Computational Complexity Analysis Of Simple Genetic

Computer Performance EngineeringGenetic and Evolutionary Computation ConferenceLectures in Parallel ComputationLogic and Computational ComplexityComputer Network SecurityComplex NonlinearityBioinspired Computation in Combinatorial OptimizationEngineering Asset Management 2011Computational ComplexityComputational ComplexityComputational ComplexityWALCOM: Algorithms and ComputationThe Description Logic HandbookComplexity and Real ComputationGenetic and Evolutionary Computation ConferenceComplexity Theory of Real FunctionsCognition and IntractabilityTheories of Computational ComplexityComputer Aided VerificationComputer Analysis of Images and PatternsGenetic and Evolutionary Computation — GECCO 2004Algorithms and ComputationDescriptional Complexity of Formal SystemsTraffic Monitoring and AnalysisAspects of ComplexityAdvancing Computing, Communication, Control and ManagementGenetic Programming Theory and Practice IXAlgorithms and Theory of Computation HandbookIntelligent Systems in Science and Information 2014Foundations of AlgorithmsTopics in Computational Complexity and the Analysis of AlgorithmsComputer Vision - ECCV 2000Computer Analysis of Images and PatternsThe Computational Beauty of NatureMultivariate Complexity Analysis of Team Management ProblemsTheory of Evolutionary ComputationComputational ComplexityLean Six Sigma Secrets for the CIOTransforms and Fast Algorithms for Signal Analysis and RepresentationsPRICAI 2006: Trends in Artificial Intelligence

Computer Performance Engineering

This book contains revised versions of papers invited for presentation at the International Workshop on Logic and Computational Complexity, LCC '94, held in Indianapolis, IN in October 1994. The synergy between logic and computational complexity has gained importance and vigor in recent years, cutting across many areas. The 25 revised full papers in this book contributed by internationally outstanding researchers document the state-of-the-art in this interdisciplinary field of growing interest; they are presented in sections on foundational issues, applicative and proof-theoretic complexity, complexity of proofs, computational complexity of functionals, complexity and model theory, and finite model theory.

Genetic and Evolutionary Computation Conference

Algorithms and Theory of Computation Handbook is a comprehensive collection of algorithms and data structures that also covers many theoretical issues. It offers a balanced perspective that reflects the needs of practitioners, including emphasis on applications within discussions on theoretical issues. Chapters include information on finite precision issues as well as discussion of specific algorithms where algorithmic techniques are of special importance, including graph drawing, robotics, forming a VLSI chip, vision and image processing, data compression, and cryptography. The book also presents some advanced topics in combinatorial optimization and parallel/distributed computing. • applications areas where

algorithms and data structuring techniques are of special importance • graph drawing • robot algorithms • VLSI layout • vision and image processing algorithms • scheduling • electronic cash • data compression • dynamic graph algorithms • on-line algorithms • multidimensional data structures • cryptography • advanced topics in combinatorial optimization and parallel/distributed computing

Lectures in Parallel Computation

Ten years ago, the inaugural European Conference on Computer Vision was held in Antibes, France. Since then, ECCV has been held biennially under the auspices of the European Vision Society at venues around Europe. This year, the privilege of organizing ECCV 2000 falls to Ireland and it is a signal honour for us to host what has become one of the most important events in the calendar of the computer vision community. ECCV is a single-track conference comprising the highest quality, previously unpublished, contributed papers on new and original research in computer vision. This year, 266 papers were submitted and, following a rigorous double-blind review process, with each paper being reviewed by three referees, 116 papers were selected by the Programme Committee for presentation at the conference. The venue for ECCV 2000 is the University of Dublin, Trinity College. -unded in 1592, it is Ireland's oldest university and has a proud tradition of scholarship in the Arts, Humanities, and Sciences, alike. The Trinity campus, set in the heart of Dublin, is an oasis of tranquility and its beautiful squares, elegant buildings, and tree-lined playing- elds provide the perfect setting for any conference.

Logic and Computational Complexity

This volume presents four machine-independent theories of computational complexity, which have been chosen for their intrinsic importance and practical relevance. The book includes a wealth of results - classical, recent, and others which have not been published before. In developing the mathematics underlying the size, dynamic and structural complexity measures, various connections with mathematical logic, constructive topology, probability and programming theories are established. The facts are presented in detail. Extensive examples are provided, to help clarify notions and constructions. The lists of exercises and problems include routine exercises, interesting results, as well as some open problems.

