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An Introduction to Data Structures and Algorithms DESIGN AND ANALYSIS OF ALGORITHMS Introduction To Algorithms Algorithms Learn Design and Analysis of Algorithms in 24 Hours Problem Solving in Data Structures and Algorithms Using C# Advanced Data Structures Bioinformatics Algorithms Problem Solving in Data Structures & Algorithms Using Python Co-Clustering Algorithms for Solving Common Fixed Point Problems Global Optimization Methods in Geophysical Inversion Planning Algorithms Knowledge Discovery and Data Mining Nested algorithms for optimal reservoir operation and their embedding in a decision support platform An Introduction to Computer Science An Introduction to Data Structures and Algorithms AI for Data Science Data Structures & Algorithms Using Php 7 Fuzzy Machine Learning Algorithms for Remote Sensing Image Classification Markov Chains Algorithms in Java, Part 5 Problem Solving in Data Structures & Algorithms Using Python Data Structures and Algorithms in Ruby Algorithms of Oppression Algorithms and Complexity Randomized Algorithms Searching with Probabilities Large-Scale Graph Processing Using Apache Giraph Deep Statistical Comparison for Meta-heuristic Stochastic Optimization Algorithms MCMC

from Scratch Fast Fourier Transform Algorithms for Parallel Computers Learn Data Structures and Algorithms Topics in Distributed Algorithms 7 Algorithm Design Paradigms Ad Hoc and Sensor Wireless Networks: Architectures, Algorithms and Protocols Algorithms for Worst-Case Design and Applications to Risk Management Linear Programming: An Introduction to Finite Improvement Algorithms Mathematics of Multidimensional Fourier Transform Algorithms Optimal Design and Related Areas in Optimization and Statistics

Learn Data Structures and Algorithms Nov 19 2020 # Learn Data Structures and Algorithms * Tutorial Data Structures and Algorithms with Java for beginners.---------- Contents: + Chapter 1 - ABSTRACT DATA TYPE + Chapter 2 - LINKED LIST + Chapter 3 - STACK & QUEUE + Chapter 4 - RECURSION + Chapter 5 - ALGORITHM ANALYSIS + Chapter 6 - SORTING + Chapter 7 - BINARY TREE

Randomized Algorithms May 26 2021 For many applications a randomized algorithm is either the simplest algorithm available, or the fastest, or both. This tutorial presents the basic concepts in the design and analysis of randomized algorithms. The first part of the book presents tools from probability theory and probabilistic analysis that are recurrent in algorithmic applications. Algorithmic examples are given to illustrate the use of each tool in a concrete setting. In the second part of the book, each of the seven chapters focuses on one important area of application of randomized algorithms: data structures; geometric algorithms; graph algorithms; number

theory; enumeration; parallel algorithms; and on-line algorithms. A comprehensive and representative selection of the algorithms in these areas is also given. This book should prove invaluable as a reference for researchers and professional programmers, as well as for students. *Deep Statistical Comparison for Meta-heuristic Stochastic Optimization Algorithms* Feb 20 2021 Focusing on comprehensive comparisons of the performance of stochastic optimization algorithms, this book provides an overview of the current approaches used to analyze algorithm performance in a range of common scenarios, while also addressing issues that are often overlooked. In turn, it shows how these issues can be easily avoided by applying the principles that have produced Deep Statistical Comparison and its variants. The focus is on statistical analyses performed using single-objective and multi-objective optimization data. At the end of the book, examples from a recently developed web-service-based e-learning tool (DSCTool) are presented. The tool provides users with all the functionalities needed to make robust statistical comparison analyses in various statistical scenarios. The book is intended for newcomers to the field and experienced researchers alike. For newcomers, it covers the basics of optimization and statistical analysis, familiarizing them with the subject matter before introducing the Deep Statistical Comparison approach. Experienced researchers can quickly move on to the content on new statistical approaches. The book is divided into three parts: Part I: Introduction to optimization, benchmarking, and statistical analysis – Chapters 2-4. Part

II: Deep Statistical Comparison of meta-heuristic stochastic optimization algorithms – Chapters 5-7. Part III: Implementation and application of Deep Statistical Comparison – Chapter 8.

Large-Scale Graph Processing Using Apache Giraph Mar 24 2021 This book takes its reader on a journey through Apache Giraph, a popular distributed graph processing platform designed to bring the power of big data processing to graph data. Designed as a step-by-step self-study guide for everyone interested in large-scale graph processing, it describes the fundamental abstractions of the system, its programming models and various techniques for using the system to process graph data at scale, including the implementation of several popular and advanced graph analytics algorithms. The book is organized as follows: Chapter 1 starts by providing a general background of the big data phenomenon and a general introduction to the Apache Giraph system, its abstraction, programming model and design architecture. Next, chapter 2 focuses on Giraph as a platform and how to use it. Based on a sample job, even more advanced topics like monitoring the Giraph application lifecycle and different methods for monitoring Giraph jobs are explained. Chapter 3 then provides an introduction to Giraph programming, introduces the basic Giraph graph model and explains how to write Giraph programs. In turn, Chapter 4 discusses in detail the implementation of some popular graph algorithms including PageRank, connected components, shortest paths and triangle closing. Chapter 5 focuses on advanced Giraph programming, discussing common Giraph algorithmic optimizations, tunable Giraph

configurations that determine the system's utilization of the underlying resources, and how to write a custom graph input and output format. Lastly, chapter 6 highlights two systems that have been introduced to tackle the challenge of large scale graph processing, GraphX and GraphLab, and explains the main commonalities and differences between these systems and Apache Giraph. This book serves as an essential reference guide for students, researchers and practitioners in the domain of large scale graph processing. It offers step-by-step guidance, with several code examples and the complete source code available in the related github repository. Students will find a comprehensive introduction to and hands-on practice with tackling large scale graph processing problems using the Apache Giraph system, while researchers will discover thorough coverage of the emerging and ongoing advancements in big graph processing systems. *Advanced Data Structures* Feb 15 2023 Learn Data Structures and Algorithms! This book is a collection of lectures notes on Data Structures and Algorithms. The content found in this book supplements the free video lecture series, of the same name, "Advanced Data Structures", by the author, Dr. Daniel Page. This video lecture series is available at http://www.pagewizardgames.com/datastructures. This book: -Contains Computer Science topics and materials comparable to those found among university courses at a similar level (second-year) at top Canadian universities. -Provides an accessible written companion and supplemental notes for those that wish to learn the subject of Data Structures and Algorithms from the video lecture series, but have difficulties taking notes, or

