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Artificial Intelligence Planning Systems James Hendler 2014-06-28 Artificial Intelligence Planning Systems documents the proceedings of the First International Conference on AI Planning Systems held in College Park, Maryland on June 15-17, 1992. This book discusses the abstract probabilistic modeling of action; building symbolic primitives with continuous control routines; and systematic adaptation for case-based planning. The analysis of ABSTRIPS; conditional nonlinear planning; and building plans to monitor and exploit open-loop and closed-loop dynamics are also elaborated. This text likewise covers the modular utility representation for decision-theoretic planning; reaction and reflection in tetris; and planning in intelligent sensor fusion. Other topics include the resource-bounded adaptive agent, critical look at Knoblock's hierarchy mechanism, and traffic laws for mobile robots. This publication is beneficial to students and researchers conducting work on AI planning systems.
PODC'19 Podc'19 2020-04-13
Algorithms - ESA '98 Gianfranco Bilardi 2003-07-30 9
Distributed Graph Analytics Unnikrishnan Cheramangalath 2020-04-17 This book brings together two important trends: graph algorithms and high-performance computing. Efficient and scalable execution of graph processing applications in data or network analysis requires innovations at multiple levels: algorithms, associated data structures, their implementation and tuning to a particular hardware. Further, programming languages and the associated compilers play a crucial role when it comes to automating efficient code generation for various architectures. This book discusses the essentials of all these aspects. The book is divided into three parts: programming, languages, and their compilation. The first part examines the manual parallelization of graph algorithms, revealing various parallelization patterns encountered, especially when dealing with graphs. The second part uses these patterns to provide language constructs that allow a graph algorithm to be specified. Programmers can work with these language constructs without worrying about their implementation, which is the focus of the third part. Implementation is handled by a compiler, which can specialize code generation for a backend device. The book also includes suggestive results on different platforms, which illustrate and justify the theory and practice covered. Together, the three parts provide the essential ingredients for creating a high-performance graph application. The book ends with a section on future directions, which offers several pointers to promising topics for future research. This book is intended for new researchers as well as graduate and advanced undergraduate students. Most of the chapters can be read independently by those familiar with the basics of parallel programming and graph algorithms. However, to make the material more accessible, the book includes a brief background on elementary graph algorithms, parallel computing and GPUs. Moreover it presents a case study using Falcon, a domain-specific language for graph algorithms, to illustrate the concepts.
Stabilization, Safety, and Security of Distributed Systems Rachid Guerraoui 2009-10-26 The papers in this volume were presented at the 11th International Sym- sium on Stabilization, Safety, and Security of Distributed Systems (SSS), held November 3–6, 2009 in Lyon, France. SSS is an international forum for researchers and practitioners in the design anddevelopmentoffault-tolerantdistributedsystemswithself-*attributes,such as self-stabilization, self-con?guration, self-organization, self-management, se- healing, self-optimization, self-adaptiveness, self-protection, etc. SSS started as theWorkshoponSelf-StabilizingSystems(WSS),the?rsttwoofwhichwereheld inAustinin1989andinLasVegasin1995.Startingin1995,theworkshopbegan to be held biennially; it was held in Santa Barbara (1997), Austin (1999), and Lisbon (2001). As interest grew and the community expanded, in 2003, the title of the forum was changed to the Symposium on Self-Stabilizing Systems (SSS). SSS was organized in San Francisco in 2003 and in Barcelona in 2005. As SSS broadened its scope and attracted researchers from other communities, a couple of changes were made in 2006. It became an annual event, and the name of the conferencewaschangedto the InternationalSymposiumonStabilization,Safety, and Security of Distributed Systems (SSS). The last three SSS conferences were held in Dallas (2006), Paris (2007), and Detroit (2008).
