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Algorithms in a Nutshell Pearson Higher Ed

Based on a new classification of algorithm design techniques and a clear delineation of analysis methods, *Introduction to the Design and Analysis of Algorithms* presents the subject in a coherent and innovative manner. Written in a student-friendly style, the book emphasizes the understanding of ideas over excessively formal treatment while thoroughly covering the material required in an introductory algorithms course. Popular puzzles are used to motivate students' interest and strengthen their skills in algorithmic problem solving. Other learning-enhancement features include chapter summaries, hints to the exercises, and a detailed solution manual.

Introduction to Algorithms MIT Press

August 6, 2009 Author, Jon Kleinberg, was recently cited in the *New York Times* for his statistical analysis research in the Internet age. *Algorithm Design* introduces algorithms by looking at the real-world problems that motivate them. The book teaches students a range of design and analysis techniques for problems that arise in computing applications. The text encourages an understanding of the algorithm design process and an appreciation of the role of algorithms in the broader field of computer science.

Algorithms in Action SIAM

This is the eBook of the printed book and may not include any media, website access codes, or print supplements that may come packaged with the bound book. *Algorithm Design* introduces algorithms by looking at the real-world problems that motivate them. The book teaches students a range of design and analysis techniques for problems that arise in computing applications. The text encourages an understanding of the algorithm design process and an appreciation of the role of algorithms in the broader field of computer science. August 6, 2009 Author, Jon Kleinberg, was recently cited in the *New York Times* for his statistical analysis research in the Internet age.

Problems on Algorithms Academic Internet Pub Incorporated

Named a Notable Book in the 21st Annual Best of Computing list by the ACM! Robert Sedgewick and Kevin Wayne's *Computer Science: An Interdisciplinary Approach* is the ideal modern introduction to computer science with Java programming for both students and professionals. Taking a broad, applications-based approach, Sedgewick and Wayne teach through important examples from science, mathematics, engineering, finance, and commercial computing. The book demystifies computation, explains its intellectual underpinnings, and covers the essential elements of programming and computational problem solving in today's environments. The authors begin by introducing basic programming elements such as variables, conditionals, loops, arrays, and I/O.

Next, they turn to functions, introducing key modular programming concepts, including components and reuse. They present a modern introduction to object-oriented programming, covering current programming paradigms and approaches to data abstraction. Building on this foundation, Sedgewick and Wayne widen their focus to the broader discipline of computer science. They introduce classical sorting and searching algorithms, fundamental data structures and their application, and scientific techniques for assessing an implementation's performance. Using abstract models, readers learn to answer basic questions about computation, gaining insight for practical application. Finally, the authors show how machine architecture links the theory of computing to real computers, and to the field's history and evolution. For each concept, the authors present all the information readers need to build confidence, together with examples that solve intriguing problems. Each chapter contains question-and-answer sections, self-study drills, and challenging problems that demand creative solutions. Companion web site (introcs.cs.princeton.edu/java) contains Extensive supplementary information, including suggested approaches to programming assignments, checklists, and FAQs Graphics and sound libraries Links to program code and test data Solutions to selected exercises Chapter summaries Detailed instructions for installing a Java programming environment Detailed problem sets and projects Companion 20-part series of video lectures is available at informit.com/title/9780134493831

Twenty Lectures on Algorithmic Game Theory CRC Press

Algorithms Illuminated is an accessible introduction to algorithms for anyone with at least a little programming experience, based on a sequence of popular online courses. Part 2 covers graph search and applications, shortest paths, and the usage and implementation of several data structures (heaps, search trees, hash tables, and bloom filters).

Computer Science Wiley Global Education

'Algorithm Design' teaches students a range of design and analysis techniques for problems that arise in computing applications. The text encourages an understanding of the algorithm design process and an appreciation of the role of algorithms in the broader field of computer science.