Computer Network Security

This edited book reports on recent developments in the theory of evolutionary computation, or more generally the domain of randomized search heuristics. It starts with two chapters on mathematical methods that are often used in the analysis of randomized search heuristics, followed by three chapters on how to measure the complexity of a search heuristic: black-box complexity, a counterpart of classical complexity theory in black-box optimization; parameterized complexity, aimed at a more fine-grained view of the difficulty of problems; and the fixed-budget perspective, which answers the question of how good a solution will be after investing a certain computational budget. The book then describes

theoretical results on three important questions in evolutionary computation: how to profit from changing the parameters during the run of an algorithm; how evolutionary algorithms cope with dynamically changing or stochastic environments; and how population diversity influences performance. Finally, the book looks at three algorithm classes that have only recently become the focus of theoretical work: estimation-of-distribution algorithms; artificial immune systems; and genetic programming. Throughout the book the contributing authors try to develop an understanding for how these methods work, and why they are so successful in many applications. The book will be useful for students and researchers in theoretical computer science and evolutionary computing.

Complex Nonlinearity

Bioinspired computation methods such as evolutionary algorithms and ant colony optimization are being applied successfully to complex engineering problems and to problems from combinatorial optimization, and with this comes the requirement to more fully understand the computational complexity of these search heuristics. This is the first textbook covering the most important results achieved in this area. The authors study the computational complexity of bioinspired computation and show how runtime behavior can be analyzed in a rigorous way using some of the best-known combinatorial optimization problems -- minimum spanning trees, shortest paths, maximum matching, covering and scheduling problems. A feature of the book is the separate treatment of single- and multiobjective problems, the latter a domain where the development of the underlying theory seems to be lagging practical successes. This book will be very valuable for teaching courses on bioinspired computation and combinatorial optimization. Researchers will also benefit as the presentation of the theory covers the most important developments in the field over the last 10 years. Finally, with a focus on well-studied combinatorial optimization problems rather than toy problems, the book will also be very valuable for practitioners in this field.

Bioinspired Computation in Combinatorial Optimization

This book offers a comprehensive perspective to modern topics in complexity theory, which is a central field of the theoretical foundations of computer science. It addresses the looming question of what can be achieved within a limited amount of time with or without other limited natural computational resources. Can be used as an introduction for advanced undergraduate and graduate students as either a textbook or for self-study, or to experts, since it provides expositions of the various sub-areas of complexity theory such as hardness amplification, pseudorandomness and probabilistic proof systems.

Engineering Asset Management 2011

This book is a comprehensive presentation of recent results and developments on several widely used transforms and their fast algorithms. In many cases, new options are provided for improved or new fast algorithms, some of which are not well known in the digital signal processing community. The book is suitable as a textbook for senior undergraduate and graduate courses in digital signal

processing. It may also serve as an excellent self-study reference for electrical engineers and applied mathematicians whose work is related to the fields of electronics, signal processing, image and speech processing, or digital design and communication.

Computational Complexity

The book contains 8 detailed expositions of the lectures given at the Kaikoura 2000 Workshop on Computability, Complexity, and Computational Algebra. Topics covered include basic models and questions of complexity theory, the Blum-Shub-Smale model of computation, probability theory applied to algorithmics (randomized alogrithms), parametric complexity, Kolmogorov complexity of finite strings, computational group theory, counting problems, and canonical models of ZFC providing a solution to continuum hypothesis. The text addresses students in computer science or mathematics, and professionals in these areas who seek a complete, but gentle introduction to a wide range of techniques, concepts, and research horizons in the area of computational complexity in a broad sense.

Computational Complexity

The book Intelligent Systems in Science and Information 2014 is the carefully edited collection of 25 extended chapters from selected papers in the field of Computational Intelligence that , which received highly recommended feedback during the Science and Information Conference (SAI) 2014 review process. All chapters have gone through substantial extension and consolidation and were subject to another round of rigorous review and additional modification and represent the state of the art of the cutting-edge research and technologies in the related areas.

Computational Complexity

This book constitutes the proceedings of the 26th International Conference on Computer Aided Verification, CAV 2014, held as part of the Vienna Summer of Logic, VSL 2014, in Vienna, Austria, in July 2014. The 46 regular papers and 11 short papers presented in this volume were carefully reviewed and selected from a total of 175 regular and 54 short paper submissions. The contributions are organized in topical sections named: software verification; automata; model checking and testing; biology and hybrid systems; games and synthesis; concurrency; SMT and theorem proving; bounds and termination; and abstraction.