would prefer having a written alternative to follow along. This book is ideal for those with already an introductory programming background, know a little bit about computing, and wish to learn more about Data Structures and Algorithms and begin a more formal study of Computer Science. The materials here are a great place to start for supplemental/additional learning materials on the subject for self-study, university students, or those that want to learn more about Computer Science. Dr. Daniel Page places great emphasis on the introductory mathematical aspects of Computer Science, a natural transition from a basic programming background to thinking a bit more like a computer scientist about Computer Science. This book is not a textbook. The author assumes the reader is familiar with algebra, functions, common finite and infinite series such as arithmetic series and geometric series, and basic control structures in programming or logic. All the algorithms in this book are described in English, or using Java-like pseudocode. Chapters -Chapter 1 - Introduction: Data Structures, Problems, Input Size, Algorithms, The Search Problem. -Chapter 2 - Intro to Analysis of Algorithms I: Complexity Analysis, Comparing Algorithms, Growth Rate of Functions (Asymptotics), Showing f is O(g), Showing f is not O(g). -Chapter 3 - Intro to Analysis of Algorithms II: Some Properties of O, An Iterative Example, Back to our "Easy" Search Problem. -Chapter 4 - Dictionaries: The Dictionary Problem, Simple Implementations of a Dictionary. -Chapter 5 - Hashing: Hash Function, Hash Code, Separate Chaining, Open Addressing, Revisiting the Load Factor. -Chapter 6 -

Trees: Tree ADT, Linked Tree Representation, Tree Property, Computing Height of a Tree, Tree Traversals -Chapter 7 - Priority Queues & Heaps: Priority Queues, Heaps, Array-Based Implementation, Building a Heap, Application: Sorting, Introduction to Amortized Analysis -Chapter 8 - Binary Search Trees: Ordered Dictionary ADT, BST Implementations, Inorder Traversal, Smallest, Get, Put, Remove, Successor. -Chapter 9 - AVL Trees: Height, AVL Trees, Re-Balancing AVL Trees, putAVL, removeAVL, AVL Tree Performance. -Chapter 10 - Graphs: Degrees and the Handshaking Lemma, Complete Graphs, Paths and Cycles, Trees, Forests, Subgraphs, and Connectivity, Graph Representations. -Chapter 11 - Graph Traversals: Depth-First Search (DFS), Path-Finding, Cycle Detection, Counting Vertices, DFS Tree, Breadth-First Search (BFS), Summary. -Chapter 12 - Minimum Spanning Trees: Weighted Graphs, Minimum Spanning Trees & Algorithms, Prim's Algorithm, Heap-Based Implementation of Prim's Algorithm and More! -Chapter 13 - Shortest Paths: Single-Source Shortest Path Problem, Dijkstra's Algorithm. -Chapter 14 - Multiway Search Trees: Beyond Binary Search Trees, Get, Put, Successor and Remove, (2,4)-Trees, B-Trees.

Mathematics of Multidimensional Fourier Transform Algorithms May 14 2020 Developing algorithms for multi-dimensional Fourier transforms, this book presents results that yield highly efficient code on a variety of vector and parallel computers. By emphasising the unified basis for the many approaches to both one-dimensional and multidimensional Fourier transforms, this book not only clarifies the fundamental similarities, but also shows how to exploit the differences in

optimising implementations. It will thus be of great interest not only to applied mathematicians and computer scientists, but also to seismologists, high-energy physicists, crystallographers, and electrical engineers working on signal and image processing.

MCMC from Scratch Jan 22 2021 This textbook explains the fundamentals of Markov Chain Monte Carlo (MCMC) without assuming advanced knowledge of mathematics and programming. MCMC is a powerful technique that can be used to integrate complicated functions or to handle complicated probability distributions. MCMC is frequently used in diverse fields where statistical methods are important – e.g. Bayesian statistics, quantum physics, machine learning, computer science, computational biology, and mathematical economics. This book aims to equip readers with a sound understanding of MCMC and enable them to write simulation codes by themselves. The content consists of six chapters. Following Chap. 2, which introduces readers to the Monte Carlo algorithm and highlights the advantages of MCMC, Chap. 3 presents the general aspects of MCMC. Chap. 4 illustrates the essence of MCMC through the simple example of the Metropolis algorithm. In turn, Chap. 5 explains the HMC algorithm, Gibbs sampling algorithm and Metropolis-Hastings algorithm, discussing their pros, cons and pitfalls. Lastly, Chap. 6 presents several applications of MCMC. Including a wealth of examples and exercises with solutions, as well as sample codes and further math topics in the Appendix, this book offers a valuable asset for students and beginners in various fields.

An Introduction to Computer

Science May 06 2022 --Instructor's manual/ jean-Paul Tremblay [and] Brad Redekopp.

Planning Algorithms Aug 09 2022 Planning algorithms are impacting technical disciplines and industries around the world, including robotics, computer-aided design, manufacturing, computer graphics, aerospace applications, drug design, and protein folding. This coherent and comprehensive book unifies material from several sources, including robotics, control theory, artificial intelligence, and algorithms. The treatment is centered on robot motion planning, but integrates material on planning in discrete spaces. A major part of the book is devoted to planning under uncertainty, including decision theory, Markov decision processes, and information spaces, which are the 'configuration spaces' of all sensor-based planning problems. The last part of the book delves into planning under differential constraints that arise when automating the motions of virtually any mechanical system. This text and reference is intended for students, engineers, and researchers in robotics, artificial intelligence, and control theory as well as computer graphics, algorithms, and computational biology.

