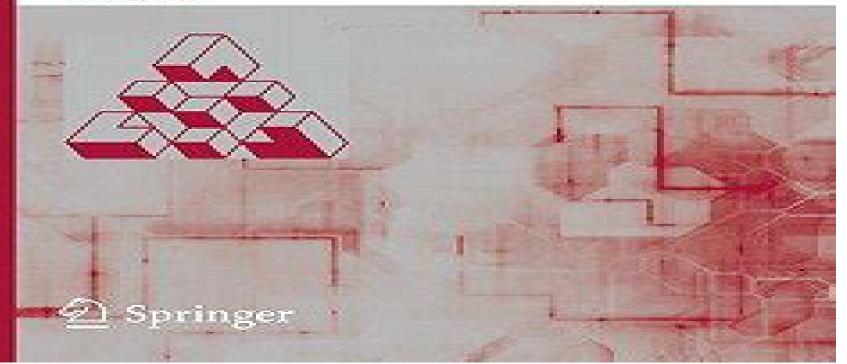
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# Mathematical Foundations of Computer Science 2010

35th International Symposium, MFCS 2010 Brno, Czech Republic, August 2010 Proceedings



### <u>Mathematical Foundations Of Computer Science 2010</u> <u>Mathematical Foundations Of Computer Science 201</u>

Jessica J Manson

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Mathematical Foundations of Computer Science 2004 Jirí Fiala, Václav Koubek, Jan Kratochvíl, 2004-08-06 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 and applications including computational biology cryptography security and articial intelligence the conference of 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 **Mathematical Foundations of Computer Science 2012** Branislav Rovan, Vladimiro Sassone, Peter Widmayer, 2012-08-01 This volume constitutes the refereed proceedings of the 37th International Symposium on Mathematical Foundations of Computer Science MFCS 2012 held in Bratislava Slovakia in August 2012 The 63 revised full papers presented together with 8 invited talks were carefully reviewed and selected from 162 submissions Topics covered include algorithmic game theory algorithmic learning theory algorithms and data structures automata formal languages bioinformatics complexity computational geometry computer assisted reasoning concurrency theory databases and knowledge based systems foundations of computing logic in computer science models of computation semantics and verification of programs and theoretical issues in artificial intelligence Mathematical Foundations of Computer Science 2014 Ersébet Csuhaj-Varjú, Martin Dietzfelbinger, Zoltán Ésik, 2014-08-12 This two volume set LNCS 8634 and LNCS 8635 constitutes the refereed conference proceedings of the 39th International Symposium on Mathematical Foundations of Computer Science MFCS 2014 held in Budapest Hungary in August 2014 The 95 revised full papers presented together with 6 invited talks were carefully selected from 270 submissions. The focus of the conference was on following topics Logic Semantics Automata Theory of Programming Algorithms Complexity Parallel and Distributed Computing Quantum Computing Automata Grammars and Formal Languages Combinatorics on Words Trees and Games

Mathematical Foundations of Computer Science 2011 Filip Murlak, Piotr Sankowski, 2011-08-09 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 **Mathematical Foundations of Computer** Science 2013 Krishnendu Chatterjee, Jirí Sgall, 2013-08-16 This book constitutes the thoroughly refereed conference proceedings of the 38th International Symposium on Mathematical Foundations of Computer Science MFCS 2013 held in Klosterneuburg Austria in August 2013 The 67 revised full papers presented together with six invited talks were carefully selected from 191 submissions Topics covered include algorithmic game theory algorithmic learning theory algorithms and data structures automata formal languages bioinformatics complexity computational geometry computer assisted reasoning concurrency theory databases and knowledge based systems foundations of computing logic in computer science models of computation semantics and verification of programs and theoretical issues in artificial intelligence Samson Abramsky on Logic and Structure in Computer Science and Beyond Alessandra Palmigiano, Mehrnoosh Sadrzadeh, 2023-08-01 Samson Abramsky's wide ranging contributions to logical and structural aspects of Computer Science have had a major influence on the field This book is a rich collection of papers inspired by and extending Abramsky's work It contains both survey material and new results organised around six major themes domains and duality game semantics contextuality and quantum computation comonads and descriptive complexity categorical and logical semantics and probabilistic computation These relate to different stages and aspects of Abramsky's work reflecting its exceptionally broad scope and his ability to illuminate and unify diverse topics Chapters in the volume include a review of his entire body of work spanning from philosophical aspects to logic programming language theory quantum theory economics and psychology and relating it to a theory of unification of sciences using dual adjunctions The section on game semantics shows how Abramsky's work has led to a powerful new paradigm for the semantics of computation The work on contextuality and categorical quantum mechanics has been highly influential and provides the foundation for increasingly widely used methods in quantum computing The work on comonads and descriptive complexity is building bridges between currently disjoint research areas in computer science relating Structure to Power The volume also includes a scientific autobiography and an overview of the contributions The outstanding set of contributors to this volume including both senior and early career academics serve as testament to