Distributed Systems Sukumar Ghosh 2006-11-22 Most applications in distributed computing center around a set of common subproblems. Distributed Systems: An Algorithmic Approach presents the algorithmic issues and necessary background theory that are needed to properly understand these challenges. Achieving a balance between theory and practice, this book bridges the gap betwee
Distributed Computing -- IWDC 2004 Nabanita Das 2004-12-16 This book constitutes the refereed proceedings of the 6th International Workshop on Distributed Computing, IWDC 2004, held in Kolkata, India in December 2004. The 27 revised full papers and 27 revised short papers presented together with 3 invited contributions and abstracts of 11 reviewed workshop papers were carefully reviewed and selected from 157 submissions. The papers are organized in topical sections on distributed algorithms, high-performance computing, distributed systems, wireless networks, information security, network protocols, reliability and testing, network topology and routing, mobile computing, ad-hoc networks, and sensor networks.
Supercomputing Vladimir Voevodin 2022-12-15 This book constitutes the refereed proceedings of the 8th Russian Supercomputing Days on Supercomputing, RuSCDays 2022, which took place in Moscow, Russia, in September 2022. The 49 full papers and 1 short paper presented in this volume were carefully reviewed and selected from 94 submissions. The papers are organized in the following topical sections: Supercomputer Simulation; HPC, BigData, AI: Architectures, Technologies, Tools; Distributed and Cloud Computing.
Introduction to Distributed Algorithms Gerard Tel 2000-09-28 Distributed algorithms have been the subject of intense development over the last twenty years. The second edition of this successful textbook provides an up-to-date introduction both to the topic, and to the theory behind the algorithms. The clear presentation makes the book suitable for advanced undergraduate or graduate courses, whilst the coverage is sufficiently deep to make it useful for practising engineers and researchers. The author concentrates on algorithms for the point-to-point message passing model, and includes algorithms for the implementation of computer communication networks. Other key areas discussed are algorithms for the control of distributed applications (wave, broadcast, election, termination detection, randomized algorithms for anonymous networks, snapshots, deadlock detection, synchronous systems), and fault-tolerance achievable by distributed algorithms. The two new chapters on sense of direction and failure detectors are state-of-the-art and will provide an entry to research in these still-developing topics.
Parallel and Distributed Computation: Numerical Methods Dimitri Bertsekas 2015-03-01 This highly acclaimed work, first published by Prentice Hall in 1989, is a comprehensive and theoretically sound treatment of parallel and distributed numerical methods. It focuses on algorithms that are naturally suited for massive parallelization, and it explores the fundamental convergence, rate of convergence, communication, and synchronization issues associated with such algorithms. This is an extensive book, which aside from its focus on parallel and distributed algorithms, contains a wealth of material on a broad variety of computation and optimization topics. It is an excellent supplement to several of our other books, including Convex Optimization Algorithms (Athena Scientific, 2015), Nonlinear Programming (Athena Scientific, 1999), Dynamic Programming and Optimal Control (Athena Scientific, 2012), Neuro-Dynamic Programming (Athena Scientific, 1996), and Network Optimization (Athena Scientific, 1998). The on-line edition of the book contains a 95-page solutions manual.
Algorithms and Computations Alok Aggarwal 2003-06-26 This book constitutes the refereed proceedings of the 10th International Symposium on Algorithms and Computation, ISAAC'99, held in Chennai, India, in December 1999. The 40 revised full papers presented together with four invited contributions were carefully reviewed and selected from 71 submissions. Among the topics covered are data structures, parallel and distributed computing, approximation algorithms, computational intelligence, online algorithms, complexity theory, graph algorithms, computational geometry, and algorithms in practice.