Advanced Algorithms and Data Structures Pearson Education

Creating robust software requires the use of efficient algorithms, but programmers seldom think about them until a problem occurs. *Algorithms in a Nutshell* describes a large number of existing algorithms for solving a variety of problems, and helps you select and implement the right algorithm for your needs -- with just enough math to let you understand and analyze algorithm performance. With its focus on application, rather than theory, this book provides efficient code solutions in several programming languages that you can easily adapt to a specific project. Each major algorithm is presented in the style of a design pattern that includes information to help you understand why and when the algorithm is appropriate. With this book, you will: Solve a particular coding problem or improve on the performance of an existing solution Quickly locate algorithms that relate to the problems you want to solve, and determine why a particular algorithm is the right one to use Get algorithmic solutions in C, C++, Java, and Ruby with implementation tips Learn the expected performance of an algorithm, and the conditions it needs to perform at its best Discover the impact that similar design decisions have on different algorithms Learn advanced data structures to improve the efficiency of algorithms With *Algorithms in a Nutshell*, you'll learn how to improve the performance of key algorithms essential for the success of your software applications. *The Design and Analysis of Algorithms* Addison-Wesley Longman

Advanced Algorithms and Data Structures introduces a collection of algorithms for complex programming challenges in data analysis, machine learning, and graph computing. Summary As a software engineer, you'll encounter countless programming challenges that initially seem confusing,

difficult, or even impossible. Don't despair! Many of these "new" problems already have well-established solutions. *Advanced Algorithms and Data Structures* teaches you powerful approaches to a wide range of tricky coding challenges that you can adapt and apply to your own applications. Providing a balanced blend of classic, advanced, and new algorithms, this practical guide upgrades your programming toolbox with new perspectives and hands-on techniques. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the technology Can you improve the speed and efficiency of your applications without investing in new hardware? Well, yes, you can: Innovations in algorithms and data structures have led to huge advances in application performance. Pick up this book to discover a collection of advanced algorithms that will make you a more effective developer. About the book *Advanced Algorithms and Data Structures* introduces a collection of algorithms for complex programming challenges in data analysis, machine learning, and graph computing. You'll discover cutting-edge approaches to a variety of tricky scenarios. You'll even learn to design your own data structures for projects that require a custom solution. What's inside Build on basic data structures you already know Profile your algorithms to speed up application Store and query strings efficiently Distribute clustering algorithms with MapReduce Solve logistics problems using graphs and optimization algorithms About the reader For intermediate programmers. About the author Marcello La Rocca is a research scientist and a full-stack engineer. His focus is on optimization algorithms, genetic algorithms, machine learning, and quantum computing. Table of Contents 1 Introducing data structures PART 1 IMPROVING OVER BASIC DATA STRUCTURES 2 Improving priority queues: d-way heaps 3 Treaps: Using randomization to balance binary search trees 4 Bloom filters: Reducing the memory for tracking content 5 Disjoint sets: Sub-linear time processing 6 Trie, radix trie: Efficient string search 7 Use case: LRU cache PART 2 MULTIDIMENSIONAL QUERIES 8 Nearest neighbors search 9 K-d trees: Multidimensional data indexing 10 Similarity Search Trees: Approximate nearest neighbors search for image retrieval 11 Applications of nearest neighbor search 12 Clustering 13 Parallel clustering: MapReduce and canopy clustering PART 3 PLANAR GRAPHS AND MINIMUM CROSSING NUMBER 14 An introduction to graphs: Finding paths of minimum distance 15 Graph embeddings and planarity: Drawing graphs with minimal edge intersections 16 Gradient descent: Optimization problems (not just) on graphs 17 Simulated annealing: Optimization beyond local minima 18 Genetic algorithms: Biologically inspired, fast-converging optimization

Practical Examples in Apache Spark and Neo4j CRC Press

Hashing algorithms scramble data and create pseudo-uniform data distributions. Bucket algorithms operate on raw untransformed data which are partitioned into groups according to membership in equal-sized d-dimensional hyperrectangles, called cells or buckets. The bucket data structure is rather sensitive to the distribution of the data. In these lecture notes, we attempt to explain the connection between the expected time of various bucket algorithms and the distribution of the data. The results are illustrated on standard searching, sorting and selection problems, as well as on a variety of problems in computational geometry and operations research. The notes grew partially from a graduate course on probability theory in computer science. I wish to thank Elizabeth Van Gulick for her help with the manuscript, and David Avis, Hanna Ayukawa, Vasek Chvatal, Beatrice Devroye, Hossam El Gindy, Duncan McCallum, Magda McCallum, Godfried Toussaint and Sue Whitesides" for making the School of Computer Science at McGill University such an enjoyable place. The work was supported by NSERC Grant A3456 and by FCAC Grant EQ-1679. INTRODUCTION 1 INTRODUCTION It is not a secret that methods based upon the truncation of data have good expected time performance. For example, for nice distributions of the data, searching is often better done via a hashing data structure instead of via a search tree. The speed one observes in practice is due to the fact that the truncation operation is a constant time operation