WALCOM: Algorithms and Computation

A large 2008 ISECS International Colloquium on Computing, Communication, Control, and Management (CCCM 2008), was held in Guangzhou, August 2008, China. Just like the name of the Colloquium, the theme for this conference is Advancing Computing, Communication, Control, and Management Technologies. 2008 ISECS International Colloquium on Computing, Communication, Control, and Management is co-sponsored by Guangdong University of Business Studies, China, Peoples' Friendship University of Russia, Russia, Central South University, China,

Southwestern University of Finance & Economics, China, and University of Amsterdam, Netherlands. It is also co-sponsored IEEE Technology Management Council, IEEE Computer Society, and Intelligent Information Technology Application Research Institute. Much work went into preparing a program of high quality. We received about 972 submissions. Every paper was reviewed by 3 program committee members, about 382 were selected as regular papers, representing a 39% acceptance rate for regular papers. The CCCM conferences serve as good platforms for the engineering community to meet with each other and to exchange ideas. The conference has also stroke a balance between theoretical and application development. The conference committees have been formed with over two hundred committee members who are mainly research center heads, faculty deans, department heads, professors, and research scientists from over 30 countries. The conferences are truly international meetings with a high level of participation from many countries. The response that we have received for the congress is excellent. This volume contains revised and extended research articles written by prominent researchers participating in the conference.

The Description Logic Handbook

Complexity and Real Computation

Starting with Cook's pioneering work on NP-completeness in 1970, polynomial complexity theory, the study of polynomial-time com putability, has quickly emerged as the new foundation of algorithms. On the one hand, it bridges the gap between the abstract approach of recursive function theory and the concrete approach of analysis of algorithms. It extends the notions and tools of the theory of computability to provide a solid theoretical foundation for the study of computational complexity of practical problems. In addition, the theoretical studies of the notion of polynomial-time tractability some times also yield interesting new practical algorithms. A typical exam ple is the application of the ellipsoid algorithm to combinatorial op timization problems (see, for example, Lovasz [1986]). On the other hand, it has a strong influence on many different branches of mathe matics, including combinatorial optimization, graph theory, number theory and cryptography. As a consequence, many researchers have begun to re-examine various branches of classical mathematics from the complexity point of view. For a given nonconstructive existence theorem in classical mathematics, one would like to find a construc tive proof which admits a polynomial-time algorithm for the solution. One of the examples is the recent work on algorithmic theory of per mutation groups. In the area of numerical computation, there are also two tradi tionally independent approaches: recursive analysis and numerical analysis.

Genetic and Evolutionary Computation Conference

Foundations of Algorithms, Fifth Edition offers a well-balanced presentation of algorithm design, complexity analysis of algorithms, and computational complexity. Ideal for any computer science students with a background in college algebra and discrete structures, the text presents mathematical concepts using standard English and simple notation to maximize accessibility and user-

friendliness. Concrete examples, appendices reviewing essential mathematical concepts, and a student-focused approach reinforce theoretical explanations and promote learning and retention. C++ and Java pseudocode help students better understand complex algorithms. A chapter on numerical algorithms includes a review of basic number theory, Euclid's Algorithm for finding the greatest common divisor, a review of modular arithmetic, an algorithm for solving modular linear equations, an algorithm for computing modular powers, and the new polynomial-time algorithm for determining whether a number is prime. The revised and updated Fifth Edition features an all-new chapter on genetic algorithms and genetic programming, including approximate solutions to the traveling salesperson problem, an algorithm for an artificial ant that navigates along a trail of food, and an application to financial trading. With fully updated exercises and examples throughout and improved instructor resources including complete solutions, an Instructor s Manual and PowerPoint lecture outlines, Foundations of Algorithms is an essential text for undergraduate and graduate courses in the design and analysis of algorithms. Key features include: The only text of its kind with a chapter on genetic algorithms Use of C++ and Java pseudocode to help students better understand complex algorithms No calculus background required Numerous clear and student-friendly examples throughout the text Fully updated exercises and examples throughout Improved instructor resources, including complete solutions, an Instructor s Manual, and PowerPoint lecture outlines"

Complexity Theory of Real Functions

In this book, Gary William Flake develops in depth the simple idea that recurrent rules can produce rich and complicated behaviors. Distinguishing "agents" (e.g., molecules, cells, animals, and species) from their interactions (e.g., chemical reactions, immune system responses, sexual reproduction, and evolution), Flake argues that it is the computational properties of interactions that account for much of what we think of as "beautiful" and "interesting." From this basic thesis, Flake explores what he considers to be today's four most interesting computational topics: fractals, chaos, complex systems, and adaptation.

Cognition and Intractability

These contributions, written by the foremost international researchers and practitioners of Genetic Programming (GP), explore the synergy between theoretical and empirical results on real-world problems, producing a comprehensive view of the state of the art in GP. Topics include: modularity and scalability; evolvability; human-competitive results; the need for important high-impact GP-solvable problems;; the risks of search stagnation and of cutting off paths to solutions; the need for novelty; empowering GP search with expert knowledge; In addition, GP symbolic regression is thoroughly discussed, addressing such topics as guaranteed reproducibility of SR; validating SR results, measuring and controlling genotypic complexity; controlling phenotypic complexity; identifying, monitoring, and avoiding over-fitting; finding a comprehensive collection of SR benchmarks, comparing SR to machine learning. This text is for all GP explorers. Readers will discover large-scale, real-world applications of GP to a variety of problem domains via in-depth presentations of the latest and most significant results.