Algorithms, Parallelism and Fine-grained Complexity for Shortest Path Problems in Sparse Graphs Udit Agarwal 2019 Computation of shortest paths is one of the classical problems in theoretical computer science. Given a pair of nodes s and t in a graph G, the goal is to find a path of minimum weight from s to t. Most graphs that commonly occur in practice are sparse graphs. In this work, we deal with several computational problems related to shortest paths in sparse graphs and we present algorithms that provide significant improvements in performance in both sequential and distributed settings. We also present fine-grained reductions that establish fine-grained hardness for several problems related to shortest paths. In the sequential context, we consider the fine-grained complexity of sparse graph problems whose time complexities have stayed at Õ(mn) over the past several decades, where m is the number of edges and n is the number of vertices in the input graph. All of these problems are known to be subcubic equivalent and this shows that achieving sub-mn running time is hard, but only for dense graphs where $m = [Theta] (n2). We introduce the notion of a sparse reduction which preserves the sparsity of graphs, and we present near linear-time sparse reductions between various pairs of graph problems in the Õ(mn) class. We also introduce the MWC-hardness conjecture, which states that Minimum Weight Cycle problem cannot be solved in sub-mn time. We establish that several important graph problems in the Õ(mn) class such as APSP, second simple shortest path (2-SiSP), Radius, and Betweenness Centrality are MWC-Hard, establishing sub-mn fine-grained hardness for these problems. A well-known generalization of the shortest path problem is the k-simple shortest paths (k-SiSP) problem, where we want to find k simple paths from s to t in a non-decreasing order of their weight. In this thesis we present a new approach for computing all pairs k simple shortest paths (k-APSiSP), which is based on forming suitable path extensions to find simple shortest paths; this method is different from the 'detour finding' technique used in all prior work on computing multiple simple shortest paths, replacement paths, and distance sensitivity oracles. The Õ(mn) time bound of our 2-APSiSP algorithm matches the fine-grained time complexity for the simpler 2-SiSP problem, which is the single source-sink version of this problem. Computing APSP is one of the most fundamental problems in distributed computing. We present a simple Õ(n [superscript 3/2]) rounds deterministic algorithm for computing APSP in the well-known CONGEST model which is the first Õ(n2) round deterministic algorithm for this problem. We then improve this further by reducing the round complexity to Õ(n [superscript 4/3]). We also present a faster algorithm for graphs with moderate integer edge weights. We develop several derandomization techniques for our deterministic APSP algorithms. These include efficient deterministic distributed algorithms for computing a small blocker set, which is a set that intersects a desired collection of shortest paths, and several deterministic pipelined approaches for computing the shortest path distance values as well as for propagating the messages in the network. Aside from our deterministic results, all non-trivial distributed algorithms currently known for computing APSP are randomized
Integer Programming and Related Areas R.v. Randow 2012-12-06
Foundations of Software Technology and Theoretical Computer Science S.N. Maheshwari 1985-11
Surveys in Combinatorial Optimization S. Martello 2011-09-22 A collection of papers surveying recent progress in the field of Combinatorial Optimization. Topics examined include theoretical and computational aspects (Boolean Programming, Probabilistic Analysis of Algorithms, Parallel Computer Models and Combinatorial Algorithms), well-known combinatorial problems (such as the Linear Assignment Problem, the Quadratic Assignment Problem, the Knapsack Problem and Steiner Problems in Graphs) and more applied problems (such as Network Synthesis and Dynamic Network Optimization, Single Facility Location Problems on Networks, the Vehicle Routing Problem and Scheduling Problems).
Distributed Computing David Peleg 2000-01-01 Gives a thorough exposition of network spanners and other locality-preserving network representations such as sparse covers and partitions.
Distributed Computer Systems H. S. M. Zedan 2014-05-12 Distributed Computer Systems: Theory and Practice is a collection of papers dealing with the design and implementation of operating systems, including distributed systems, such as the amoeba system, argus, Andrew, and grapevine. One paper discusses the concepts and notations for concurrent programming, particularly language notation used in computer programming, synchronization methods, and also compares three classes of languages. Another paper explains load balancing or load redistribution to improve system performance, namely, static balancing and adaptive load balancing. For program efficiency, the user can choose from various debugging approaches to locate or fix errors without significantly disturbing the program behavior. Examples of debuggers pertain to the ada language and the occam programming language. Another paper describes the architecture of a real-time distributed database system used for computer network management, monitoring integration, as well as administration and control of both local area or wide area communications networks. The book can prove helpful to programmers, computer engineers, computer technicians, and computer instructors dealing with many aspects of computers, such as programming, hardware interface, networking, engineering or design.
Design and Analysis of Distributed Algorithms Nicola Santoro 2006-11-03 This text is based on a simple and fully reactive computational model that allows for intuitive comprehension and logical designs. The principles and techniques presented can be applied to any distributed computing environment (e.g., distributed systems, communication networks, data networks, grid networks, internet, etc.). The text provides a wealth of unique material for learning how to design algorithms and protocols perform tasks efficiently in a distributed computing environment.