Ad Hoc and Sensor Wireless Networks: Architectures, Algorithms and Protocols Aug 17 2020 "This Ebook brings together the latest developments and studies of Mobile Ad Hoc Networks (MANETs) and Wireless Sensor Networks (WSNs), which should provide a seedbed for new breakthroughs. It focuses on the most representative topics in MANETs and WSNs, s"

Global Optimization Methods in Geophysical Inversion Sep 10 2022 Providing an

up-to-date overview of the most popular global optimization methods used in interpreting geophysical observations, this new edition includes a detailed description of the theoretical development underlying each method and a thorough explanation of the design, implementation and limitations of algorithms. New and expanded chapters provide details of recently developed methods, such as the neighborhood algorithm, particle swarm optimization, hybrid Monte Carlo and multi-chain MCMC methods. Other chapters include new examples of applications, from uncertainty in climate modeling to whole earth studies. Several different examples of geophysical inversion, including joint inversion of disparate geophysical datasets, are provided to help readers design algorithms for their own applications. This is an authoritative and valuable text for researchers and graduate students in geophysics, inverse theory and exploration geoscience, and an important resource for professionals working in engineering and petroleum exploration.

Problem Solving in Data Structures and Algorithms Using C# Mar 16 2023 "Problem Solving in Data Structures & Algorithms" is a series of books about the usage of Data Structures and Algorithms in computer programming. The book is easy to follow and is written for interview preparation point of view. In these books, the examples are solved in various languages like Go, C, C++, Java, C#, Python, VB, JavaScript and PHP. GitHub Repositories for these books. https://github.com/Hemant-Jain-Author Book's Composition This book introduces you to the world of data structures and algorithms. Data

structures defines the way in which data is arranged in memory for fast and efficient access while algorithms are a set of instruction to solve problems by manipulating these data structures. Designing an efficient algorithm is a very important skill that all software companies, e.g. Microsoft, Google, Facebook etc. pursues. Most of the interviews for these companies are focused on knowledge of data-structures and algorithms. They look for how candidates use concepts of data structures and algorithms to solve complex problems efficiently. Apart from knowing, a programming language you also need to have good command of these key computer fundamentals to not only qualify the interview but also excel in you jobs as a software engineer. This book assumes that you are a C# language developer. You are not an expert in C# language, but you are well familiar with concepts of classes, functions, arrays, pointers and recursion. At the start of this book, we will be looking into Complexity Analysis followed by the various data structures and their algorithms. We will be looking into a Linked-List, Stack, Queue, Trees, Heap, Hash-Table and Graphs. We will also be looking into Sorting, Searching techniques. In last few chapters, we will be looking into various algorithmic techniques. Such as, Brute-Force algorithms, Greedy algorithms, Divide and Conquer algorithms, Dynamic Programming, Reduction and Backtracking. .

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Fast Fourier Transform Algorithms for Parallel Computers Dec 21 2020 Following an introduction to the basis of the fast Fourier transform (FFT), this book focuses on the implementation details on FFT for parallel computers. FFT is an efficient implementation of the discrete Fourier transform (DFT), and is widely used for many applications in engineering, science, and mathematics. Presenting many algorithms in pseudo-code and a complexity analysis, this book offers a valuable reference guide for graduate students, engineers, and scientists in the field who wish to apply FFT to large-scale problems. Parallel computation is becoming indispensable in solving the large-scale problems increasingly arising in a wide range of applications. The performance of parallel supercomputers is steadily improving, and it is expected that a massively parallel system with hundreds of thousands of compute nodes equipped with multi-core processors and accelerators will be available in the near future. Accordingly, the book also provides up-to-date computational techniques relevant to the FFT in state-of-the-art parallel computers. Following the introductory chapter, Chapter 2 introduces readers to the DFT and the basic idea of the FFT. Chapter 3 explains mixed-radix FFT algorithms, while Chapter 4 describes split-radix FFT

algorithms. Chapter 5 explains multi-dimensional FFT algorithms, Chapter 6 presents high-performance FFT algorithms, and Chapter 7 addresses parallel FFT algorithms for shared-memory parallel computers. In closing, Chapter 8 describes parallel FFT algorithms for distributed-memory parallel computers.

Problem Solving in Data Structures & Algorithms Using Python Sep 29 2021 This book is about the usage of Data Structures and Algorithms in computer programming. Designing an efficient algorithm to solve a computer science problem is a skill of Computer programmer. This is the skill which tech companies like Google, Amazon, Microsoft, Adobe and many others are looking for in an interview. This book assumes that you are a Python language developer. You are not an expert in Python language, but you are well familiar with concepts of references, functions, lists and recursion. In the start of this book, we will be revising the Python language fundamentals. We will be looking into some of the problems in arrays and recursion too. Then in the coming chapter, we will be looking into complexity analysis. Then will look into the various data structures and their algorithms. We will be looking into a Linked List, Stack, Queue, Trees, Heap, Hash Table and Graphs. We will be looking into Sorting & Searching techniques. Then we will be looking into algorithm analysis, we will be looking into Brute Force algorithms, Greedy algorithms, Divide & Conquer algorithms, Dynamic Programming, Reduction, and Backtracking. In the end, we will be looking into System Design, which will give a systematic approach for solving the design problems in an Interview.

Linear Programming: An Introduction to

Finite Improvement Algorithms Jun 14 2020 This text covers the basic theory and computation for a first course in linear programming, including substantial material on mathematical proof techniques and sophisticated computation methods. Includes Appendix on using Excel. 1984 edition.

Searching with Probabilities Apr 24 2021 Search algorithms for finding optimal solutions are, at least from the practical point of view, often enough intractible, so that the search for good ('satisficing') solutions becomes a research topic of its own interest. Satisficing solutions and different approaches to obtain them under various criteria is the subject of these notes, published in the series "Research notes in artificial intelligence". In an introductory chapter the author presents the known point - value and the point - { { set of values} } identification used in search- based decision-algorithms for guiding the search and discusses some of their advantages and disadvantages. This motivates the here studied alternative approach using that evaluation functions do not return a point - value or a range of values corresponding to a point (state) in a tree but now a distribution function, that describes the possible location of the 'value' of the state. Chapter 2 introduces this model, Chapter 6 resumes the basic results. Chapter 8 (supported by chapter 5) provides the conclusion by comparing it with the respective performance of the mentioned approaches. There are convincing, both with respect to feasibility and, at least in some cases, to the superiority of the probabilistic approach. The known algorithms B ∗ B∗, the selection-verification algorithm B ∗ B∗ and others, and their connection with the

integrability into the presented approach are the body of the chapters 3, 4 and 7. Of course, some parallel reading (in particular about the mentioned algorithms) must be done by non-specialists in order to profit from all the presented material. Readers interested in search algorithms for chess programs would find this particularly rewarding. More generally one can say, that these notes are certainly informative and of the whole well-written. The reviewer would without hesitation recommend these notes to all scientists in the areas AI, OR or computer science with interest in the subject of search algorithms. Applied probabilists may also find these notes an informative source about what is already done in a specialized field, which, in our times of computers, is bound to draw an increasing attention, and in which independent valuable contributions would be very desirable.

