[DOC] Algorithms

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Algorithms in a Nutshell-George T. Heineman 2008-10-14 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.

Algorithms Unlocked-Thomas H. Cormen 2013 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-Thomas H.. Cormen 2001 An extensively revised edition of a mathematically rigorous yet accessible introduction to algorithms.

Clever Algorithms-Jason Brownlee 2011-01 This book provides a handbook of algorithmic recipes from the fields of Metaheuristics, Biologically Inspired Computation and Computational Intelligence that have been described in a complete, consistent, and centralized manner. These standardized descriptions were carefully designed to be accessible, usable, and understandable. Most of the algorithms described in this book were originally inspired by biological and natural systems, such as the adaptive capabilities of genetic evolution and the acquired immune system, and the foraging behaviors of birds, bees, ants and bacteria. An encyclopedic algorithm reference, this book is intended for research scientists, engineers, students, and interested amateurs. Each algorithm description provides a working code example in the Ruby Programming Language.

Algorithms from THE BOOK-Kenneth Lange 2020-05-04 Algorithms are a dominant force in modern culture, and every indication is that they will become more pervasive, not less. The best algorithms are undergirded by beautiful mathematics. This text cuts across discipline boundaries to highlight some of the most famous and successful algorithms. Readers are exposed to the principles behind these examples and guided in assembling complex algorithms from simpler building blocks. Written in clear,

instructive language within the constraints of mathematical rigor, Algorithms from THE BOOK includes a large number of classroom-tested exercises at the end of each chapter. The appendices cover background material often omitted from undergraduate courses. Most of the algorithm descriptions are accompanied by Julia code, an ideal language for scientific computing. This code is immediately available for experimentation. Algorithms from THE BOOK is aimed at first-year graduate and advanced undergraduate students. It will also serve as a convenient reference for professionals throughout the mathematical sciences, physical sciences, engineering, and the quantitative sectors of the biological and social sciences.

Grokking Algorithms-Aditya Y. Bhargava 2016-05-25 Summary Grokking Algorithms is a fully illustrated, friendly guide that teaches you how to apply common algorithms to the practical problems you face every day as a programmer. You'll start with sorting and searching and, as you build up your skills in thinking algorithmically, you'll tackle more complex concerns such as data compression and artificial intelligence. Each carefully presented example includes helpful diagrams and fully annotated code samples in Python. Learning about algorithms doesn't have to be boring! Get a sneak peek at the fun, illustrated, and friendly examples you'll find in Grokking Algorithms on Manning Publications' YouTube channel. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the Technology An algorithm is nothing more than a step-by-step procedure for solving a problem. The algorithms you'll use most often as a programmer have already been discovered, tested, and proven. If you want to understand them but refuse to slog through dense multipage proofs, this is the book for you. This fully illustrated and engaging guide makes it easy to learn how to use the most important algorithms effectively in your own programs. About the Book Grokking Algorithms is a friendly take on this core computer science topic. In it,

you'll learn how to apply common algorithms to the practical programming problems you face every day. You'll start with tasks like sorting and searching. As you build up your skills, you'll tackle more complex problems like data compression and artificial intelligence. Each carefully presented example includes helpful diagrams and fully annotated code samples in Python. By the end of this book, you will have mastered widely applicable algorithms as well as how and when to use them. What's Inside Covers search, sort, and graph algorithms Over 400 pictures with detailed walkthroughs Performance trade-offs between algorithms Python-based code samples About the Reader This easy-to-read, picture-heavy introduction is suitable for self-taught programmers, engineers, or anyone who wants to brush up on algorithms. About the Author Aditya Bhargava is a Software Engineer with a dual background in Computer Science and Fine Arts. He blogs on programming at adit.io. Table of Contents Introduction to algorithms Selection sort Recursion Quicksort Hash tables Breadth-first search Dijkstra's algorithm Greedy algorithms Dynamic programming K-nearest neighbors