Graphs and Algorithms in Communication Networks Arie Koster 2009-12-01 Algorithmic discrete mathematics plays a key role in the development of information and communication technologies, and methods that arise in computer science, mathematics and operations research – in particular in algorithms, computational complexity, distributed computing and optimization – are vital to modern services such as mobile telephony, online banking and VoIP. This book examines communication networking from a mathematical viewpoint. The contributing authors took part in the European COST action 293 – a four-year program of multidisciplinary research on this subject. In this book they offer introductory overviews and state-of-the-art assessments of current and future research in the fields of broadband, optical, wireless and ad hoc networks. Particular topics of interest are design, optimization, robustness and energy consumption. The book will be of interest to graduate students, researchers and practitioners in the areas of networking, theoretical computer science, operations research, distributed computing and mathematics.
Progress in Simulation George W. Zobrist 1994 Contributions from researchers and practitioners explore a spectrum of topics, including simulation software, parallel simulation techniques, knowledge-based simulations, simulation of neural nets, object-orientated simulation reuse of simulation models, and applications of simulation in areas such as architecture, manufacturing, LANs and others. These volumes are intended for a wide audience - those professionally involved in simulation research and applications, scholars and technical managers.
Parallel Computing in Optimization A. Migdalas 2013-12-01 During the last three decades, breakthroughs in computer technology have made a tremendous impact on optimization. In particular, parallel computing has made it possible to solve larger and computationally more difficult prob lems. This volume contains mainly lecture notes from a Nordic Summer School held at the Linkoping Institute of Technology, Sweden in August 1995. In order to make the book more complete, a few authors were invited to contribute chapters that were not part of the course on this first occasion. The purpose of this Nordic course in advanced studies was three-fold. One goal was to introduce the students to the new achievements in a new and very active field, bring them close to world leading researchers, and strengthen their competence in an area with internationally explosive rate of growth. A second goal was to strengthen the bonds between students from different Nordic countries, and to encourage collaboration and joint research ventures over the borders. In this respect, the course built further on the achievements of the "Nordic Network in Mathematical Programming" , which has been running during the last three years with the support ofthe Nordic Council for Advanced Studies (NorFA). The final goal was to produce literature on the particular subject, which would be available to both the participating students and to the students of the "next generation" .
Exploring New Frontiers of Theoretical Informatics Jean-Jacques Lévy 2006-04-11 In recent years, IT application scenarios have evolved in very innovative ways. Highly distributed networks have now become a common platform for large-scale distributed programming, high bandwidth communications are inexpensive and widespread, and most of our work tools are equipped with processors enabling us to perform a multitude of tasks. In addition, mobile computing (referring specifically to wireless devices and, more broadly, to dynamically configured systems) has made it possible to exploit interaction in novel ways. To harness the flexibility and power of these rapidly evolving, interactive systems, there is need of radically new foundational ideas and principles; there is need to develop the theoretical foundations required to design these systems and to cope with the many complex issues involved in their construction; and there is need to develop effective principles for building and analyzing such systems. Reflecting the diverse and wide spectrum of topics and interests within the theoretical computer science community, Exploring New Frontiers of Theoretical Informatics, is presented in two distinct but interrelated tracks: - Algorithms, Complexity and Models of Computation, -Logic, Semantics, Specification and Verification. Exploring New Frontiers of Theoretical Informatics contains 46 original and significant contributions addressing these foundational questions, as well as 4 papers by outstanding invited speakers. These papers were presented at the 3rd IFIP International Conference on Theoretical Computer Science (TCS 2004), which was held in conjunction with the 18th World Computer Congress in Toulouse, France in August 2004 and sponsored by the International Federation for Information Processing (IFIP).
