Applied and Algorithmic Graph Theory

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Applied and Algorithmic Graph Theory Gary Chartrand,Ortrud R. Oellermann,1993 Designed as a bridge to cross the gap between mathematics and computer science and planned as the mathematics base for computer science students this maths text is designed to help the student develop an understanding of the concept of an efficient algorithm *Algorithmic Graph Theory and Perfect Graphs* Martin Charles Golumbic,2004-02-04 Algorithmic Graph Theory and Perfect Graphs first published in 1980 has become the classic introduction to the field This new Annals edition continues to convey the message that intersection graph models are a necessary and important tool for solving real world problems It remains a stepping stone from which the reader may embark on one of many fascinating research trails The past twenty years have been an amazingly fruitful period of research in algorithmic graph theory and structured families of graphs Especially important have been the theory and applications of new intersection graph models such as generalizations of permutation graphs and interval graphs These have lead to new families of perfect graphs and many algorithmic results These are surveyed in the new Epilogue chapter in this second edition New edition of the Classic book on the topic Wonderful introduction to a rich research area Leading author in the field of algorithmic graph theory Beautifully written for the new mathematician or computer scientist Comprehensive treatment **Algorithmic graph theory and perfect graphs** Martin C. Golumbic,1988

Algorithmic Graph Theory Alan Gibbons,1985-06-27 An introduction to pure and applied graph theory with an emphasis on algorithms and their complexity Algorithmic Graph Theory James A. McHugh,1990 Applied Graph Theory: An Introduction With Graph Optimization And Algebraic Graph Theory Christopher H Griffin,2023-08-08 This book serves as an introduction to graph theory and its applications It is intended for a senior undergraduate course in graph theory but is also appropriate for beginning graduate students in science or engineering The book presents a rigorous proof based introduction to graph theory while also discussing applications of the results for solving real world problems of interest The book is divided into four parts Part 1 covers the combinatorial aspects of graph theory including a discussion of common vocabulary a discussion of vertex and edge cuts Eulerian tours Hamiltonian paths and a characterization of trees This leads to Part 2 which discusses common combinatorial optimization problems Spanning trees shortest path problems and matroids are all discussed as are maximum flow problems Part 2 ends with a discussion of graph coloring and a proof of the NP completeness of the coloring problem Part 3 introduces the reader to algebraic graph theory and focuses on Markov chains centrality computation e g eigenvector centrality and page rank as well as spectral graph clustering and the graph Laplacian Part 4 contains additional material on linear programming which is used to provide an alternative analysis of the maximum flow problem Two appendices containing prerequisite material on linear algebra and probability theory are also provided

Topics in Algorithmic Graph Theory Lowell W. Beineke,Martin Charles Golumbic,Robin J. Wilson,2021-06-03 Algorithmic graph theory has been expanding at an extremely rapid rate since the middle of the twentieth century in parallel with the

growth of computer science and the accompanying utilization of computers where efficient algorithms have been a prime goal This book presents material on developments on graph algorithms and related concepts that will be of value to both mathematicians and computer scientists at a level suitable for graduate students researchers and instructors The fifteen expository chapters written by acknowledged international experts on their subjects focus on the application of algorithms to solve particular problems All chapters were carefully edited to enhance readability and standardize the chapter structure as well as the terminology and notation The editors provide basic background material in graph theory and a chapter written by the book s Academic Consultant Martin Charles Golumbic University of Haifa Israel provides background material on algorithms as connected with graph theory **Graph Theory** Karin R Saoub,2021-03-16 Graph Theory An Introduction to Proofs Algorithms and Applications Graph theory is the study of interactions conflicts and connections The relationship between collections of discrete objects can inform us about the overall network in which they reside and graph theory can provide an avenue for analysis This text for the first undergraduate course will explore major topics in graph theory from both a theoretical and applied viewpoint Topics will progress from understanding basic terminology to addressing computational questions and finally ending with broad theoretical results Examples and exercises will guide the reader through this progression with particular care in strengthening proof techniques and written mathematical explanations Current applications and exploratory exercises are provided to further the reader s mathematical reasoning and understanding of the relevance of graph theory to the modern world Features The first chapter introduces graph terminology mathematical modeling using graphs and a review of proof techniques featured throughout the book The second chapter investigates three major route problems eulerian circuits hamiltonian cycles and shortest paths The third chapter focuses entirely on trees terminology applications and theory Four additional chapters focus around a major graph concept connectivity matching coloring and planarity Each chapter brings in a modern application or approach Hints and Solutions to selected exercises provided at the back of the book Author Karin R Saoub is an Associate Professor of Mathematics at Roanoke College in Salem Virginia She earned her PhD in mathematics from Arizona State University and BA from Wellesley College Her research focuses on graph coloring and on line algorithms applied to tolerance graphs She is also the author of A Tour Through Graph Theory published by CRC Press **AGT 2009** Workshop on algorithmic graph theory, Warwick, 23-25 March 2009,2009 **Graph Theory** Nicos Christofides,1986 **Graph Theory with Algorithms and its Applications** Santanu Saha Ray,2012-11-02 The book has many important features which make it suitable for both undergraduate and postgraduate students in various branches of engineering and general and applied sciences The important topics interrelating Mathematics Computer Science are also covered briefly The book is useful to readers with a wide range of backgrounds including Mathematics Computer Science Computer Applications and Operational Research While dealing with theorems and algorithms emphasis is laid on constructions which consist of formal proofs examples with applications Uptill