Bioinformatics Algorithms Jan 14 2023 Bioinformatics Algorithms: an Active Learning Approach is one of the first textbooks to emerge from the recent Massive Online Open Course (MOOC) revolution. A light-hearted and analogy-filled companion to the authors' acclaimed online course (http://coursera.org/course/bioinformatics), this book presents students with a dynamic approach to learning bioinformatics. It strikes a unique balance between practical challenges in modern biology and fundamental algorithmic ideas, thus capturing the interest of students of biology and computer science students alike.Each chapter begins with a central biological question, such as "Are There Fragile Regions in the Human Genome?" or "Which DNA Patterns Play the Role of Molecular Clocks?" and then steadily develops the algorithmic sophistication required to answer

this question. Hundreds of exercises are incorporated directly into the text as soon as they are needed; readers can test their knowledge through automated coding challenges on Rosalind (http://rosalind.info) , an online platform for learning bioinformatics.The textbook website (http://bioinformaticsalgorithms.org) directs readers toward additional educational materials, including video lectures and PowerPoint slides.

Algorithms in Java, Part 5 Oct 31 2021 Once again, Robert Sedgewick provides a current and comprehensive introduction to important algorithms. The focus this time is on graph algorithms, which are increasingly critical for a wide range of applications, such as network connectivity, circuit design, scheduling, transaction processing, and resource allocation. In this book, Sedgewick offers the same successful blend of theory and practice that has made his work popular with programmers for many years. Michael Schidlowsky and Sedgewick have developed concise new Java implementations that both express the methods in a natural and direct manner and also can be used in real applications. Algorithms in Java, Third Edition, Part 5: Graph Algorithms is the second book in Sedgewick's thoroughly revised and rewritten series. The first book, Parts 1-4, addresses fundamental algorithms, data structures, sorting, and searching. A forthcoming third book will focus on strings, geometry, and a range of advanced algorithms. Each book's expanded coverage features new algorithms and implementations, enhanced descriptions and diagrams, and a wealth of new exercises for polishing skills. The natural match between Java classes and abstract data type (ADT)

implementations makes the code more broadly useful and relevant for the modern object-oriented programming environment. The Web site for this book (www.cs.princeton.edu/~rs/) provides additional source code for programmers along with a variety of academic support materials for educators. Coverage includes: A complete overview of graph properties and types Diagraphs and DAGs Minimum spanning trees Shortest paths Network flows Diagrams, sample Java code, and detailed algorithm descriptions A landmark revision, Algorithms in Java, Third Edition, Part 5 provides a complete tool set for programmers to implement, debug, and use graph algorithms across a wide range of computer applications.

Co-Clustering Nov 12 2022 Cluster or co-cluster analyses are important tools in a variety ofscientific areas. The introduction of this book presents a state ofthe art of already well-established, as well as more recent methodsof co-clustering. The authors mainly deal with the two-modepartitioning under different approaches, but pay particularattention to a probabilistic approach. Chapter 1 concerns clustering in general and the model-basedclustering in particular. The authors briefly review the classicalclustering methods and focus on the mixture model. They present anddiscuss the use of different mixtures adapted to different types ofdata. The algorithms used are described and related works withdifferent classical methods are presented and commented upon. Thischapter is useful in tackling the problem of co-clustering under the mixture approach. Chapter 2 is devoted tothe latent block model proposed in the mixture approach context.The authors discuss this model

in detail and present its interestregarding co-clustering. Various algorithms are presented in ageneral context. Chapter 3 focuses on binary and categorical data.It presents, in detail, the appropriated latent block mixturemodels. Variants of these models and algorithms are presented andillustrated using examples. Chapter 4 focuses on contingency data.Mutual information, phi-squared and model-based co-clustering arestudied. Models, algorithms and connections among differentapproaches are described and illustrated. Chapter 5 presents thecase of continuous data. In the same way, the different approachesused in the previous chapters are extended to this situation. Contents 1. Cluster Analysis. 2. Model-Based Co-Clustering. 3. Co-Clustering of Binary and Categorical Data. 4. Co-Clustering of Contingency Tables. 5. Co-Clustering of Continuous Data. About the Authors Gérard Govaert is Professor at the University of Technologyof Compiègne, France. He is also a member of the CNRSLaboratory Heudiasyc (Heuristic and diagnostic of complex systems).His research interests include latent structure modeling, modelselection, model-based cluster analysis, block clustering andstatistical pattern recognition. He is one of the authors of theMIXMOD (MIXtureMODelling) software. Mohamed Nadif is Professor at the University of Paris-Descartes,France, where he is a member of LIPADE (Paris Descartes computerscience laboratory) in the Mathematics and Computer Sciencedepartment. His research interests include machine learning, datamining, model-based cluster analysis, co-clustering, factorizationand data analysis. Cluster Analysis is

an important tool in a variety of scientificareas. Chapter 1 briefly presents a state of the art of alreadywell-established as well more recent methods. The hierarchical,partitioning and fuzzy approaches will be discussed amongst others.The authors review the difficulty of these classical methods intackling the high dimensionality, sparsity and scalability. Chapter2 discusses the interests of coclustering, presenting differentapproaches and defining a co-cluster. The authors focus onco-clustering as a simultaneous clustering and discuss the cases ofbinary, continuous and co-occurrence data. The criteria andalgorithms are described and illustrated on simulated and realdata. Chapter 3 considers co-clustering as a model-basedco-clustering. A latent block model is defined for different kindsof data. The estimation of parameters and co-clustering is tackledunder two approaches: maximum likelihood and classification maximumlikelihood. Hard and soft algorithms are described and applied onsimulated and real data. Chapter 4 considers co-clustering as amatrix approximation. The trifactorization approach is consideredand algorithms based on update rules are described. Links withnumerical and probabilistic approaches are established. Acombination of algorithms are proposed and evaluated on simulatedand real data. Chapter 5 considers a co-clustering or bi-clusteringas the search for coherent co-clusters in biological terms or theextraction of co-clusters under conditions. Classical algorithmswill be described and evaluated on simulated and real data.Different indices to evaluate the quality of coclusters are notedand used in

numerical experiments. *Algorithms of Oppression* Jul 28 2021 Acknowledgments -- Introduction: the power of algorithms -- A society, searching -- Searching for Black girls -- Searching for people and communities -- Searching for protections from search engines -- The future of knowledge in the public -- The future of information culture -- Conclusion: algorithms of oppression -- Epilogue -- Notes -- Bibliography -- Index -- About the author