Algorithms for Dynamic and Distributed Networks Matteo Pontecorvi 2017 In this thesis we study the problem of computing Betweenness Centrality in dynamic and distributed networks. Betweenness Centrality (BC) is a well-known measure for the relative importance of a node in a social network. It is widely used in applications such as understanding lethality in biological networks, identifying key actors in terrorist networks, supply chain management processes and more. The necessity of computing BC in large networks, especially when they quickly change their topology over time, motivates the study of dynamic algorithms that can perform faster than static ones. Moreover, the current techniques for computing BC requires a deeper understanding of a classic problem in computer science: computing all pairs all shortest paths (APASP) in a graph. One of the main contributions of this thesis is a collection of dynamic algorithms for computing APASP and BC scores which are provably faster than static algorithms for several classes of graphs. We use n = |V| and m = |E| to indicate respectively the number of nodes and edges in a directed positively weighted graph G = (V,E). Our bounds depend on the parameter [nu]* that is defined as the maximum number of edges that lie on shortest paths through any single vertex. The main results in the first part of this thesis are listed below. - A decrease-only algorithm for computing BC and APASP running in time O([nu]* n) that is provably faster than recomputing from scratch in sparse graphs. - An increase-only algorithm for computing BC and APASP that runs in O([nu]*2 log n) per update for a sequence of at least [Omega](m*/[nu]*) updates. Here m* is the number of edges in G that lie on shortest paths. This algorithm uses O(m* [nu]*) space. - An increase-only algorithm for computing BC and APASP that runs in O([nu]*2 log n) but improves the computational space to O(m*n). - A fully dynamic algorithm for computing BC and APASP that runs in O([nu]*2 log3 n) amortized time per update for a sequence of at least [Omega](n) updates. - A refinement of our fully dynamic algorithm that improves the amortized running time to O([nu]*2 log2 n), saving a logarithmic factor. In the second part of this thesis, we study the case when the input graph is a distributed network of machines and the BC score of each machine, considering its location within the network topology, needs to be computed. In this scenario, each node in the input graph is a self-contained machine with limited knowledge of the network and communication power. Each machine only knows the (virtual) location of the neighbors machines (adjacent nodes in the input graph). The messages, exchanged in each round between machines, cannot exceed a bounded size of at most O(log n) bits. In this distributed model, called CONGEST, we present algorithms for computing BC in near-optimal time for unweighted networks, and some classes of weighted networks. Specifically, our main results are: - A distributed BC algorithm for unweighted undirected graphs completing in at most min(2n+O(D[underscore u]); 4n) rounds, where D[underscore u] is the diameter of the undirected network. - A distributed BC algorithm for unweighted directed graphs completing in at most min(2n + O(D); 4n) rounds, where D is the diameter of the directed network. - A distributed APSP algorithm for unweighted directed graphs completing in at most min(n + O(D); 2n) rounds. - A distributed BC algorithm for weighted directed acyclic graphs (dag) completing in at most 2n + O(L) rounds, where L is the longest length of a path in the dag. - A distributed APSP algorithm for weighted dags completing in at most n + O(L) rounds.
The Shortest Path Problem Camil Demetrescu
Networked Systems Karima Echihabi 2021-12-01 This book constitutes the revised selected papers of the 9th International Conference on Networked Systems, NETYS 2021, held virtually in May 2021.The 15 revised full papers and 2 short papers presented were carefully reviewed and selected from 32 submissions. The papers are organized in the following thematic blocks: distributed systems, blockchain, and verification.
