

The Problem

One of our original goals in developing the Maximum-Flow Problem was to be able to solve the Bipartite Matching Problem, and we now show how to do this. Recall that a *bipartite graph* $G = (V, E)$ is an undirected graph whose node set can be partitioned as $V = X \cup Y$, with the property that every edge $e \in E$ has one end in X and the other end in Y . A *matching* M in G is a subset of the edges $M \subseteq E$ such that each node appears in at most one edge in M . The Bipartite Matching Problem is that of finding a matching in G of largest possible size.

Designing the Algorithm

The graph defining a matching problem is undirected, while flow networks are directed; but it is actually not difficult to use an algorithm for the Maximum-Flow Problem to find a maximum matching.

Beginning with the graph G in an instance of the Bipartite Matching Problem, we construct a flow network G' as shown in Figure 7.9. First we direct all edges in G from X to Y . We then add a node s , and an edge (s, x) from s to each node in X . We add a node t , and an edge (y, t) from each node in Y to t . Finally, we give each edge in G' a capacity of 1.

We now compute a maximum s - t flow in this network G' . We will discover that the value of this maximum is equal to the size of the maximum matching in G . Moreover, our analysis will show how one can use the flow itself to recover the matching.

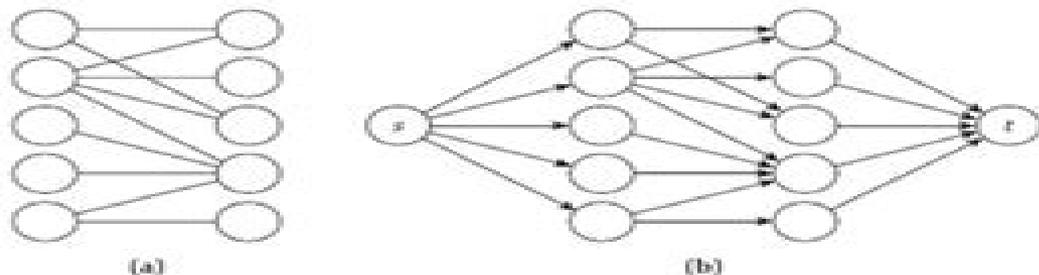


Figure 7.9 (a) A bipartite graph. (b) The corresponding flow network, with all capacities equal to 1.

Algorithm Design Tardos Solutions

Christian G. Meyer



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Algorithm Design: A Methodological Approach - 150 problems and detailed solutions Patrick Bosc, Marc Guyomard, Laurent Miclet, 2023-01-31 A bestseller in its French edition this book is original in its construction and its success in the French market demonstrates its appeal It is based on three principles 1 An organization of the chapters by families of algorithms exhaustive search divide and conquer etc On the contrary there is no chapter devoted only to a systematic exposure of say algorithms on strings Some of these will be found in different chapters 2 For each family of algorithms an introduction is given to the mathematical principles and the issues of a rigorous design with one or two pedagogical examples 3 For the most part the book details 150 problems spanning seven families of algorithms For each problem a precise and progressive statement is given More importantly a complete solution is detailed with respect to the design principles that have been presented often some classical errors are pointed out Roughly speaking two thirds of the book is devoted to the detailed rational construction of the solutions

Data Structures and Algorithms with Python Aadinath Pothuvaal, 2025-02-20 Dive into the Heart of Pythonic Algorithms and Data Structures offers a comprehensive guide designed to empower both beginners and seasoned developers Whether you re mastering the foundations of computer science or enhancing your problem solving skills this book provides a roadmap through the intricacies of efficient data organization and algorithmic prowess We introduce the versatility of Python setting the stage for an exploration of various data structures including arrays linked lists stacks queues trees and graphs Each chapter presents practical examples and Python code snippets for easy comprehension and application As the journey progresses we shift focus to algorithms covering sorting techniques searching methods and dynamic programming Real world applications and case studies bridge the gap between theory and practical implementation reinforcing each algorithm s relevance in solving tangible problems The book emphasizes a hands on approach encouraging active engagement with Python code and algorithms Whether you re preparing for coding interviews building scalable software or honing your programming skills this book equips you with the knowledge and confidence to navigate the challenging terrain of Data Structures and Algorithms using Python

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Advances in Neural Information Processing Systems 19 Bernhard Schölkopf, John C. Platt, Thomas Hofmann, 2007 The

annual Neural Information Processing Systems NIPS conference is the flagship meeting on neural computation and machine learning This volume contains the papers presented at the December 2006 meeting held in Vancouver

Encyclopedia of Algorithms Ming-Yang Kao,2008-08-06 One of Springer s renowned Major Reference Works this awesome achievement provides a comprehensive set of solutions to important algorithmic problems for students and researchers interested in quickly locating useful information This first edition of the reference focuses on high impact solutions from the most recent decade while later editions will widen the scope of the work All entries have been written by experts while links to Internet sites that outline their research work are provided The entries have all been peer reviewed This defining reference is published both in print and on line

Proceedings of the Fifth Annual ACM-SIAM Symposium on Discrete Algorithms ,1994-01-01 The January 1994 Symposium was jointly sponsored by the ACM Special Interest Group for Automata and Computability Theory and the SIAM Activity Group on Discrete Mathematics Among the topics in 79 unrefereed papers comparing point sets under projection on line search in a simple polygon low degree tests maximal empty ellipsoids roots of a polynomial and its derivatives dynamic algebraic algorithms fast comparison of evolutionary trees an efficient algorithm for dynamic text editing and tight bounds for dynamic storage allocation No index Annotation copyright by Book News Inc Portland OR

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Approximation Algorithms for NP-hard Problems Dorit S. Hochbaum,1997 This is the first book to fully address the study of approximation algorithms as a tool for coping with intractable problems With chapters contributed by leading researchers in the field this book introduces unifying techniques in the analysis of approximation algorithms APPROXIMATION ALGORITHMS FOR NP HARD PROBLEMS is intended for computer scientists and operations researchers interested in specific algorithm implementations as well as design tools for algorithms Among the techniques discussed the use of linear programming primal dual techniques in worst case analysis semidefinite programming computational geometry techniques randomized algorithms average case analysis probabilistically checkable proofs and inapproximability and the Markov Chain Monte Carlo method The text includes a variety of pedagogical features definitions exercises open problems glossary of problems index and notes on how best to use the book

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