Topics in Distributed Algorithms Oct 19 2020

DESIGN AND ANALYSIS OF ALGORITHMS Jul 20 2023 This well organized text provides the design techniques of algorithms in a simple and straight forward manner. It describes the complete development of various algorithms along with their pseudo-codes in order to have an understanding of their applications. The book begins with a description of the fundamental concepts and basic design techniques of algorithms. Gradually, it introduces more complex and advanced topics such as dynamic programming, backtracking and various algorithms related to graph data structure. Finally, the text elaborates on NP-hard, matrix operations and sorting network. Primarily designed as a text for undergraduate students of Computer Science and Engineering and Information Technology (B.Tech., Computer Science, B.Tech. IT) and postgraduate students of Computer Applications (MCA), the book would also be quite useful to postgraduate students of Computer Science and IT (M.Sc., Computer Science; M.Sc., IT). New to this Second Edition 1. A new section on Characteristics of Algorithms (Section 1.3) has been added 2. Five new sections on

Insertion Sort (Section 2.2), Bubble Sort (Section 2.3), Selection Sort (Section 2.4), Shell Sort/Diminishing Increment Sort/Comb Sort (Section 2.5) and Merge Sort (Section 2.6) have been included 3. A new chapter on Divide and Conquer (Chapter 5) has also been incorporated

Learn Design and Analysis of Algorithms in 24 Hours Apr 17 2023 Table Of Content Chapter 1: Greedy Algorithm with Example: What is, Method and Approach What is a Greedy Algorithm? History of Greedy Algorithms Greedy Strategies and Decisions Characteristics of the Greedy Approach Why use the Greedy Approach? How to Solve the activity selection problem Architecture of the Greedy approach Disadvantages of Greedy Algorithms Chapter 2: Circular Linked List: Advantages and Disadvantages What is a Circular Linked List? Basic Operations in Circular Linked lists Insertion Operation Deletion Operation Traversal of a Circular Linked List Advantages of Circular Linked List Disadvantages of Circular Linked List Singly Linked List as a Circular Linked List Applications of the Circular Linked List Chapter 3: Array in Data Structure: What is, Arrays Operations [Examples] What are Arrays? Concept of Array Why do we need arrays? Creating an Array in Python Ways to Declare an Array in Python Array Operations Creating an Array in C++ Array Operations in C++ Array Operations in Java Chapter 4: B TREE in Data Structure: Search, Insert, Delete Operation Example What is a B Tree? Why use B-Tree History of B Tree Search Operation Insert Operation Delete Operation Chapter 5: B+ TREE : Search, Insert and Delete Operations Example What is a B+ Tree? Rules for B+ Tree Why use B+ Tree B+ Tree vs. B Tree Search Operation Insert Operation Delete

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Subsequence? Naive Method Optimal Substructure Recursive Method of Longest Comm Sequence Dynamic Programming method of Longest Common Subsequence (LCS) Chapter 17: Dijisktra's Algorithm: C++, Python Code Example What is the shortest path or shortest distance? How Dijkstra's Algorithm Works Difference Between Dijkstra and BFS, DFS 2D grid demonstration of how BFS works Example of Dijkstra's Algorithm C++ implementation Dijkstra's Algorithm Python implementation Dijkstra's Algorithm Application of Dijkstra Algorithm Limitation of Dijkstra's Algorithm **Problem Solving in Data Structures & Algorithms Using Python** Dec 13 2022 "Problem Solving in Data Structures & Algorithms" is a series of books about the usage of Data Structures and Algorithms in computer programming. The book is easy to follow and is written for interview preparation point of view. In these books, the examples are solved in various languages like Go, C, C++, Java, C#, Python, VB, JavaScript and PHP. GitHub Repositories for these books. https://github.com/Hemant-Jain-Author Book's Composition This book introduces you to the world of data structures and algorithms. Data structures defines the way in which data is arranged in memory for fast and efficient access while algorithms are a set of instruction to solve problems by manipulating these data structures. Designing an efficient algorithm is a very important skill that all software companies, e.g. Microsoft, Google, Facebook etc. pursues. Most of the interviews for these companies are focused on knowledge of data-structures and algorithms. They

look for how candidates use concepts of data structures and algorithms to solve complex problems efficiently. Apart from knowing, a programming language you also need to have good command of these key computer fundamentals to not only qualify the interview but also excel in you jobs as a software engineer. This book assumes that you are a C language developer. You are not an expert in C language, but you are well familiar with concepts of classes, functions, arrays, pointers and recursion. At the start of this book, we will be looking into Complexity Analysis followed by the various data structures and their algorithms. We will be looking into a Linked-List, Stack, Queue, Trees, Heap, Hash-Table and Graphs. We will also be looking into Sorting, Searching techniques. In last few chapters, we will be looking into various algorithmic techniques. Such as, Brute-Force algorithms, Greedy algorithms, Divide and Conquer algorithms, Dynamic Programming, Reduction and Backtracking. . Table of Contents Chapter 0: How to use this book. Chapter 1: Algorithms Analysis Chapter 2: Approach to solve algorithm design problems Chapter 3: Abstract Data Type & C# Collections Chapter 4: Searching Chapter 5: Sorting Chapter 6: Linked List Chapter 7: Stack Chapter 8: Queue Chapter 9: Tree Chapter 10: Priority Queue Chapter 11: Hash-Table Chapter 12: Graphs Chapter 13: String Algorithms Chapter 14: Algorithm Design Techniques Chapter 15: Brute Force Algorithm Chapter 16: Greedy Algorithm Chapter 17: Divide & Conquer Chapter 18: Dynamic Programming Chapter 19: Backtracking Chapter 20: Complexity Theory

Algorithms May 18 2023 Algorithms play a central role both in the theory and in the practice of computing. The

goal of the authors was to write a textbook that would not trivialize the subject but would still be readable by most students on their own. The book contains over 120 exercises. Some of them are drills; others make important points about the material covered in the text or introduce new algorithms not covered there. The book also provides programming projects. From the Table of Contents: Chapter 1: Basic knowledge of Mathematics, Relations, Recurrence relation and Solution techniques, Function and Growth of functions. Chapter 2: Different Sorting Techniques and their analysis. Chapter 3: Greedy approach, Dynamic Programming, Branch and Bound techniques, Backtracking and Problems, Amortized analysis, and Order Statics. Chapter 4: Graph algorithms, BFS, DFS, Spanning Tree, Flow Maximization Algorithms. Shortest Path Algorithms. Chapter 5: Binary search tree, Red black Tree, Binomial heap, B-Tree and Fibonacci Heap. Chapter 6: Approximation Algorithms, Sorting Networks, Matrix operations, Fast Fourier Transformation, Number theoretic Algorithm, Computational geometry Randomized Algorithms, String matching, NP-Hard, NP-Completeness, Cooks theorem.