Samson Abramsky's enduring influence It will provide an invaluable and unique resource for both students and established **Mathematical Foundations of Computer Science** ,2004 researchers **Information Content of Online Problems** Jasmin Smula, 2015-08-11 In online computation an algorithm has to solve some optimization problem while receiving the input instance gradually without any knowledge about the future input Such an online algorithm has to compute parts of the output for parts of the input based on what it knows about the input so far and without being able to revoke its decisions later Almost inevitably the algorithm makes a bad choice at some point that leads to a solution that is suboptimal with respect to the whole input instance Compared to an offline algorithm that is given the entire input instance at once the online algorithm thus has a substantial handicap Developing online algorithms that nonetheless compute solutions of some adequate quality is a large and rich field of research within computer science Models and Analysis for Distributed Systems Serge Haddad, Fabrice Kordon, Laurent Pautet, Laure Petrucci, 2013-02-07 Nowadays distributed systems are increasingly present for public software applications as well as critical systems software applications as well as critical systems This title and Distributed Systems Design and Algorithms from the same editors introduce the underlying concepts the associated design techniques and the related security issues The objective of this book is to describe the state of the art of the formal methods for the analysis of distributed systems Numerous issues remain open and are the topics of major research projects One current research trend consists of profoundly mixing the design modeling verification and implementation stages This prototyping based approach is centered around the concept of model refinement This book is more specifically intended for readers that wish to gain an overview of the application of formal methods in the design of distributed systems Master's and PhD students as well as engineers in industry will find a global understanding of the techniques as well as references to the most up to date works in this area Computer Science Logic Anuj Dawar, 2010 Annotation This volume constitutes the refereed proceedings of the 24th International Workshop on Computer Science Logic CSL 2010 held in Brno Czech Republic in August 2010 The 33 full papers presented together with 7 invited talks were carefully reviewed and selected from 103 submissions Topics covered include automated deduction and interactive theorem proving constructive mathematics and type theory equational logic and term rewriting automata and games modal and temporal logic model checking decision procedures logical aspects of computational complexity finite model theory computational proof theory logic programming and constraints lambda calculus and combinatory logic categorical logic and topological semantics domain theory database theory specification extraction and transformation of programs logical foundations of programming paradigms verification and program analysis linear logic higher order logic and nonmonotonic A Statistical Mechanical Interpretation of Algorithmic Information Theory Kohtaro Tadaki, 2019-11-11 This reasoning book is the first one that provides a solid bridge between algorithmic information theory and statistical mechanics Algorithmic information theory AIT is a theory of program size and recently is also known as algorithmic randomness AIT