Performance Evaluation of Checkpoint Rollback-recovery Algorithms in Distributed Systems-William Anthony Manzo 1991 Performance evaluation of checkpoint rollback recovery strategies for distributed systems is a field which has not been studied much. Considerable work has been completed in the performance analysis of checkpoint strategies in centralized systems. The necessity for such a study is clear considering the fact that although most distributed algorithms of this kind receive an analysis when presented in the literature, not one of these algorithms is rigorously compared to any other one in a controlled environment. We have chosen four algorithms for our study, each with different approaches to checkpoint placement, storage, synchronization and rollback checkpoint selection synchronization. Both analytic and simulation approaches were taken to carry out the performance study. An analytic

model for checkpoint rollback recovery performance analysis in a distributed system is presented here. A basic model for a single node in a distributed system was developed and then a model for a distributed system was constructed using the basic model of the single node to form the components of the network. The basic model relies heavily on previous models for centralized systems. In this study, performance was analyzed using the Weibull distribution which has been shown to model experimental failure data better than the exponential distribution. Finally, the distributed system model was used as a basis for extended general network models that cover the different assumptions of the algorithms studied.

Practical Handbook of Genetic Algorithms-Lance D. Chambers 2019-09-17 Practical Handbook of Genetic Algorithms, Volume 3: Complex Coding Systems contains computer-code examples for the development of genetic algorithm systems - compiling them from an array of practitioners in the field. Each

contribution of this singular resource includes: unique code segments documentation descripti

Low Complexity Algorithms for Density Functional Electronic Structure Calculations-Stefan Goedecker 1993

An Introduction to Data Structures and Algorithms-J.A. Storer 2001-11-09 Data structures and algorithms are presented at the college level in a highly accessible format that presents material with one-page displays in a way that will appeal to both teachers and students. The thirteen chapters cover: Models of Computation, Lists, Induction and Recursion, Trees, Algorithm Design, Hashing, Heaps, Balanced Trees, Sets Over a Small Universe, Graphs, Strings, Discrete Fourier Transform, Parallel Computation. Key features: Complicated concepts are expressed clearly in a single page with minimal notation and without the "clutter" of the syntax of a particular programming

language; algorithms are presented with self-explanatory "pseudo-code." * Chapters 1-4 focus on elementary concepts, the exposition unfolding at a slower pace. Sample exercises with solutions are provided. Sections that may be skipped for an introductory course are starred. Requires only some basic mathematics background and some computer programming experience. * Chapters 5-13 progress at a faster pace. The material is suitable for undergraduates or first-year graduates who need only review Chapters 1 -4. * This book may be used for a one-semester introductory course (based on Chapters 1-4 and portions of the chapters on algorithm design, hashing, and graph algorithms) and for a one-semester advanced course that starts at Chapter 5. A year-long course may be based on the entire book. * Sorting, often perceived as rather technical, is not treated as a separate chapter, but is used in many examples (including bubble sort, merge sort, tree sort, heap sort, quick sort, and several parallel algorithms). Also, lower bounds on sorting by comparisons are included with the presentation of heaps in the context of lower bounds for comparison-based structures. * Chapter 13 on parallel models of computation is something of a mini-book itself, and a good way to end a course. Although it is not clear what parallel

Novel Algorithms and Techniques in Telecommunications, Automation and Industrial Electronics-Tarek Sobh 2008-08-15 Novel Algorithms and Techniques in Telecommunications, Automation and Industrial Electronics includes a set of rigorously reviewed world-class manuscripts addressing and detailing state-of-the-art research projects in the areas of Industrial Electronics, Technology and Automation, Telecommunications and Networking. Novel Algorithms and Techniques in Telecommunications, Automation and Industrial Electronics includes selected papers form the conference proceedings of the International Conference on Industrial Electronics, Technology and Automation (IETA 2007) and International Conference on Telecommunications and

Networking (TeNe 07) which were part of the International Joint Conferences on Computer, Information and Systems Sciences and Engineering (CISSE 2007).

A Novel Class of Recursively Constrained Algorithms for Localized Energy Solutions-Irina F. Gorodnitsky 1995

Combinatorial Algorithms-Donald L. Kreher 1998-12-18 This textbook thoroughly outlines combinatorial algorithms for generation, enumeration, and search. Topics include backtracking and heuristic search methods applied to various combinatorial structures, such as: Combinations Permutations Graphs Designs Many classical areas are covered as well as new research topics not included in most existing texts, such as: Group algorithms Graph isomorphism Hill-climbing Heuristic search algorithms This work serves as an exceptional textbook for a modern course in combinatorial algorithms, providing a unified and focused collection of recent topics of interest in the area. The authors, synthesizing material that can only be found scattered through many different sources, introduce the most important combinatorial algorithmic techniques - thus creating an accessible, comprehensive text that students of mathematics, electrical engineering, and computer science can understand without needing a prior course on combinatorics.