7 Algorithm Design Paradigms Sep 17 2020 The intended readership includes both undergraduate and graduate students majoring in computer science as well as researchers in the computer science area. The book is suitable either as a textbook or as a supplementary book in algorithm courses. Over 400 computational problems are covered with various algorithms to tackle them. Rather than providing students simply with the best known algorithm for a problem, this book presents various algorithms

for readers to master various algorithm design paradigms. Beginners in computer science can train their algorithm design skills via trivial algorithms on elementary problem examples. Graduate students can test their abilities to apply the algorithm design paradigms to devise an efficient algorithm for intermediate-level or challenging problems. Key Features: Dictionary of computational problems: A table of over 400 computational problems with more than 1500 algorithms is provided. Indices and Hyperlinks: Algorithms, computational problems, equations, figures, lemmas, properties, tables, and theorems are indexed with unique identification numbers and page numbers in the printed book and hyperlinked in the e-book version. Extensive Figures: Over 435 figures illustrate the algorithms and describe computational problems. Comprehensive exercises: More than 352 exercises help students to improve their algorithm design and analysis skills. The answers for most questions are available in the accompanying solution manual. Nested algorithms for optimal reservoir operation and their embedding in a decision support platform Jun 07 2022 Reservoir operation is a multi-objective optimization problem, and is traditionally solved with dynamic programming (DP) and stochastic dynamic programming (SDP) algorithms. The thesis presents novel algorithms for optimal reservoir operation, named nested DP (nDP), nested SDP (nSDP), nested reinforcement learning (nRL) and their multi-objective (MO) variants, correspondingly MOnDP, MOnSDP and MOnRL. The idea is to include a nested optimization algorithm into each

state transition, which reduces the initial problem dimension and alleviates the curse of dimensionality. These algorithms can solve multi-objective optimization problems, without significantly increasing the algorithm complexity or the computational expenses. It can additionally handle dense and irregular variable discretization. All algorithms are coded in Java and were tested on the case study of the Knezevo reservoir in the Republic of Macedonia. Nested optimization algorithms are embedded in a cloud application platform for water resources modeling and optimization. The platform is available 24/7, accessible from everywhere, scalable, distributed, interoperable, and it creates a real-time multiuser collaboration platform. This thesis contributes with new and more powerful algorithms for an optimal reservoir operation and cloud application platform. All source codes are available for public use and can be used by researchers and practitioners to further advance the mentioned areas. Algorithms for Solving Common Fixed Point Problems Oct 11 2022 This book details approximate solutions to common fixed point problems and convex feasibility problems in the presence of perturbations. Convex feasibility problems search for a common point of a finite collection of subsets in a Hilbert space; common fixed point problems pursue a common fixed point of a finite collection of self-mappings in a Hilbert space. A variety of algorithms are considered in this book for solving both types of problems, the study of which has fueled a rapidly growing area of research. This monograph is timely and highlights the numerous applications to engineering, computed

tomography, and radiation therapy planning. Totaling eight chapters, this book begins with an introduction to foundational material and moves on to examine iterative methods in metric spaces. The dynamic string-averaging methods for common fixed point problems in normed space are analyzed in Chapter 3. Dynamic string methods, for common fixed point problems in a metric space are introduced and discussed in Chapter 4. Chapter 5 is devoted to the convergence of an abstract version of the algorithm which has been called component-averaged row projections (CARP). Chapter 6 studies a proximal algorithm for finding a common zero of a family of maximal monotone operators. Chapter 7 extends the results of Chapter 6 for a dynamic string-averaging version of the proximal algorithm. In Chapters 8 subgradient projections algorithms for convex feasibility problems are examined for infinite dimensional Hilbert spaces.

AI for Data Science Mar 04 2022 Master the approaches and principles of Artificial Intelligence (AI) algorithms, and apply them to Data Science projects with Python and Julia code. Aspiring and practicing Data Science and AI professionals, along with Python and Julia programmers, will practice numerous AI algorithms and develop a more holistic understanding of the field of AI, and will learn when to use each framework to tackle projects in our increasingly complex world. The first two chapters introduce the field, with Chapter 1 surveying Deep Learning models and Chapter 2 providing an overview of algorithms beyond Deep Learning, including Optimization, Fuzzy Logic, and Artificial Creativity. The next chapters focus on AI frameworks; they contain data and Python and

Julia code in a provided Docker, so you can practice. Chapter 3 covers Apache's MXNet, Chapter 4 covers TensorFlow, and Chapter 5 investigates Keras. After covering these Deep Learning frameworks, we explore a series of optimization frameworks, with Chapter 6 covering Particle Swarm Optimization (PSO), Chapter 7 on Genetic Algorithms (GAs), and Chapter 8 discussing Simulated Annealing (SA). Chapter 9 begins our exploration of advanced AI methods, by covering Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs). Chapter 10 discusses optimization ensembles and how they can add value to the Data Science pipeline. Chapter 11 contains several alternative AI frameworks including Extreme Learning Machines (ELMs), Capsule Networks (CapsNets), and Fuzzy Inference Systems (FIS). Chapter 12 covers other considerations complementary to the AI topics covered, including Big Data concepts, Data Science specialization areas, and useful data resources to experiment on. A comprehensive glossary is included, as well as a series of appendices covering Transfer Learning, Reinforcement Learning, Autoencoder Systems, and Generative Adversarial Networks. There is also an appendix on the business aspects of AI in data science projects, and an appendix on how to use the Docker image to access the book's data and code. The field of AI is vast, and can be overwhelming for the newcomer to approach. This book will arm you with a solid understanding of the field, plus inspire you to explore further.