Algorithms Pearson Higher Ed

These are my lecture notes from CS681: Design and Analysis of Algorithms, a one-semester graduate course I taught at Cornell for three consecutive fall semesters from '88 to '90. The course serves a dual purpose: to cover core material in algorithms for graduate students in computer science preparing for their PhD qualifying exams, and to introduce theory students to some advanced topics in the design and analysis of algorithms. The material is thus a mixture of core and advanced topics. At first I meant these notes to supplement and not supplant a textbook, but over the three years they gradually took on a life of their own. In addition to the notes, I depended heavily on the texts • A. V. Aho, J. E. Hopcroft, and J. D. Ullman, *The Design and Analysis of Computer Algorithms*. Addison-Wesley, 1975. • M. R. Garey and D. S. Johnson, *Computers and Intractability: A Guide to the Theory of NP-Completeness*. w. H. Freeman, 1979. • R. E. Tarjan, *Data Structures and Network Algorithms*. SIAM Regional Conference Series in Applied Mathematics 44, 1983. and still recommend them as excellent references.

Algorithms Unlocked Addison-Wesley Professional

For anyone who has ever wondered how computers solve problems, an engagingly written guide for nonexperts to the basics of computer algorithms. Have you ever wondered how your GPS can find the fastest way to your destination, selecting one route from seemingly countless possibilities in mere seconds? How your credit card account number is protected when you make a purchase over the Internet? The answer is algorithms. And how do these mathematical formulations translate themselves into your GPS, your laptop, or your smart phone? This book offers an engagingly written guide to the basics of computer algorithms. In *Algorithms Unlocked*, Thomas Cormen—coauthor of the leading college textbook on the subject—provides a general explanation, with limited mathematics, of how algorithms enable computers to solve problems. Readers will learn what computer algorithms are, how to describe them, and how to evaluate them. They will discover simple ways to search for information in a computer; methods for rearranging information in a computer into a prescribed order ("sorting"); how to solve basic problems that can be modeled in a computer with a mathematical structure called a "graph" (useful for modeling road networks, dependencies among tasks, and financial relationships); how to solve problems that ask questions about strings of characters such as DNA structures; the basic principles behind cryptography; fundamentals of data compression; and even that there are some problems that no one has figured out how to solve on a computer in a reasonable amount of time.

Introduction To Algorithms Cambridge University Press

Based on the authors' market leading data structures books in Java and C++, this textbook offers a comprehensive, definitive introduction to data structures in Python by authoritative authors. Data

Structures and Algorithms in Python is the first authoritative object-oriented book available for the Python data structures course. Designed to provide a comprehensive introduction to data structures and algorithms, including their design, analysis, and implementation, the text will maintain the same general structure as Data Structures and Algorithms in Java and Data Structures and Algorithms in C++.

Algorithm Design Springer Science & Business Media

There are many distinct pleasures associated with computer programming. Craftsmanship has its quiet rewards, the satisfaction that comes from building a useful object and making it work. Excitement arrives with the flash of insight that cracks a previously intractable problem. The spiritual quest for elegance can turn the hacker into an artist. There are pleasures in parsimony, in squeezing the last drop of performance out of clever algorithms and tight coding. The games, puzzles, and challenges of problems from international programming competitions are a great way to experience these pleasures while improving your algorithmic and coding skills. This book contains over 100 problems that have appeared in previous programming contests, along with discussions of the theory and ideas necessary to attack them. Instant online grading for all of these problems is available from two WWW robot judging sites. Combining this book with a judge gives an exciting new way to challenge and improve your programming skills. This book can be used for self-study, for teaching innovative courses in algorithms and programming, and in training for international competition. The problems in this book have been selected from over 1,000 programming problems at the Universidad de Valladolid online judge. The judge has ruled on well over one million submissions from 27,000 registered users around the world to date. We have taken only the best of the best, the most fun, exciting, and interesting problems available.

Algorithm Design: Pearson New International Edition OUP USA

'Algorithm Design' teaches students a range of design and analysis techniques for problems that arise in computing applications. The text encourages an understanding of the algorithm design process and an appreciation of the role of algorithms in the broader field of computer science.

The Science of Socially Aware Algorithm Design Cambridge University Press

This textbook, for second- or third-year students of computer science, presents insights, notations, and analogies to help them describe and think about algorithms like an expert, without grinding through lots of formal proof. Solutions to many problems are provided to let students check their progress, while class-tested PowerPoint slides are on the web for anyone running the course. By looking at both the big picture and easy step-by-step methods for developing algorithms, the author guides students around the common pitfalls. He stresses paradigms such as loop invariants and recursion to unify a huge range of algorithms into a few meta-algorithms. The book fosters a deeper understanding of how and why each algorithm works. These insights are presented in a careful and clear way, helping students to think abstractly and preparing them for creating their own innovative ways to solve problems.