Theories of Computational Complexity

In this thesis, we identify and develop simple combinatorial models for four natural team management tasks and identify tractable and intractable cases with respect to their computational complexity. To this end, we perform a multivariate complexity analysis of the underlying problems and test some of our algorithms on synthetic and empirical data. Our first task is to find a team that is accepted by competing groups and also satisfies the agenda of some principal. Extending an approval balloting procedure by an agenda model, we formalize this task as a simple combinatorial model where potential team members are represented by a set of proposals and the competing groups are represented by voters with favorite ballots, that is, subsets of proposals. We show that the underlying problems UNANIMOUSLY ACCEPTED BALLOT and MAJORITYWISE ACCEPTED BALLOT are NP-hard even without an agenda for the principal. Herein, UNANIMOUSLY ACCEPTED BALLOT asks for a set of proposals that is accepted by all voters and MAJORITYWISE ACCEPTED BALLOT asks for a set of proposals that is accepted by a strict majority of the voters where acceptance means that each voter supports the majority of the proposals. On the positive side, we show fixed-parameter tractability with respect to the parameters "number of proposals" and "number of voters". With respect to the parameter "maximum size of the favorite ballots" we show fixed-parameter tractability for UNANIMOUSLY ACCEPTED BALLOT and W[1]-completeness for MAJORITYWISE ACCEPTED BALLOT. On the negative side, we show W[2]-hardness for the parameter "size of the solution" and NP-hardness for various special cases. Our second task is to partition a set of individuals into homogeneous groups. Using concepts from the combinatorial data anonymization model k-ANONYMITY, we develop a new model which formalizes this task. The information about the individuals is stored in a matrix where rows represent individuals and columns represent attributes of the individuals. The homogeneity requirement of each potential group is specified by a "pattern vector". We show that some special cases of the underlying problem HOMOGENEOUS TEAM FORMATION are NP-hard while others allow for (fixed-parameter) tractability results. We transfer our "pattern vector" concept back to combinatorial data anonymization and show that it may help to improve the usability of the anonymized data. We show that the underlying problem PATTERN-GUIDED k-ANONYMITY is NP-hard and complement this by a fixed-parameter tractability result based on a "homogeneity parameterization". Building on this, we develop an exact ILP-based solution method as well as a simple but very effective greedy heuristic. Experiments on several real-world datasets show that our heuristic easily matches up to the established "Mondrian" algorithm for k-ANONYMITY in terms of quality of the anonymization and outperforms it in terms of running time. Our third task is to effectively train team members in order to ensure that from a set of important skills each skill is covered by a majority of the team. We formalize this task by a natural binary matrix modification problem where team members are represented by rows and skills are represented by columns. The underlying problem is known as LOBBYING in the context of bribery in voting. We study how natural parameters such as "number of rows", "number of columns", "number of rows to modify", or the "maximum number of ones missing for any column to have a majority of ones" (referred to as "gap value") govern the computational complexity. On the negative side, we show NP-hardness even if each row contains at most three ones. On the positive side, for example, we prove fixed-parameter