Automated Design and Optimization of Wire Antennas Using Genetic Algorithms-Derek Scott Linden 1997 A Genetic Algorithm (GA) has been used in conjunction with the Numerical Electromagnetics Code, Version 2 (NEC2) to create and optimize atypical wire antenna designs with impressive characteristics. Antenna design parameters are encoded into an ordered series of numbers and/or symbols analogous to a biological chromosome. A cost function that quantifies how well a design meets the engineer's specifications is created. The GA uses

these to generate and evaluate a population of designs. The most successful designs are then promoted and mixed through mating and mutation, while poor designs are removed. This process, difficult to trap in local minima, continues until convergence criteria are met, generally yielding excellent designs with no user intervention or initial guesses. Three antennas have been optimized: a monopole loaded with a modified folded dipole, the Yagi antenna, and the crooked-wire genetic antenna. Prior study of the loaded monopole had shown hemispherical coverage was possible. The GA found an asymmetric loaded monopole with an average variation in gain over the hemisphere of only 0.4dB, confirmed by measurement. GA-optimized Yagi antennas surpassed the gain of conventional Yagis by about 1dB, improvement also confirmed by measurement. The GA designed a Yagi with a beamwidth of 50 deg -60 deg, sidelobes nearly 25dB down, and a 14% bandwidth-specifications difficult to achieve using conventional techniques. The crooked-wire genetic antenna is several wires joined in series; locations and lengths are determined by the GA. Optimization for hemispherical coverage with right-hand circular polarization (RHCP) produced highly unusual shapes unrealizable using a conventional approach. RHCP hemispherical coverage was achieved with less than 4dB variation. Measurements verify the results.

Topics in Computational Complexity and the Analysis of Algorithms-Richard P. Brent 1980

A Comparison of Genetic Algorithms and Other Machine Learning Systems of a Complex Classification Task from Common Disease Research-Clare Bates Congdon 1995 Abstract: "The thesis project is an investigation of some well- known machine learning systems and evaluates their utility when applied to a classification task from the field of human genetics. This common- disease research task, an inquiry into genetic and biochemical factors and their association with a family history of coronary

artery disease (CAD), is more complex than many pursued in machine learning research, due to interactions and the inherent noise in the dataset. The task also differs from most pursued in machine learning research because there is a desire to explain the dataset with a small number of rules, even at the expense of accuracy, so that they will be more accessible to medical researchers who are unaccustomed to dealing with disjunctive explanations of data. Furthermore, there is assymetry in the task in that good explanations of the positive examples is of more importance than good explanations of the negative examples. The primary machine learning approach investigated in this research is genetic algorithms (GA's); decision trees, Autoclass, and Cobweb are also included. The GA performed the best in terms of descriptive ability with the common-disease research task, although decision trees also demonstrated certain strengths. Autoclass and Cobweb were recognized from the onset as being inappropriate for the needs of common-disease researchers (because both systems are unsupervised learners that create probabilistic structures), but were included for their interest in the machine learning community; these systems did not perform as well as GA's and decision trees in terms of their ability to describe the data. In terms of predictive accuracy, all systems performed poorly, and the differences between any two of the three best systems is not significant. When positive and negative examples are considered separately, the GA does significantly better than the other systems in predicting positive examples and significantly worse in predicting negative examples. The thesis illustrates that the investigation of 'real' problems from researchers in other fields can lead machine learning researchers to challenge their systems in ways they may not otherwise have considered, and may lead these researchers to a symbiotic relationship that benefits multiple research communities."

Data Structures and Algorithms-Alfred V. Aho 1983 Data -- Data Structures.