Randomized Algorithms and Probabilistic Analysis Princeton University Press

Richard Bird takes a radical approach to algorithm design, namely, design by calculation. These 30 short chapters each deal with a particular programming problem drawn from sources as diverse as games and puzzles, intriguing combinatorial tasks, and more familiar areas such as data compression and string matching. Each pearl starts with the statement of the problem expressed using the functional programming language Haskell, a powerful yet succinct language for capturing algorithmic ideas clearly and simply. The novel aspect of the book is that each solution is calculated from an initial formulation of the problem in Haskell by appealing to the laws of functional programming. Pearls of Functional Algorithm Design will appeal to the aspiring functional programmer, students and teachers interested in the principles of algorithm design, and anyone seeking to master the techniques of reasoning about programs in an equational style.

Pearls of Functional Algorithm Design Cambridge University Press

Discover how graph algorithms can help you leverage the relationships within your data to develop more intelligent solutions and enhance your machine learning models. You'll learn how graph analytics are uniquely suited to unfold complex structures and reveal difficult-to-find patterns lurking in your data. Whether you are trying to build dynamic network models or forecast real-world behavior, this book illustrates how graph algorithms deliver value—from finding vulnerabilities and bottlenecks to detecting communities and improving machine learning predictions. This practical book walks you through hands-on examples of how to use graph algorithms in Apache Spark and Neo4j—two of the most common choices for graph analytics. Also included: sample code and tips for over 20 practical graph algorithms that cover optimal pathfinding, importance through centrality, and community detection. Learn how graph analytics vary from conventional statistical analysis. Understand how classic graph algorithms work, and how they are applied. Get guidance on which algorithms to use for different types of questions. Explore algorithm examples with working code and sample datasets from Spark and Neo4j. See how connected feature extraction can increase machine learning accuracy and precision. Walk through creating an ML workflow for link prediction combining Neo4j and Spark.

The Algorithm Design Manual Springer Science & Business Media

Computer science and economics have engaged in a lively interaction over the past fifteen years, resulting in the new field of algorithmic game theory. Many problems that are central to modern computer science, ranging from resource allocation in large networks to online advertising, involve interactions between multiple self-interested parties. Economics and game theory offer a host of useful models and definitions to reason about such problems. The flow of ideas also travels in the other direction, and concepts from computer science are increasingly important in economics. This book grew out of the author's Stanford University course on algorithmic game theory, and aims to give students and other newcomers a quick and accessible introduction to many of the most important concepts in the field. The book also includes case studies on online advertising, wireless spectrum auctions, kidney exchange, and network management.

A Guide to Algorithm Design Cambridge University Press

Over the course of a generation, algorithms have gone from mathematical abstractions to powerful mediators of daily life. Algorithms have made our lives more efficient, more entertaining, and, sometimes, better informed. At the same time, complex algorithms are increasingly violating the basic rights of individual citizens. Allegedly anonymized datasets routinely leak our most sensitive personal information; statistical models for everything from mortgages to college admissions reflect racial and gender bias. Meanwhile, users manipulate algorithms to "game" search engines, spam filters, online reviewing services, and navigation apps. Understanding and improving the science behind the algorithms that run our lives is rapidly becoming one of the most pressing issues of this century. Traditional fixes, such as laws, regulations and watchdog groups, have proven woefully inadequate. Reporting from the cutting edge of scientific research, *The Ethical Algorithm* offers a new approach: a set of principled solutions based on the emerging and exciting science of socially aware algorithm design. Michael Kearns and Aaron Roth explain how we can better embed human principles into machine code - without halting the advance of data-driven scientific exploration. Weaving together innovative research with stories of citizens, scientists, and activists on the front lines, *The Ethical Algorithm* offers a compelling vision for a future, one in which we can better protect humans from the unintended impacts of algorithms while continuing to inspire wondrous advances in technology.

Foundations of Data Science "O'Reilly Media, Inc."

Focusing on algorithms for distributed-memory parallel architectures, *Parallel Algorithms* presents a rigorous yet accessible treatment of theoretical models of parallel computation, parallel algorithm design for homogeneous and heterogeneous platforms, complexity and performance analysis, and essential notions of scheduling. The book extract