tractability for the parameter "number of columns" and provide a greedy logarithmic-factor approximation algorithm. We also show empirically that this greedy algorithm performs well on general instances. As a further key result, we prove LOGSNP-completeness for constant gap values. Our fourth task is to redistribute teams of equal size. More precisely, one asks to reduce the number of equal-size teams by dissolving some teams, distributing their team members to non-conflicting non-dissolved teams, and ensuring that all new teams are again of equal size. We formalize this task by a new combinatorial graph model. We show relations to known graph models such as perfect matchings, flow networks, and star partitions. On the negative side, we show that the underlying problem is NP-hard even if the old team size and the team size increase are distinct constants. On the positive side, we show that even our two-party variant of the problem is polynomial-time solvable when there are no conflicts or when the districts to dissolve and the districts to win are known. Furthermore, we show fixed-parameter tractability with respect to treewidth when the old team size and the team size increase are constants. In dieser Dissertation identifizieren und entwickeln wir einfache kombinatorische Modelle für vier natürliche Teamverwaltungsaufgaben und untersuchen bezüglich Berechnungskomplexität handhabbare und nicht handhabbare Fälle. Hierzu analysieren wir die multivariate Komplexität der zu Grunde liegenden Probleme und testen manche unserer Algorithmen auf synthetischen und empirischen Daten. Unsere erste Aufgabe ist es ein Team zu finden, welches von einer Gemeinschaft akzeptiert wird und den Vorstellungen (im Folgenden „Agenda") eines Chefs entspricht. Wir formalisieren diese Aufgabe mit einem einfachen kombinatorischen Modell, indem wir ein bekanntes Verfahren aus dem Wahlkontext durch ein Agendamodell erweitern. In diesem Modell wird die Gemeinschaft durch Wähler mit je einer „Favoritenmenge" repräsentiert. Wir zeigen, dass die resultierenden Probleme UNANIMOUSLY ACCEPTED BALLOT und MAJORITYWISE ACCEPTED BALLOT NP-schwer sind, sogar wenn es keine Agenda des Chefs gibt. Hierbei fragt UNANIMOUSLY ACCEPTED BALLOT, ob es ein Team gibt, welches von allen Wählern akzeptiert wird. MAJORITYWISE ACCEPTED BALLOT fragt, ob es ein Team gibt, welches von einer strikten Mehrheit der Wähler akzeptiert wird. Akzeptanz bedeutet in diesem Zusammenhang, dass jeder Wähler die Mehrheit der Teammitglieder unterstützt. Auf der positiven Seite zeigen wir „fixed-parameter tractability" (FPT) für die Parameter „Anzahl an potentiellen Teammitgliedern" und „Anzahl an Wählern". Für den Parameter „maximale Größe der Favoritenmengen" zeigen wir ein FPT-Ergebnis für UNANIMOUSLY ACCEPTED BALLOT und W[1]-Vollständigkeit für MAJORITYWISE ACCEPTED BALLOT. Unsere zweite Aufgabe ist es eine Menge von Individuen in homogene Gruppen zu partitionieren. Unter Ausnutzung von Konzepten des kombinatorischen Datenanonymisierungsmodells k-ANONYMITY entwickeln wir ein neues Modell, welches diese Aufgabe formalisiert. Dabei werden die Homogenitätsanforderungen jeder potentiellen Gruppe durch einen „Mustervektor" spezifiziert. Die Informationen über die Individuen sind in einer Matrix gespeichert, wo Individuen durch Zeilen und ihre Attribute durch Spalten repräsentiert werden. Wir zeigen, dass einige Spezialfälle des sich ergebenden Problems HOMOGENEOUS TEAM FORMATION NP-schwer sind während andere FPT-Ergebnisse ermöglichen. Wir übertragen unser „Mustervektorkonzept" zurück in die Welt der kombinatorischen Datenanonymisierung und zeigen, dass es helfen kann die Nutzbarkeit der anonymisierten Daten zu verbessern. Wir zeigen, dass das zu Grunde liegende Problem NP-schwer ist und ergänzen dies durch ein FPT-Ergebnis bezüglich eines

„Homogenitätsparameters". Aufbauend darauf entwickeln wir sowohl eine ILP-basierte exakte Lösungsmethode als auch eine Heuristik und testen diese in Experimenten mit empirischen Daten. Unsere dritte Aufgabe ist es ein Team effektiv auszubilden, um sicherzustellen, dass aus einer Menge von wichtigen Fähigkeiten jede jeweils von der Mehrheit der Teammitglieder beherrscht wird. Wir formalisieren diese Aufgabe durch ein natürliches Matrixmodifikationsproblem auf binären Matrizen, wobei Teammitglieder durch Zeilen und deren Fähigkeiten durch Spalten repräsentiert werden. Das resultierende Problem ist bekannt als LOBBYING im Kontext von Bestechung in Wahlen. Wir untersuchen wie natürliche Parameter wie „Anzahl an Zeilen", „Anzahl an Spalten" oder die „maximale Anzahl an fehlenden Einsen pro Spalte um eine Mehrheit an Einsen zu erhalten" (im Folgenden „Gap-Wert") die Berechnungskomplexität unseres Problems beeinflussen. Auf der negativen Seite zeigen wir NP-Schwere, sogar wenn jede Zeile höchstens drei Einsen enthält. Auf der positiven Seite zeigen wir zum Beipiel ein FPT-Ergebnis für den Parameter „Anzahl an Spalten" und entwickeln eine Heuristik mit logarithmischen Approximationsfaktort und testen diese auf empirischen Daten. Als weiteres Schlüsselergebnis zeigen wir, dass unser Problem LOGSNP-vollständig ist für konstante Gap-Werte. Unsere vierte Aufgabe ist es Teams gleicher Größe neu aufzuteilen. Genauer versucht man die Anzahl gleichgroßer Teams zu reduzieren indem man einige Teams auflöst, deren Mitglieder an nicht in Konflikt stehenden verbleibende Teams verteilt und dabei sicherstellt, dass alle neuen Teams wiederum gleich groß sind. Wir formalisieren diese Aufgabe durch ein neues kombinatorisches Graphmodell. Wir zeigen dessen Beziehungen zu bekannten Graphkonzepten wie Perfekten Matchings, Flussnetzwerken, und Sternpartitionen von Graphen. Auf der negativen Seite zeigen wir, dass das zu Grunde liegende Problem NP-schwer ist, sogar wenn die alte Teamgröße und der Teamgrößenanstieg voneinander verschiedene Konstanten sind. Auf der positiven Seite zeigen wir unter anderem, dass unser Problem in Polynomzeit lösbar ist, wenn es keine Konflikte gibt oder wenn die aufzulösenden und zu gewinnenden Teams bereits bekannt sind.