Algorithms for Worst-Case Design and Applications to Risk Management

Jul 16 2020 Recognizing that robust decision making is vital in risk management, this book provides concepts and algorithms for computing the best decision in view of the worst-case scenario. The main tool used is minimax, which ensures robust policies with guaranteed optimal performance that will improve further if the worst case is not realized. The applications considered are drawn from finance, but the design and algorithms presented are equally applicable to problems of economic policy, engineering design, and other areas of decision making. Critically, worst-case design addresses not only Armageddon-type uncertainty. Indeed, the determination of the worst case becomes nontrivial when faced with numerous--possibly infinite--and reasonably likely rival scenarios. Optimality does not depend on any single scenario but on all the scenarios under consideration. Worst-case optimal decisions provide guaranteed optimal performance for systems operating within the specified scenario range indicating the uncertainty. The noninferiority of minimax solutions--which also offer the possibility of multiple maxima--ensures this optimality. Worst-case design is not intended to necessarily replace expected value optimization when the underlying uncertainty is stochastic. However, wise decision making requires the justification of policies based on expected value optimization in view of the worst-case scenario. Conversely, the cost of the assured performance provided by robust worst-case decision making needs to be evaluated relative to optimal expected values. Written for postgraduate students and researchers engaged in optimization, engineering design, economics, and finance, this book

will also be invaluable to practitioners in risk management.

Knowledge Discovery and Data Mining Jul 08 2022 This book presents a specific and unified approach to Knowledge Discovery and Data Mining, termed IFN for Information Fuzzy Network methodology. Data Mining (DM) is the science of modelling and generalizing common patterns from large sets of multi-type data. DM is a part of KDD, which is the overall process for Knowledge Discovery in Databases. The accessibility and abundance of information today makes this a topic of particular importance and need. The book has three main parts complemented by appendices as well as software and project data that are accessible from the book's web site (http://www.eng.tau.ac.iV-maimonlifn-kdg£). Part I (Chapters 1-4) starts with the topic of KDD and DM in general and makes reference to other works in the field, especially those related to the information theoretic approach. The remainder of the book presents our work, starting with the IFN theory and algorithms. Part II (Chapters 5-6) discusses the methodology of application and includes case studies. Then in Part III (Chapters 7-9) a comparative study is presented, concluding with some advanced methods and open problems. The IFN, being a generic methodology, applies to a variety of fields, such as manufacturing, finance, health care, medicine, insurance, and human resources. The appendices expand on the relevant theoretical background and present descriptions of sample projects (including detailed results).

Algorithms and Complexity Jun 26 2021 This first part presents chapters on models of computation, complexity theory, data structures, and efficient

computation in many recognized sub-disciplines of Theoretical Computer Science. **An Introduction to Data Structures and Algorithms** Aug 21 2023 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 **Introduction To Algorithms** Jun 19 2023 An extensively revised edition of a mathematically rigorous yet accessible introduction to algorithms. Fuzzy Machine Learning Algorithms for Remote Sensing Image Classification Jan 02 2022 This book covers the state-of-art image classification methods for discrimination of earth objects from remote sensing satellite data with an emphasis on fuzzy machine learning and deep learning algorithms. Both types of algorithms are described in such details that these can be implemented directly for thematic mapping of multiple-class or specific-class landcover from multispectral optical remote sensing data. These algorithms along with multi-date, multi-sensor remote sensing are capable to monitor specific stage (for e.g., phenology of growing crop) of a particular class also included. With these capabilities fuzzy machine learning algorithms have strong applications in areas like crop insurance, forest fire mapping, stubble burning, post disaster damage mapping etc. It also provides details about the temporal indices database using proposed Class Based Sensor Independent (CBSI) approach supported by practical examples. As well, this book addresses other related algorithms based on distance, kernel based as well as spatial information through Markov

Random Field (MRF)/Local convolution methods to handle mixed pixels, non-linearity and noisy pixels. Further, this book covers about techniques for quantiative assessment of soft classified fraction outputs from soft classification and supported by in-house developed tool called sub-pixel multi-spectral image classifier (SMIC). It is aimed at graduate, postgraduate, research scholars and working professionals of different branches such as Geoinformation sciences, Geography, Electrical, Electronics and Computer Sciences etc., working in the fields of earth observation and satellite image processing. Learning algorithms discussed in this book may also be useful in other related fields, for example, in medical imaging. Overall, this book aims to: exclusive focus on using large range of fuzzy classification algorithms for remote sensing images; discuss ANN, CNN, RNN, and hybrid learning classifiers application on remote sensing images; describe sub-pixel multi-spectral image classifier tool (SMIC) to support discussed fuzzy and learning algorithms; explain how to assess soft classified outputs as fraction images using fuzzy error matrix (FERM) and its advance versions with FERM tool, Entropy, Correlation Coefficient, Root Mean Square Error and Receiver Operating Characteristic (ROC) methods and; combines explanation of the algorithms with case studies and practical applications.

Data Structures and Algorithms in Ruby Aug 29 2021 This book is about the usage of Data Structures and Algorithms in computer programming. GitHub Link: https://github.com/Hemant-Jain-Author/ We will be studying complexity analysis. Then will

look into the various data structures and their algorithms. We will be studying Linked-List, Stack, Queue, Trees, Heap, Hash Table and Graphs. We will be studying Sorting & Searching techniques. Then we will be looking into algorithm analysis, we will be looking into Brute Force algorithms, Greedy algorithms, Divide & Conquer algorithms, Dynamic Programming, Reduction, and Backtracking. TABLE OF CONTENTS CHAPTER 0: HOW TO USE THIS BOOK CHAPTER 1: ALGORITHMS ANALYSIS CHAPTER 2: APPROACH TO SOLVE ALGORITHM DESIGN PROBLEMS CHAPTER 3: ABSTRACT DATA TYPE & RUBY COLLECTIONS CHAPTER 4: SEARCHING CHAPTER 5: SORTING CHAPTER 6: LINKED LIST CHAPTER 7: STACK CHAPTER 8: QUEUE CHAPTER 9: TREE CHAPTER 10: PRIORITY QUEUE CHAPTER 11: HASH-TABLE CHAPTER 12: GRAPHS CHAPTER 13: STRING ALGORITHMS CHAPTER 14: ALGORITHM DESIGN TECHNIQUES CHAPTER 15: BRUTE FORCE ALGORITHM CHAPTER 16: GREEDY ALGORITHM CHAPTER 17: DIVIDE-AND-CONQUER, DECREASE-AND-CONQUER CHAPTER 18: DYNAMIC PROGRAMMING CHAPTER 19: BACKTRACKING CHAPTER 20: COMPLEXITY THEORY AND NP COMPLETENESS