Path Problems in Networks John Baras 2010-04-04 The algebraic path problem is a generalization of the shortest path problem in graphs. Various instances of this abstract problem have appeared in the literature, and similar solutions have been independently discovered and rediscovered. The repeated appearance of a problem is evidence of its relevance. This book aims to help current and future researchers add this powerful tool to their arsenal, so that they can easily identify and use it in their own work. Path problems in networks can be conceptually divided into two parts: A distillation of the extensive theory behind the algebraic path problem, and an exposition of a broad range of applications. First of all, the shortest path problem is presented so as to fix terminology and concepts: existence and uniqueness of solutions, robustness to parameter changes, and centralized and distributed computation algorithms. Then, these concepts are generalized to the algebraic context of semirings. Methods for creating new semirings, useful for modeling new problems, are provided. A large part of the book is then devoted to numerous applications of the algebraic path problem, ranging from mobile network routing to BGP routing to social networks. These applications show what kind of problems can be modeled as algebraic path problems; they also serve as examples on how to go about modeling new problems. This monograph will be useful to network researchers, engineers, and graduate students. It can be used either as an introduction to the topic, or as a quick reference to the theoretical facts, algorithms, and application examples. The theoretical background assumed for the reader is that of a graduate or advanced undergraduate student in computer science or engineering. Some familiarity with algebra and algorithms is helpful, but not necessary. Algebra, in particular, is used as a convenient and concise language to describe problems that are essentially combinatorial. Table of Contents: Classical Shortest Path / The Algebraic Path Problem / Properties and Computation of Solutions / Applications / Related Areas / List of Semirings and Applications
Distributed Algorithms for Message-Passing Systems Michel Raynal 2013-06-29 Distributed computing is at the heart of many applications. It arises as soon as one has to solve a problem in terms of entities -- such as processes, peers, processors, nodes, or agents -- that individually have only a partial knowledge of the many input parameters associated with the problem. In particular each entity cooperating towards the common goal cannot have an instantaneous knowledge of the current state of the other entities. Whereas parallel computing is mainly concerned with 'efficiency', and real-time computing is mainly concerned with 'on-time computing', distributed computing is mainly concerned with 'mastering uncertainty' created by issues such as the multiplicity of control flows, asynchronous communication, unstable behaviors, mobility, and dynamicity. While some distributed algorithms consist of a few lines only, their behavior can be difficult to understand and their properties hard to state and prove. The aim of this book is to present in a comprehensive way the basic notions, concepts, and algorithms of distributed computing when the distributed entities cooperate by sending and receiving messages on top of an asynchronous network. The book is composed of seventeen chapters structured into six parts: distributed graph algorithms, in particular what makes them different from sequential or parallel algorithms; logical time and global states, the core of the book; mutual exclusion and resource allocation; high-level communication abstractions; distributed detection of properties; and distributed shared memory. The author establishes clear objectives per chapter and the content is supported throughout with illustrative examples, summaries, exercises, and annotated bibliographies. This book constitutes an introduction to distributed computing and is suitable for advanced undergraduate students or graduate students in computer science and computer engineering, graduate students in mathematics interested in distributed computing, and practitioners and engineers involved in the design and implementation of distributed

applications. The reader should have a basic knowledge of algorithms and operating systems.
Nonsequential and Distributed Programming with Go Christian Maurer 2021-01-19 Der Band bietet eine kompakte Einführung in die Nichtsequentielle Programmierung als gemeinsamen Kern von Vorlesungen über Betriebssysteme, Verteilte Systeme, Parallele Algorithmen, Echtzeitprogrammierung und Datenbanktransaktionen. Basiskonzepte zur Synchronisation und Kommunikation nebenläufiger Prozesse werden systematisch dargestellt: Schlösser, Semaphore, Monitore, lokaler und netzweiter Botschaftenaustausch. Die Algorithmen sind in der Programmiersprache Google Go formuliert, mit der viele Synchronisationskonzepte ausgedrückt werden können.
Distributed Computation on Graphs: Shortest Path Algorithms K. M. Chandy 1982 The authors use the paradigm of diffusing computation, introduced by Dijkstra and Scholten, to solve a class of graph problems. They present a detailed solution to the problem of computing shortest paths from a single vertex to all other vertices, in the presence of negative cycles. (Author).
High-Speed Railway Operation Under Emergent Conditions Limin Jia 2021-07-17 This book addresses the current development status of high-speed railways globally and analyzes their operational schemes and practices under emergent conditions. It covers methods and problem-solving philosophy with regard to complexity analysis, capacity evaluation, passenger-flow forecasts, operating strategies, passenger-flow allocation, resource allocation and supporting technologies in the context of serious accidents and adverse environmental influences on train operation and service organization of high-speed railways. The abnormal scenarios, emergent conditions, adverse events and corresponding theoretical and applicational solutions dealing with the train operation both in line and network scale are all from real-world cases related to and designed for Chinese high-speed railway network which is the largest in scale, the highest in complexity and the most difficult in tackling with the complex and diverse climate and geographical environment , and thus makes the book both theoretically rigorous and practically applicable. It not only helps readers consider the train and network interactions from the perspective of complexity science, but also provides them with a philosophical framework and approaches available to construct their own roadmap and problem-solving paradigms in their daily research or management. This book is suitable for researchers, postgraduates and managerial and engineering practitioners in railway-related fields, especially in high-speed railway operation and emergency management.