provides a framework for characterizing the notion of randomness for an individual object and for studying it closely and comprehensively In this book a statistical mechanical interpretation of AIT is introduced while explaining the basic notions and results of AIT to the reader who has an acquaintance with an elementary theory of computation A simplification of the setting of AIT is the noiseless source coding in information theory First in the book a statistical mechanical interpretation of the noiseless source coding scheme is introduced It can be seen that the notions in statistical mechanics such as entropy temperature and thermal equilibrium are translated into the context of noiseless source coding in a natural manner Then the framework of AIT is introduced On this basis the introduction of a statistical mechanical interpretation of AIT is begun Namely the notion of thermodynamic quantities such as free energy energy and entropy is introduced into AIT In the interpretation the temperature is shown to be equal to the partial randomness of the values of all these thermodynamic quantities where the notion of partial randomness is a stronger representation of the compression rate measured by means of program size complexity Additionally it is demonstrated that this situation holds for the temperature itself as a thermodynamic quantity That is for each of all the thermodynamic quantities above the computability of its value at temperature T gives a sufficient condition for T to be a fixed point on partial randomness In this groundbreaking book the current status of the interpretation from both mathematical and physical points of view is reported For example a total statistical mechanical interpretation of AIT that actualizes a perfect correspondence to normal statistical mechanics can be developed by identifying a microcanonical ensemble in the framework of AIT As a result the statistical mechanical meaning of the thermodynamic quantities of AIT is clarified In the book the close relationship of the interpretation to Landauer s principle is pointed out Education and Training for the Information Technology Workforce ,2003 **Exploring** an Unknown Graph by a Team of Robots Using Serendipity Rendezvous Algorithms Hamido Hourani, 2013-10-30 Dependence on a team of robots to carry out the exploration missions has many benefits such as speeding up the missions provided that the coordination among robots is maintained Many circumstances limit the communication which is crucial for the coordination among robots e g impenetrable barriers high temperature etc A periodic rendezvous strategy is considered in this dissertation a work around in order to overlap communication ranges of the robots Attending these periodic rendezvous sessions requires that the robots interrupt their current exploration progress periodically and traverse back to the rendezvous points i e Interruptibility During their trips to these points they do not gain new knowledge since they cross already explored parts of the area Therefore using rendezvous strategies improves the team behaviour but has a negative impact on the time efficiency Serendipity Rendezvous the contribution of this dissertation invests the dedicated time of Interruptibility trip in the inter coordination among the robots by finding a serendipity path This path is where the robot which runs Serendipity Rendezvous meets its colleagues accidentally on its way to the rendezvous point The evaluation results show that Serendipity Rendezvous is able to mitigate the negative impact of Interruptibility while maintaining its

positive impacts Moreover it provides a balance utilization of robots for the exploration activities These results are achieved without affecting the already scheduled rendezvous Hence Serendipity Rendezvous optimizes periodic rendezvous sessions as long as the margin of the gaining knowledge by meeting other robots on the serendipity path is considered rewarded for the robots which run Serendipity Rendezvous **Combinatorics and Complexity of Partition Functions** Alexander Barvinok, 2017-03-13 Partition functions arise in combinatorics and related problems of statistical physics as they encode in a succinct way the combinatorial structure of complicated systems The main focus of the book is on efficient ways to compute approximate various partition functions such as permanents hafnians and their higher dimensional versions graph and hypergraph matching polynomials the independence polynomial of a graph and partition functions enumerating 0 1 and integer points in polyhedra which allows one to make algorithmic advances in otherwise intractable problems The book unifies various often quite recent results scattered in the literature concentrating on the three main approaches scaling interpolation and correlation decay The prerequisites include moderate amounts of real and complex analysis and linear algebra making the book accessible to advanced math and physics undergraduates Sparsity Jaroslav Nešetřil, Patrice Ossona de Mendez, 2012-04-24 This is the first book devoted to the systematic study of sparse graphs and sparse finite structures Although the notion of sparsity appears in various contexts and is a typical example of a hard to define notion the authors devised an unifying classification of general classes of structures This approach is very robust and it has many remarkable properties For example the classification is expressible in many different ways involving most extremal combinatorial invariants. This study of sparse structures found applications in such diverse areas as algorithmic graph theory complexity of algorithms property testing descriptive complexity and mathematical logic homomorphism preservation fixed parameter tractability and constraint satisfaction problems It should be stressed that despite of its generality this approach leads to linear and nearly linear algorithms Jaroslav Ne et il is a professor at Charles University Prague Patrice Ossona de Mendez is a CNRS researcher et EHESS Paris This book is related to the material presented by the first author at ICM 2010

Introduction to Tropical Geometry Diane Maclagan, Bernd Sturmfels, 2021-12-13 Tropical geometry is a combinatorial shadow of algebraic geometry offering new polyhedral tools to compute invariants of algebraic varieties. It is based on tropical algebra where the sum of two numbers is their minimum and the product is their sum. This turns polynomials into piecewise linear functions and their zero sets into polyhedral complexes. These tropical varieties retain a surprising amount of information about their classical counterparts. Tropical geometry is a young subject that has undergone a rapid development since the beginning of the 21st century. While establishing itself as an area in its own right deep connections have been made to many branches of pure and applied mathematics. This book offers a self contained introduction to tropical geometry suitable as a course text for beginning graduate students. Proofs are provided for the main results such as the Fundamental Theorem and the Structure Theorem Numerous examples and explicit computations illustrate the main