Computer Aided Verification

This text represents state-of-the-art trends and developments in the emerging field of engineering asset management as presented at the Sixth World Congress on Engineering Asset Management (WCEAM) held in Cincinnati, OH, USA from October 3-5, 2011 The Proceedings of the WCEAM 2011 is an excellent reference for practitioners, researchers and students in the multidisciplinary field of asset management, covering topics such as: Asset condition monitoring and intelligent maintenance; Asset data warehousing, data mining and fusion; Asset performance and level-of-service models; Design and lifecycle integrity of physical assets; Deterioration and preservation models for assets; Education and training in asset management; Engineering standards in asset management; Fault diagnosis and prognostics; Financial analysis methods for physical assets; Human dimensions in integrated asset management; Information quality management; Information systems and knowledge management; Intelligent maintenance; Intelligent sensors and devices; Maintenance strategies in asset management; Optimization decisions in asset management; Prognostics & Health Management; Risk management in asset management; Strategic asset management; and Sustainability in asset management.

Computer Analysis of Images and Patterns

This book constitutes the refereed proceedings of the Second International Workshop on Mathematical Methods, Models, and Architectures for Computer Network Security, MMM-ACNS 2003, held in St. Petersburg, Russia in September 2003. The 29 revised full papers and 12 revised short papers presented together with 6 invited papers were carefully reviewed and selected from a total of 62 submissions. The papers are organized in topical sections on mathematical models and architectures for computer network security; intrusion detection; public key distribution, authentication, and access control; cryptography; and stenography.

Genetic and Evolutionary Computation — GECCO 2004

Provides an accessible introduction to computational complexity analysis and its application to questions of intractability in cognitive science.

Algorithms and Computation

This book constitutes the proceedings of the 6th International Workshop on Traffic Monitoring and Analysis, TMA 2014, held in London, UK, in April 2014. The thoroughly refereed 11 full papers presented in this volume were carefully reviewed and selected from 30 submissions. The contributions are organized in topical sections on tools and lessons learned from passive measurement, performance at the edge and Web, content and inter domain.

Descriptional Complexity of Formal Systems

Welcome to the third annualWorkshopon Algorithms and Computation (WAL- COM 2009). The workshop provided a forum for researchers working in al- rithms and theory of computation from all over the world. This volume contains the papers presented at WALCOM 2009 held during February 18-20, 2009 at the Indian Statistical Institute, Kolkata, India. The scienti?c program of WALCOM 2009 included 30 contributed papers selected throughaveryhighqualityrefereeingprocessfrom102submissionswithauthors from 30 countries. In addition, there were four invited talks delivered by Otfried Cheong of KAIST, Korea, Janos Pach of Courant Institute, NY, USA, Sandeep SenofIndianInstitute ofTechnology,NewDelhi,IndiaandCheeYapofCourant Institute, NY, USA, who are all eminent and well-known researchers. As editors of these proceedings, we would like to thank all the authors who showed interest in WALCOM 2009. The reputation of a conference is enhanced by its Program Committee and the invited talks. We were able to get highly respected researchers to serve on our Program Committee. We are very much indebted to all members of the Program Committee who did excellent work in helping us to ?nalize the technical program. We also thank all external referees without whose help it would not have been possible to evaluate so many cont- butions in so little time. We thank the invited speakers for presenting their talks on current research areas of theoretical computer science.

Traffic Monitoring and Analysis

This beginning graduate textbook describes both recent achievements and classical results of computational complexity theory. Requiring essentially no background apart from mathematical maturity, the book can be used as a reference for self-study for anyone interested in complexity, including physicists, mathematicians, and other scientists, as well as a textbook for a variety of courses and seminars. More than 300 exercises are included with a selected hint set. The book starts with a broad introduction to the field and progresses to advanced results. Contents include: definition of Turing machines and basic time and space complexity classes, probabilistic algorithms, interactive proofs, cryptography, quantum computation, lower bounds for concrete computational models (decision trees, communication complexity, constant depth, algebraic and monotone circuits, proof complexity), average-case complexity and hardness amplification, derandomization and pseudorandom constructions, and the PCP theorem.