Dynamics, Control and Algorithms of Rigid Bodies and Flexible Structures-Yong-Ren Pu 1996

Convergence Analysis of Reweighted Sum-product Algorithms-Tanya Gazelle Roosta 2008

Algorithms-

Computational Optimization, Methods and Algorithms-Slawomir Koziel 2011-06-17 Computational optimization is an important paradigm with a wide range of applications. In virtually all branches of engineering and industry, we almost always try to optimize something - whether to minimize the cost and energy consumption, or to maximize profits, outputs, performance and efficiency. In many cases, this search for optimality is challenging, either because of the high computational cost of evaluating objectives and constraints, or because of the nonlinearity, multimodality, discontinuity and uncertainty of the problem functions in the real-world systems. Another complication is that most problems are often NP-hard, that is, the solution time for finding the optimum increases exponentially with the problem size. The development of efficient algorithms and specialized techniques that address these difficulties is of primary importance for contemporary engineering, science and industry. This book consists of 12 self-contained chapters, contributed from worldwide experts who are working in these exciting areas. The book strives to review and discuss the latest developments concerning optimization and modelling with a focus on methods and algorithms for computational optimization. It also covers well-chosen, real-world applications in science, engineering and industry. Main topics include derivative-free optimization, multi-objective evolutionary algorithms, surrogate-based methods, maximum simulated likelihood

estimation, support vector machines, and metaheuristic algorithms. Application case studies include aerodynamic shape optimization, microwave engineering, black-box optimization, classification, economics, inventory optimization and structural optimization. This graduate level book can serve as an excellent reference for lecturers, researchers and students in computational science, engineering and industry.

Algorithms for Finding Zeros and Extrema of Functions Without Calculating Derivatives-Richard P. Brent 1971 Theorems are given concerning the order (i.e., rate) of convergence of a successive interpolation process for finding simple zeros of a function or its derivatives, using only function evaluations. Special cases include the successive linear interpolation process for finding zeros, and a parabolic interpolation process for finding turning points. Results on interpolation and finite differences include weakening the hypotheses of a theorem of Ralston on the derivative of the error in

Lagrangian interpolation. The theoretical results are applied to given algorithms for finding zeros or local minima of functions of one variable, in the presence of rounding errors. The algorithms are guaranteed to converge nearly as fast as would bisection or Fibonacci search, and in most practical cases convergence is superlinear, and much faster than for bisection or Fibonacci search. (Author).

Shared Processor Modeling of Algorithms with Parallelism-John Ernest Randolph 1972

hompack: a suite of codes for globally convergent homotopy algorithms-layne t. watson, stephen c. billups, alexander p. morgan 1985

Disturbance Estimation and Parameter Identification Algorithms for Vehicle Systems-Chia-Shang Liu 1997

Use of Injection Island Genetic Algorithms in the Optimization of Composite Flywheels-David James Eby 1997

Algorithms for Singular Value Decomposition and Hankel Solver on Multiprocessor Systems-Tong-Jyh Lee 1994

Algorithms for Solving Overdetermined Systems of Linear Equations in the L[p-subsript] Sense-Robert William Owens 1975

Asymptotics of Gradient-based Neural Network Training Algorithms-Sayandev Mukherjee 1994

Network Flow Algorithms-David P. Williamson 2019-09-05 Offers an up-to-date, unified treatment of combinatorial algorithms to solve network flow problems for graduate students and professionals.

On Generalizations of Adaptive Algorithms and Application of the Fuzzy Sets Concept to Pattern Classification-William Go Wee 1982

The Geometry of Efficient Retrieval Algorithms-Azad Bolour 1977

Sublogarithmic-time Parallel Algorithms-Dino Karabeg 1988

Pseudo-time Algorithms for the Navier-Stokes Equations-R. C. Swanson 1986

Algorithms of Oppression-Safiya Umoja Noble 2018-02-20 A revealing look at how negative