concepts Each of the six chapters concludes with problems that will help the readers to practice their tropical skills and to gain access to the research literature This wonderful book will appeal to students and researchers of all stripes it begins at an undergraduate level and ends with deep connections to toric varieties compactifications and degenerations In between the authors provide the first complete proofs in book form of many fundamental results in the subject The pages are sprinkled with illuminating examples applications and exercises and the writing is lucid and meticulous throughout It is that rare kind of book which will be used equally as an introductory text by students and as a reference for experts Matt Baker Georgia Institute of Technology Tropical geometry is an exciting new field which requires tools from various parts of mathematics and has connections with many areas A short definition is given by Maclagan and Sturmfels Tropical geometry is a marriage between algebraic and polyhedral geometry. This wonderful book is a pleasant and rewarding journey through different landscapes inviting the readers from a day at a beach to the hills of modern algebraic geometry. The authors present building blocks examples and exercises as well as recent results in tropical geometry with ingredients from algebra combinatorics symbolic computation polyhedral geometry and algebraic geometry. The volume will appeal both to beginning graduate students willing to enter the field and to researchers including experts Alicia Dickenstein University of Buenos Aires Argentina Mathematics For Computation (M4c) Marco Benini, Olaf Beyersdorff, Michael Rathjen, Peter Michael Schuster, 2023-03-21 The overall topic of the volume Mathematics for Computation M4C is mathematics taking crucially into account the aspect of computation investigating the interaction of mathematics with computation bridging the gap between mathematics and computation wherever desirable and possible and otherwise explaining why not Recently abstract mathematics has proved to have more computational content than ever expected Indeed the axiomatic method originally intended to do away with concrete computations seems to suit surprisingly well the programs from proofs paradigm with abstraction helping not only clarity but also efficiency Unlike computational mathematics which rather focusses on objects of computational nature such as algorithms the scope of M4C generally encompasses all the mathematics including abstract concepts such as functions The purpose of M4C actually is a strongly theory based and therefore is a more reliable and sustainable approach to actual computation up to the systematic development of verified software While M4C is situated within mathematical logic and the related area of theoretical computer science in principle it involves all branches of mathematics especially those which prompt computational considerations In traditional terms the topics of M4C include proof theory constructive mathematics complexity theory reverse mathematics type theory category theory and domain theory The aim of this volume is to provide a point of reference by presenting up to date contributions by some of the most active scholars in each field A variety of approaches and techniques are represented to give as wide a view as possible and promote cross fertilization between different styles and traditions **SOFSEM 2021: Theory and Practice of Computer** Science Tomáš Bureš, Riccardo Dondi, Johann Gamper, Giovanna Guerrini, Tomasz Jurdziński, Claus Pahl, Florian

Sikora, Prudence W.H. Wong, 2021-01-20 This book contains the invited and contributed papers selected for presentation at SOFSEM 2021 the 47th International Conference on Current Trends in Theory and Practice of Computer Science which was held online during January 25 28 2021 hosted by the Free University of Bozen Bolzano Italy The 33 full and 7 short papers included in the volume were carefully reviewed and selected from 100 submissions. They were organized in topical sections on foundations of computer science foundations of software engineering foundations of data science and engineering and foundations of algorithmic computational biology The book also contains 5 invited papers Lattice Basis Reduction Murray R. Bremner, 2011-08-12 First developed in the early 1980s by Lenstra Lenstra and Lov sz the LLL algorithm was originally used to provide a polynomial time algorithm for factoring polynomials with rational coefficients It very quickly became an essential tool in integer linear programming problems and was later adapted for use in cryptanalysis This book provides an introduction to the theory and applications of lattice basis reduction and the LLL algorithm With numerous examples and suggested exercises the text discusses various applications of lattice basis reduction to cryptography number theory polynomial factorization and matrix canonical forms **Evolutionary Multi-Criterion Optimization** Hemant Singh, Tapabrata Ray, Joshua Knowles, Xiaodong Li, Juergen Branke, Bing Wang, Akira Oyama, 2025-02-27 This two volume set LNCS 15512 15513 constitutes the proceedings of the 13th International Conference on Evolutionary Multi Criterion Optimization EMO 2025 held in Canberra ACT Australia in March 2025 The 38 full papers and 2 extended abstracts presented in this book were carefully reviewed and selected from 63 submissions. The papers are divided into the following topical sections Part I Algorithm design Benchmarking Applications Part II Algorithm analysis Surrogates and machine learning Multi criteria decision support

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