Aspects of Complexity

The classical theory of computation has its origins in the work of Goedel, Turing, Church, and Kleene and has been an extraordinarily successful framework for theoretical computer science. The thesis of this book, however, is that it provides an inadequate foundation for modern scientific computation where most of the algorithms are real number algorithms. The goal of this book is to develop a formal theory of computation which integrates major themes of the classical theory and which is more directly applicable to problems in mathematics, numerical analysis, and scientific computing. Along the way, the authors consider such fundamental problems as: * Is the Mandelbrot set decidable? * For simple quadratic maps, is the Julia set a halting set? * What is the real complexity of Newton's method? * Is there an algorithm for deciding the knapsack problem in a ploynomial number of steps? * Is the Hilbert Nullstellensatz intractable? * Is the problem of locating a real zero of a degree four polynomial intractable? * Is linear programming tractable over the reals? The book is divided into three parts: The first part provides an extensive introduction and then proves the fundamental NP-completeness theorems of Cook-Karp and their extensions to more general number fields as the real and complex numbers. The later parts of the book develop a formal theory of computation which integrates major themes of the classical theory and which is more directly applicable to problems in mathematics, numerical analysis, and scientific computing.

Advancing Computing, Communication, Control and Management

This book constitutes the refereed proceedings of the 15th International Workshop of Descriptional Complexity of Formal Systems, DCFS 2013, held in London, ON, Canada, in July 2013. The 22 revised full papers presented together with 4 invited papers were carefully reviewed and selected from 46 submissions. The topics covered are automata, grammars, languages and other formal systems; various modes of operations and complexity measures; co-operating systems; succinctness of description of objects, state-explosion-like phenomena; circuit complexity of Boolean functions and related measures; size complexity and structural complexity of formal systems; trade-offs between computational models

and mode of operation; applications of formal systems; for instance in software and hardware testing, in dialogue systems, in systems modeling or in modeling natural languages; and their complexity constraints; size or structural complexity of formal systems for modeling natural languages; complexity aspects related to the combinatorics of words; descriptional complexity in resource-bounded or structure-bounded environments; structural complexity as related to descriptional complexity; frontiers between decidability and undecidability; universality and reversibility; nature-motivated (bio-inspired) architectures and unconventional models of computing; Kolmogorov-Chaitin complexity, algorithmic information.

Genetic Programming Theory and Practice IX

This book constitutes the refereed proceedings of the 9th Pacific Rim International Conference on Artificial Intelligence, PRICAI 2006, held in Guilin, China in August 2006. The 81 revised full papers and 87 revised short papers presented together with 3 keynote talks were carefully reviewed and selected from 596 submissions. The papers are organized in topical sections on intelligent agents, automated reasoning, machine learning and data mining, natural language processing and speech recognition, computer vision, perception and animation, evolutionary computing, industrial applications, intelligent agents, automated reasoning, evolutionary computing, game, machine learning and data mining, information retrieval, natural language processing, neural networks, and computer vision.

Algorithms and Theory of Computation Handbook

Complex Nonlinearity: Chaos, Phase Transitions, Topology Change and Path Integrals is a book about prediction & control of general nonlinear and chaotic dynamics of high-dimensional complex systems of various physical and non-physical nature and their underpinning geometro-topological change. The book starts with a textbook-like expose on nonlinear dynamics, attractors and chaos, both temporal and spatio-temporal, including modern techniques of chaos–control. Chapter 2 turns to the edge of chaos, in the form of phase transitions (equilibrium and non-equilibrium, oscillatory, fractal and noise-induced), as well as the related field of synergetics. While the natural stage for linear dynamics comprises of flat, Euclidean geometry (with the corresponding calculation tools from linear algebra and analysis), the natural stage for nonlinear dynamics is curved, Riemannian geometry (with the corresponding tools from nonlinear, tensor algebra and analysis). The extreme nonlinearity – chaos – corresponds to the topology change of this curved geometrical stage, usually called configuration manifold. Chapter 3 elaborates on geometry and topology change in relation with complex nonlinearity and chaos. Chapter 4 develops general nonlinear dynamics, continuous and discrete, deterministic and stochastic, in the unique form of path integrals and their action-amplitude formalism. This most natural framework for representing both phase transitions and topology change starts with Feynman's sum over histories, to be quickly generalized into the sum over geometries and topologies. The last Chapter puts all the previously developed techniques together and presents the unified form of complex nonlinearity. Here we have chaos, phase transitions, geometrical dynamics and topology change, all working together in the form of path integrals. The objective of this book is to provide a serious reader with a serious scientific tool that will enable them to actually perform a competitive

research in modern complex nonlinearity. It includes a comprehensive bibliography on the subject and a detailed index. Target readership includes all researchers and students of complex nonlinear systems (in physics, mathematics, engineering, chemistry, biology, psychology, sociology, economics, medicine, etc.), working both in industry/clinics and academia.