biases against women of color are embedded in search engine results and algorithms Run a Google search for "black girls"—what will you find? "Big Booty" and other sexually explicit terms are likely to come up as top search terms. But, if you type in "white girls," the results are radically different. The suggested porn sites and un-moderated discussions about "why black women are so sassy" or "why black women are so angry" presents a disturbing portrait of black womanhood in modern society. In Algorithms of Oppression, Safiya Umoja Noble challenges the idea that search engines like Google offer an equal playing field for all forms of ideas, identities, and activities. Data discrimination is a real social problem; Noble argues that the combination of private interests in promoting certain sites, along with the monopoly status of a relatively small number of Internet search engines, leads to a biased set of search algorithms that privilege whiteness and discriminate against people of color, specifically women of color. Through an analysis of textual and media searches as well as extensive research on paid online advertising, Noble exposes a culture of racism and sexism in the way discoverability is created online. As search engines and their related companies grow in importance—operating as a source for email, a major vehicle for primary and secondary school learning, and beyond—understanding and reversing these disquieting trends and discriminatory practices is of utmost importance. An original, surprising and, at times, disturbing account of bias on the internet, Algorithms of Oppression contributes to our understanding of how racism is created, maintained, and disseminated in the 21st century.

Efficient Algorithms for Dilated Mappings of Binary Trees-Institute for Computer Applications in Science and Engineering 1990 The problem is addressed of finding a 1-1 mapping of the vertices of a binary tree onto those of a target binary tree such that the son of a mode on the a desendent of the image of that node in the second binary tree. There are two

natural measures of the cost of this mapping, namely the dilation cost i.e. the maximum distance in the target binary tree between the images of vertices that are adjacent in the original tree. The other measure, expansion cost, is defined as the number of extra nodes/edges to be added to the target binary tree in order ensure a 1-1 mapping. An efficient algorithm is described to find a mapping of one binary tree onto another. It is possible to minimize one cost of mapping at the expense of the other. This problem arises when designing pipelined Arithmetic Logic Units for special purpose computers. The pipeline is composed of ALU chips connected in the form of a binary tree. The operands to the pipeline can be supplied to the leaf nodes of the binary tree which then process and and pass the results up to their parents. The final result is available at the root. As each new application may require a distinct nesting of operations, it is useful to be able to find a good mapping of a new binary tree over existing ALU tree. Another problem arises if every distinct required binary tree is known beforehand. Here it is useful to hardwire the pipeline in the form of a minimal supertree that contains all required binary trees. Keywords: Assignment, Dilation, Embedding, Mapping problem, Parallel processing, Pipeline.

Evolving Waveforms with Genetic Algorithms-Cristyn Magnus 2003

Distributed Operating Systems & Algorithms-Randy Chow 1997 Distributed Operating Systems and Algorithms integrates into one text both the theory and implementation aspects of distributed operating systems for the first time. This innovative book provides the reader with knowledge of the important algorithms necessary for an in-depth understanding of distributed systems; at the same time it motivates the study of these algorithms by presenting a systems framework for their practical application. The first part of the book is intended for use in an advanced

course on operating systems and concentrates on parallel systems, distributed systems, real-time systems, and computer networks. The second part of the text is written for a course on distributed algorithms with a focus on algorithms for asynchronous distributed systems. While each of the two parts is self-contained, extensive cross-referencing allows the reader to emphasize either theory or implementation or to cover both elements of selected topics.Features: Integrates and balances coverage of the advanced aspects of operating systems with the distributed algorithms used by these systems. Includes extensive references to commercial and experimental systems to illustrate the concepts and implementation issues. Provides precise algorithm description and explanation of why these algorithms were developed. Structures the coverage of algorithms around the creation of a framework for implementing a replicated server- a prototype for implementing a fault-tolerant and highly available distributed system. Contains programming projects on such topics as sockets, RPC, threads, and implementation of distributed algorithms using these tools. Includes an extensive annotated bibliography for each chapter, pointing the reader to recent developments. Solutions to selected exercises, templates to programming problems, a simulator for algorithms for distributed synchronization, and teaching tips for selected topics are available to qualified instructors from Addison Wesley. 0201498383B04062001

Algorithms and Approximations for Queueing Systems-M. H. van Hoorn 1984

Algorithm Design-Michael T. Goodrich 2002 Michael Goodrich and Roberto Tamassia, authors of the successful, Data Structures and Algorithms in Java, 2/e, have written Algorithm Engineering, a text designed to provide a comprehensive introduction to the design, implementation and analysis of computer algorithms and data structures from a modern perspective. This book offers theoretical analysis techniques as well as

algorithmic design patterns and experimental methods for the engineering of algorithms. Market: Computer Scientists; Programmers.