Distributed Algorithms Jan van Leeuwen 1988-05 This volume presents the proceedings of the 2nd International Workshop on Distributed Algorithms, held July 8-10, 1987, in Amsterdam, The Netherlands. It contains 29 papers on new developments in the area of the design and analysis of distributed algorithms. The topics covered include, e.g. algorithms for distributed consensus and agreement in networks, connection management and topology update schemes, election and termination detection protocols, and other issues in distributed network control.
Distributed Graph Algorithms for Computer Networks Kayhan Erciyes 2013-05-16 This book presents a comprehensive review of key distributed graph algorithms for computer network applications, with a particular emphasis on practical implementation. Topics and features: introduces a range of fundamental graph algorithms, covering spanning trees, graph traversal algorithms, routing algorithms, and self-stabilization; reviews graph-theoretical distributed approximation algorithms with applications in ad hoc wireless networks; describes in detail the implementation of each algorithm, with extensive use of supporting examples, and discusses their concrete network applications; examines key graph-theoretical algorithm concepts, such as dominating sets, and parameters for mobility and energy levels of nodes in wireless ad hoc networks, and provides a contemporary survey of each topic; presents a simple simulator, developed to run distributed algorithms; provides practical exercises at the end of each chapter.
Algorithms and Computation Alok Aggarwal 1999-12 This book constitutes the refereed proceedings of the 10th International Symposium on Algorithms and Computation, ISAAC'99, held in Chennai, India, in December 1999. The 40 revised full papers presented together with four invited contributions were carefully reviewed and selected from 71 submissions. Among the topics covered are data structures, parallel and distributed computing, approximation algorithms, computational intelligence, online algorithms, complexity theory, graph algorithms, computational geometry, and algorithms in practice.
Smart Modelling for Engineering Systems Margarita N. Favorskaya 2021-01-30 This book is a collection of research papers selected for presentation at the International Conference on Smart Computational Methods in Continuum Mechanics 2021, organized by Moscow Institute of Physics and Technology and the Institute for Computer Aided Design of Russian Academy of Sciences. The work is presented in two volumes. The primary objective of the book is to report the state-of-the-art on smart computational paradigms in continuum mechanics and explore the use of artificial intelligence paradigms such as neural nets and machine learning for improving the performance of the designed engineering systems. The book includes up-to-date smart computational methods which are used to solve problems in continuum mechanics, engineering, seismic prospecting, non-destructive testing, and so on. The main features of the book are the research papers on the application of novel smart methods including neural nets and machine learning, computational algorithms, smart software systems, and high-performance computer systems for solving complex engineering problems. The case studies pertaining to the real-world applications in the above fields are included. The book presents a collection of best research papers in English language from some of the world leaders in the field of smart system modelling and design of engineering systems.
PARLE '92, Parallel Architectures and Languages Europe Daniel Etiemble 1992-06-03 The 1992 Parallel Architectures and Languages Europe conference continues the tradition - of a wide and representative international meeting of specialists from academia and industry in theory, design, and application of parallel computer systems - set by the previous PARLE conferences held in Eindhoven in 1987, 1989, and 1991. This volume contains the 52 regular and 25 poster papers that were selected from 187 submitted papers for presentation and publication. In addition, five invited lectures areincluded. The regular papers are organized into sections on: implementation of parallel programs, graph theory, architecture, optimal algorithms, graph theory and performance, parallel software components, data base optimization and modeling, data parallelism, formal methods, systolic approach, functional programming, fine grain parallelism, Prolog, data flow systems, network efficiency, parallel algorithms, cache systems, implementation of parallel languages, parallel scheduling in data base systems, semantic models, parallel data base machines, and language semantics.