Intelligent Systems in Science and Information 2014

This book constitutes the refereed proceedings of the 10th International Conference on Computer Analysis of Images and Patterns, CAIP 2003, held in Groningen, The Netherlands in August 2003. The 94 revised papers presented were carefully reviewed and selected from 160 submissions. The papers are organized in topical sections on analysis and understanding, video analysis, segmentation, shape, classification, face recognition, interpolation and spatial transformations, and filtering.

Foundations of Algorithms

Topics in Computational Complexity and the Analysis of Algorithms

Computer Vision - ECCV 2000

This volume contains the proceedings of the 7th European Performance En-neering Workshop (EPEW 2010), held in Bertinoro, Italy, on September 23–24, 2010. The purpose of this workshop series is to gather academic and industrial researchers working on all aspects of performance engineering. This year the workshop was structured around three main areas: system and network p-formance engineering, software performance engineering, and the modeling and evaluation techniques supporting them. This edition of the workshop attracted 38 submissions, whose authors we wish to thank for their interest in EPEW 2010. After a careful review process during which every paper was refereed by at least three reviewers, the Program Committee selected 16 papers for presentation at the workshop. We warmly thank all the members of the ProgramCommittee and all the reviewersfor their fair and constructive comments and discussions. The workshop program was enriched by two keynote talks given by Marco Roccetti and Ralf Reussner. We conclude by expressing our gratitude to all the people who contributed to the organization of EPEW 2010, in particular the sta? of the University Residential Center of Bertinoro. We are also grateful to the EasyChair team for having allowed us to use their conference system and Springer for the continued editorial support of this workshop series.

Computer Analysis of Images and Patterns

This is an annual conference that deals with computational complexity in very broad terms. Complexity 2003 looks into topics such as complexity classes, algebraic complexity, proof complexity, interactive proof systems, Kolmogorov

complexity, Reducibility, communication complexity, complexity and logic, nonapproximability, cryptographic complexity, complexity and learning, quantum computation, circuits and other concrete computational models.

The Computational Beauty of Nature

New and classical results in computational complexity, including interactive proofs, PCP, derandomization, and quantum computation. Ideal for graduate students.

Multivariate Complexity Analysis of Team Management Problems

Theory of Evolutionary Computation

This book contains collected lectures given at the 1990 ALCOM Spring School of Parallel Computation. The motivation for the school was to provide an introduction for graduate students to topics at the leading edge of research in this very active area of computer science. Topics covered include PRAM algorithmics, general purpose computation, systolic and distributed algorithms, distributed memory models, as well as issues from practical parallel computation. The papers by some of the leading figures in this field have been carefully edited to make a coherent and unique introduction to the state of the art in concurrent computing.

Computational Complexity

The two volume set LNCS 3102/3103 constitutes the refereed proceedings of the Genetic and Evolutionary Computation Conference, GECCO 2004, held in Seattle, WA, USA, in June 2004. The 230 revised full papers and 104 poster papers presented were carefully reviewed and selected from 460 submissions. The papers are organized in topical sections on artificial life, adaptive behavior, agents, and ant colony optimization; artificial immune systems, biological applications; coevolution; evolutionary robotics; evolution strategies and evolutionary programming; evolvable hardware; genetic algorithms; genetic programming; learning classifier systems; real world applications; and search-based software engineering.

Lean Six Sigma Secrets for the CIO

This volume presents the proceedings of the fourth annual International Symposium on Algorithms and Computation, held in Hong Kong in December 1993.Numerous selected papers present original research in such areas as design and analysis of algorithms, computational complexity, and theory of computation. Topics covered include: - automata, languages, and computability, - combinatorial, graph, geometric, and randomized algorithms, - networks and distributed algorithms, - VLSIand parallel algorithms, - theory of learning and robotics, - number theory and robotics. Three invited papers are also included.

Transforms and Fast Algorithms for Signal Analysis and

Representations

Going beyond the usual how-to guide, Lean Six Sigma Secrets for the CIO supplies proven tips and valuable case studies that illustrate how to combine Six Sigma's rigorous quality principles with Lean methods for uncovering and eliminating waste in IT processes. Using these methods, the text explains how to take an approach that is all about improving IT performance, productivity, and security—as much as it is about cutting costs. Savvy IT veterans describe how to use Lean Six Sigma with IT governance frameworks such as COBIT and ITIL and warn why these frameworks should be considered starting points rather than destinations. This complete resource for CIOs and IT managers provides effective strategies to address the human element that is so fundamental to success and explains how to maximize the voice of your customers while keeping in touch with the needs of your staff. And perhaps most importantly—it provides the evidence needed to build your case to upper management. Supplying you with the tools to create methods that will bring out the best in your employees; Lean Six Sigma Secrets for the CIO provides the understanding required to manage your IT operations with unique effectiveness and efficiency in service of the bottom line.

PRICAI 2006: Trends in Artificial Intelligence

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