there is scarcity of books in the open literature which cover all the things including most importantly various algorithms and applications with examples **Applied Graph Theory** Wai-Kai Chen,2012-12-02 Applied Graph Theory provides an introduction to the fundamental concepts of graph theory and its applications The five key topics that are covered in depth are i foundations of electrical network theory ii the directed graph solutions of linear algebraic equations iii topological analysis of linear systems iv trees and their generation and v the realization of directed graphs with prescribed degrees Previously these results have been found only in widely scattered and incomplete journal articles and institutional reports This book attempts to present a unified and detailed account of these applications A special feature of the book is that almost all the results are documented in relationship to the known literature and all the references which have been cited in the text are listed in the bibliography Thus the book is especially suitable for those who wish to continue with the study of special topics and to apply graph theory to other fields *Graph Theory, Combinatorics and Algorithms* Martin Charles Golumbic,Irith Ben-Arroyo Hartman,2006-03-30 Graph Theory Combinatorics and Algorithms Interdisciplinary Applications focuses on discrete mathematics and combinatorial algorithms interacting with real world problems in computer science operations research applied mathematics and engineering The book contains eleven chapters written by experts in their respective fields and covers a wide spectrum of high interest problems across these discipline domains Among the contributing authors are Richard Karp of UC Berkeley and Robert Tarjan of Princeton both are at the pinnacle of research scholarship in Graph Theory and Combinatorics The chapters from the contributing authors focus on real world applications all of which will be of considerable interest across the areas of Operations Research Computer Science Applied Mathematics and Engineering These problems include Internet congestion control high speed communication networks multi object auctions resource allocation software testing data structures etc In sum this is a book focused on major contemporary problems written by the top research scholars in the field using cutting edge mathematical and computational techniques **Optimization Problems in Graph Theory** Boris Goldengorin,2018-09-27 This book presents open optimization problems in graph theory and networks Each chapter reflects developments in theory and applications based on Gregory Gutin s fundamental contributions to advanced methods and techniques in combinatorial optimization Researchers students and engineers in computer science big data applied mathematics operations research algorithm design artificial intelligence software engineering data analysis industrial and systems engineering will benefit from the state of the art results presented in modern graph theory and its applications to the design of efficient algorithms for optimization problems Topics covered in this work include Algorithmic aspects of problems with disjoint cycles in graphs Graphs where maximal cliques and stable sets intersect The maximum independent set problem with special classes A general technique for heuristic algorithms for optimization problems The network design problem with cut constraints Algorithms for computing the frustration index of a signed graph A heuristic approach for studying the patrol problem on a graph Minimum possible sum and product of the

proper connection number Structural and algorithmic results on branchings in digraphs Improved upper bounds for Korkel Ghosh benchmark SPLP instances **Applied Graph Theory in Computer Vision and Pattern Recognition** Abraham Kandel,Horst Bunke,Mark Last,2007-04-11 Graph theory has strong historical roots in mathematics especially in topology Its birth is usually associated with the four color problem posed by Francis Guthrie 1 in 1852 but its real origin probably goes back to the Seven Bridges of Konigsber g 2 problem proved by Leonhard Euler in 1736 A computational solution to these two completely different problems could be found after each problem was abstracted to the level of a graph model while ignoring such irrelevant details as country shapes or cross river distances In general a graph is a nonempty set of points vertices and the most basic information preserved by any graph structure refers to adjacency relationships edges between some pairs of points In the simplest graphs edges do not have to hold any attributes except their endpoints but in more sophisticated graph structures edges can be associated with a direction or assigned a label Graph vertices can be labeled as well A graph can be represented graphically as a drawing vertex dot edge arc but aslongaseverypairofadjacentpointsstaysconnected by the same edge the graph vertices can be moved around on a drawing without changing the underlying graph structure The expressive power of the graph models placing a special emphasis on c nectivity between objects has made them the models of choice in chemistry physics biology and other elds **Algorithmic Graph Theory** Bill Jackson,1994-01-01 **Graph Algorithms in the Language of Linear Algebra** Jeremy Kepner,John Gilbert,2011-01-01 The current exponential growth in graph data has forced a shift to parallel computing for executing graph algorithms Implementing parallel graph algorithms and achieving good parallel performance have proven difficult This book addresses these challenges by exploiting the well known duality between a canonical representation of graphs as abstract collections of vertices and edges and a sparse adjacency matrix representation This linear algebraic approach is widely accessible to scientists and engineers who may not be formally trained in computer science The authors show how to leverage existing parallel matrix computation techniques and the large amount of software infrastructure that exists for these computations to implement efficient and scalable parallel graph algorithms The benefits of this approach are reduced algorithmic complexity ease of implementation and improved performance **Graph Theory : an Algorithmic Approach** N. Christofides,1975 **Graph Theory** Geir Agnarsson,Raymond Greenlaw,2007 For junior to senior level courses in Graph Theory taken by majors in Mathematics Computer Science or Engineering or for beginning level graduate courses Once considered an unimportant branch of topology graph theory has come into its own through many important contributions to a wide range of fields and is now one of the fastest growing areas in discrete mathematics and computer science This new text introduces basic concepts definitions theorems and examples from graph theory The authors present a collection of interesting results from mathematics that involve key concepts and proof techniques cover design and analysis of computer algorithms for solving problems in graph theory and discuss applications of graph theory to the sciences It is mathematically rigorous but also practical intuitive and algorithmic

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