Data Structures & Algorithms Using Php 7 Feb 03 2022 "Problem Solving in Data Structures & Algorithms" is a series of books about the usage of Data Structures and Algorithms in computer programming. The book is easy to follow and is written for interview preparation point of view. In various books, the

examples are solved in various languages like C, C++, Java, C#, Python, VB, JavaScript and PHP. Book's Composition This book is designed for interviews so in Chapter 0, various preparation plans are proposed. Then in chapters 1, a brief introduction of the programming language and concept of recursion is explained. A number of problems based on recursion and array are explained. Then in the coming chapter, we will be looking into complexity analysis. Then we will be looking into Sorting & Searching techniques. Then will look into the various data structures and their algorithms. We will be looking into a Linked List, Stack, Queue, Trees, Heap, Hash Table and Graphs. Then we will be looking into algorithm analysis, we will be looking into Brute Force algorithms, Greedy algorithms, Divide & Conquer algorithms, Dynamic Programming, and Backtracking. In the end, we will be looking into System Design, which will give a systematic approach for solving the design problems in an Interview. Table of Contents Chapter 0: How to use this book. Chapter 1: Introduction - Programming Overview Chapter 2: Algorithms Analysis Chapter 3: Approach to solve algorithm design problems Chapter 4: Abstract Data Type Chapter 5: Searching Chapter 6: Sorting Chapter 7: Linked List Chapter 8: Stack Chapter 9: Queue Chapter 10: Tree Chapter 11: Priority Queue Chapter 12: Hash-Table Chapter 13: Graphs Chapter 14: String Algorithms Chapter 15: Algorithm Design Techniques Chapter 16: Brute Force Algorithm Chapter 17: Greedy Algorithm Chapter 18: Divide & Conquer Chapter 19: Dynamic Programming Chapter 20: Backtracking Chapter 21: Complexity Theory Chapter 22: Interview Strategy Chapter 23: System

Design

Optimal Design and Related Areas in Optimization and Statistics Apr 12 2020 The present volume is a collective monograph devoted to applications of the optimal design theory in optimization and statistics. The chapters re?ect the topics discussed at the workshop "W-Optimum Design and Related Statistical Issues" that took place in Juan-les-Pins, France, in May 2005. The title of the workshop was chosen as a light-hearted celebration of the work of Henry Wynn. It was supported by the Laboratoire I3S (CNRS/Universit´ e de Nice, Sophia Antipolis), to which Henry is a frequent visitor. The topics covered partly re?ect the wide spectrum of Henry's research - terests. Algorithms for constructing optimal designs are discussed in Chap. 1, where Henry's contribution to the ?eld is acknowledged. Steepest-ascent - gorithms used to construct optimal designs are very much related to general gradientalgorithmsf orconvexoptimizatio n. Inthelasttenyears,as igni?cant part of Henry's research was devoted to the study of the asymptotic prop- ties of such algorithms. This topic is covered by Chaps. 2 and 3. The work by Alessandra Giovagnoli concentrates on the use of majorization and stoch- tic ordering, and Chap. 4 is a hopeful renewal of their collaboration. One of Henry's major recent interests is what is now called algebraic statistics, the application of computational commutative algebra to statistics, and he was partly responsible for introducing the experimental design sub-area, reviewed in Chap. 5. One other sub-area is the application to Bayesian networks and Chap. 6 covers this, with Chap. 7 being strongly related.

Markov Chains Dec 01 2021 This new edition of

Markov Chains: Models, Algorithms and Applications has been completely reformatted as a text, complete with end-of-chapter exercises, a new focus on management science, new applications of the models, and new examples with applications in financial risk management and modeling of financial data. This book consists of eight chapters. Chapter 1 gives a brief introduction to the classical theory on both discrete and continuous time Markov chains. The relationship between Markov chains of finite states and matrix theory will also be highlighted. Some classical iterative methods for solving linear systems will be introduced for finding the stationary distribution of a Markov chain. The chapter then covers the basic theories and algorithms for hidden Markov models (HMMs) and Markov decision processes (MDPs). Chapter 2 discusses the applications of continuous time Markov chains to model queueing systems and discrete time Markov chain for computing the PageRank, the ranking of websites on the Internet. Chapter 3 studies Markovian models for manufacturing and re-manufacturing systems and presents closed form solutions and fast numerical algorithms for solving the captured systems. In Chapter 4, the authors present a simple hidden Markov model (HMM) with fast numerical algorithms for estimating the model parameters. An application of the HMM for customer classification is also presented. Chapter 5 discusses Markov decision processes for customer lifetime values. Customer Lifetime Values (CLV) is an important concept and quantity in marketing management. The authors present an approach based on Markov decision

processes for the calculation of CLV using real data. Chapter 6 considers higher-order Markov chain models, particularly a class of parsimonious higher-order Markov chain models. Efficient estimation methods for model parameters based on linear programming are presented. Contemporary research results on applications to demand predictions, inventory control and financial risk measurement are also presented. In Chapter 7, a class of parsimonious multivariate Markov models is introduced. Again, efficient estimation methods based on linear programming are presented. Applications to demand predictions, inventory control policy and modeling credit ratings data are discussed. Finally, Chapter 8 re-visits hidden Markov models, and the authors present a new class of hidden Markov models with efficient algorithms for estimating the model parameters. Applications to modeling interest rates, credit ratings and default data are discussed. This book is aimed at senior undergraduate students, postgraduate students, professionals, practitioners, and researchers in applied mathematics, computational science, operational research, management science and finance, who are interested in the formulation and computation of queueing networks, Markov chain models and related topics. Readers are expected to have some basic knowledge of probability theory, Markov processes and matrix theory.

An Introduction to Data Structures and Algorithms Apr 05 2022 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