Shortest Path Solvers. From Software to Wetware Andrew Adamatzky 2018-04-26 This book offers advanced parallel and distributed algorithms and experimental laboratory prototypes of unconventional shortest path solvers. In addition, it presents novel and unique algorithms of solving shortest problems in massively parallel cellular automaton machines. The shortest path problem is a fundamental and classical problem in graph theory and computer science and is frequently applied in the contexts of transport and logistics, telecommunication networks, virtual reality and gaming, geometry, and social networks analysis. Software implementations include distance-vector algorithms for distributed path computation in dynamics networks, parallel solutions of the constrained shortest path problem, and application of the shortest path solutions in gathering robotic swarms. Massively parallel algorithms utilise cellular automata, where a shortest path is computed either via matrix multiplication in automaton arrays, or via the representation of data graphs in automaton lattices and using the propagation of wave-like patterns. Unconventional shortest path solvers are presented in computer models of foraging behaviour and protoplasmic network optimisation by the slime mould Physarum polycephalum and fluidic devices, while experimental laboratory prototypes of path solvers using chemical media, flows and droplets, and electrical current are also highlighted. The book will be a pleasure to explore for readers from all walks of life, from undergraduate students to university professors, from mathematicians, computers scientists and engineers to chemists and biologists.
Processor Networks and Aspects of the Mapping Problem Peter A. J. Hilbers 1991-11-21 Here Hilbers discusses the general case of how to use processors simultaneously in order to solve a single problem rather than any specific application, and develops a theory independent of particular architectures. He starts by introducing distributed computing with graph theory, and considers processor networks and their price/performance ratios. He goes on to look at obtaining homogeneous distributions of work over networks and considers examples. Finally he discusses message routing within a processor network. This is intended to be a fundamental treatment of the relevant subjects and is aimed at computer scientists and graduate students in computer science who have experience with parallel processing: it will also be useful to others interested in processor networks.
Distributed Algorithms on Graphs Eli Gafni 1986 This volume contains papers presented at the First International Workshop on Distributed Algorithms. The papers present solutions to a wide spectrum of problems (leader election, resource allocation, routing, etc.) and focus on a variety of issues that influence communications complexity.
Distributed Algorithms, second edition Wan Fokkink 2018-03-02 The new edition of a guide to distributed algorithms that emphasizes examples and exercises rather than the intricacies of mathematical models. This book offers students and researchers a guide to distributed algorithms that emphasizes examples and exercises rather than the intricacies of mathematical models. It avoids mathematical argumentation, often a stumbling block for students, teaching algorithmic thought rather than proofs and logic. This approach allows the student to learn a large number of algorithms within a relatively short span of time. Algorithms are explained through brief, informal descriptions, illuminating examples, and practical exercises. The examples and exercises allow readers to understand algorithms intuitively and from different perspectives. Proof sketches, arguing the correctness of an algorithm or explaining the idea behind fundamental results, are also included. The algorithms presented in the book are for the most part “classics,” selected because they shed light on the algorithmic design of distributed systems or on key issues in distributed computing and concurrent programming. This second edition has been substantially revised. A new chapter on distributed transaction offers up-to-date treatment of database transactions and the important evolving area of transactional memory. A new chapter on security discusses two exciting new topics: blockchains and quantum cryptography. Sections have been added that cover such subjects as rollback recovery, fault-tolerant termination detection, and consensus for shared memory. An appendix offers pseudocode descriptions of many algorithms. Solutions and slides are available for instructors. Distributed Algorithms can be used in courses for upper-level undergraduates or graduate students in computer science, or as a reference for researchers in the field.
Distributed Computing Ajay D. Kshemkalyani 2011-03-03 Designing distributed computing systems is a complex process requiring a solid understanding of the design problems and the theoretical and practical aspects of their solutions. This comprehensive textbook covers the fundamental principles and models underlying the theory, algorithms and systems aspects of distributed computing. Broad and detailed coverage of the theory is balanced with practical systems-related issues such as mutual exclusion, deadlock detection, authentication, and failure recovery. Algorithms are carefully selected, lucidly presented, and described without complex proofs. Simple explanations and illustrations are used to elucidate the algorithms. Important emerging topics such as peer-to-peer networks and network security are also considered. With vital algorithms, numerous illustrations, examples and homework problems, this textbook is suitable for advanced undergraduate and graduate students of electrical and computer engineering and computer science. Practitioners in data networking and sensor networks will also find this a valuable resource. Additional resources are available online at www.cambridge.org/9780521876346.