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## Introduction To Algorithms

MIT Press *The first edition won the award for Best 1990 Professional and Scholarly Book in Computer Science and Data Processing by the Association of American Publishers. There are books on algorithms that are rigorous but incomplete and others that cover masses of material but lack rigor. Introduction to Algorithms combines rigor and comprehensiveness. The book covers a broad range of algorithms in depth, yet makes their design and analysis accessible to all levels of readers. Each chapter is relatively self-contained and can be used as a unit of study. The algorithms are described in English and in a pseudocode designed to be readable by anyone who has done a little programming. The explanations have been kept elementary without sacrificing depth of coverage or mathematical rigor. The first edition became the standard reference for professionals and a widely used text in universities worldwide.*

*The second edition features new chapters on the role of algorithms, probabilistic analysis and randomized algorithms, and linear programming, as well as extensive revisions to virtually every section of the book. In a subtle but important change, loop invariants are introduced early and used throughout the text to prove algorithm correctness. Without changing the mathematical and analytic focus, the authors have moved much of the mathematical foundations material from Part I to an appendix and have included additional motivational material at the beginning.*

## Reinforcement Learning, second edition

### An Introduction

MIT Press *The significantly expanded and updated new edition of a widely used text on reinforcement learning, one of the most active research areas in artificial intelligence. Reinforcement learning, one of the most active research areas in artificial intelligence, is a computational approach to learning whereby an agent tries to maximize the total amount of reward it receives while interacting with a complex, uncertain environment. In Reinforcement Learning, Richard Sutton and Andrew Barto provide a clear and simple account of the field's key ideas and algorithms. This second edition has been significantly expanded and updated, presenting new topics and updating coverage of other topics. Like the first edition, this second edition focuses on core online learning algorithms, with the more mathematical material set off in shaded boxes. Part I covers as much of reinforcement learning as possible without going beyond the tabular case for which exact solutions can be found. Many algorithms presented in this part are new to the second edition, including UCB, Expected Sarsa, and Double Learning. Part II extends these ideas to function approximation, with new sections on such topics as artificial neural networks and the Fourier basis, and offers expanded treatment of off-policy learning and policy-gradient methods. Part III has new chapters on reinforcement learning's relationships to psychology and neuroscience, as well as an updated case-studies chapter including AlphaGo and AlphaGo Zero, Atari game playing, and IBM Watson's wagering strategy. The final chapter discusses the future societal impacts of reinforcement learning.*

### An Introduction to the Analysis of Algorithms

World Scientific *A successor to the first edition, this updated and revised book is a great companion guide for students and engineers alike, specifically software engineers who design reliable code. While succinct, this edition is mathematically rigorous, covering the*

foundations of both computer scientists and mathematicians with interest in algorithms. Besides covering the traditional algorithms of Computer Science such as Greedy, Dynamic Programming and Divide & Conquer, this edition goes further by exploring two classes of algorithms that are often overlooked: Randomised and Online algorithms — with emphasis placed on the algorithm itself. The coverage of both fields are timely as the ubiquity of Randomised algorithms are expressed through the emergence of cryptography while Online algorithms are essential in numerous fields as diverse as operating systems and stock market predictions. While being relatively short to ensure the essentiality of content, a strong focus has been placed on self-containment, introducing the idea of pre/post-conditions and loop invariants to readers of all backgrounds. Containing programming exercises in Python, solutions will also be placed on the book's website. Contents: Preliminaries Greedy Algorithms Divide and Conquer Dynamic Programming Online Algorithms Randomized Algorithms Appendix A: Number Theory and Group Theory Appendix B: Relations Appendix C: Logic Readership: Students of undergraduate courses in algorithms and programming. Keywords: Algorithms; Greedy; Dynamic Programming; Online; Randomized; Loop Invariant Key Features: The book is concise, and of a portable size that can be conveniently carried around by students. It emphasizes correctness of algorithms: how to prove them correct, which is of great importance to software engineers. It contains a chapter on randomized algorithms and applications to cryptography, as well as a chapter on online algorithms and applications to caching/paging, both of which are relevant and current topics. Reviews: "Summing up, the book contains very nice introductory material for beginners in the area of correct algorithm's design." Zentralblatt MATH

## Introduction to Algorithms, third edition

MIT Press The latest edition of the essential text and professional reference, with substantial new material on such topics as vEB trees, multithreaded algorithms, dynamic programming, and edge-based flow. Some books on algorithms are rigorous but incomplete; others cover masses of material but lack rigor. Introduction to Algorithms uniquely combines rigor and comprehensiveness. The book covers a broad range of algorithms in depth, yet makes their design and analysis accessible to all levels of readers. Each chapter is relatively self-contained and can be used as a unit of study. The algorithms are described in English and in a pseudocode designed to be readable by anyone who has done a little programming. The explanations have been kept elementary without sacrificing depth of coverage or mathematical rigor. The first edition became a widely used text in universities worldwide as well as the standard reference for professionals. The second edition featured new chapters on the role of algorithms, probabilistic analysis and randomized algorithms, and linear programming. The third edition has been revised and updated throughout. It includes two completely new chapters, on van Emde Boas trees and multithreaded algorithms, substantial additions to the chapter on recurrence (now called "Divide-and-Conquer"), and an appendix on matrices. It features improved treatment of dynamic programming and greedy algorithms

*and a new notion of edge-based flow in the material on flow networks. Many exercises and problems have been added for this edition. The international paperback edition is no longer available; the hardcover is available worldwide.*

## Bandit Algorithms

*Cambridge University Press A comprehensive and rigorous introduction for graduate students and researchers, with applications in sequential decision-making problems.*

## Introduction to Information Retrieval

*Cambridge University Press Class-tested and coherent, this textbook teaches classical and web information retrieval, including web search and the related areas of text classification and text clustering from basic concepts. It gives an up-to-date treatment of all aspects of the design and implementation of systems for gathering, indexing, and searching documents; methods for evaluating systems; and an introduction to the use of machine learning methods on text collections. All the important ideas are explained using examples and figures, making it perfect for introductory courses in information retrieval for advanced undergraduates and graduate students in computer science. Based on feedback from extensive classroom experience, the book has been carefully structured in order to make teaching more natural and effective. Slides and additional exercises (with solutions for lecturers) are also available through the book's supporting website to help course instructors prepare their lectures.*

## Mathematics for Machine Learning

*Cambridge University Press Distills key concepts from linear algebra, geometry, matrices, calculus, optimization, probability and statistics that are used in machine learning.*

## Quantum Computation and Quantum Information

*Cambridge University Press First-ever comprehensive introduction to the major new subject of quantum computing and quantum information.*

# Introduction To Design And Analysis Of Algorithms, 2/E

Pearson Education India

## Understanding Machine Learning

## From Theory to Algorithms

Cambridge University Press *Introduces machine learning and its algorithmic paradigms, explaining the principles behind automated learning approaches and the considerations underlying their usage.*

## An Introduction to the Analysis of Algorithms

## Introdu Analysi Algori\_p2

Addison-Wesley *Despite growing interest, basic information on methods and models for mathematically analyzing algorithms has rarely been directly accessible to practitioners, researchers, or students. An Introduction to the Analysis of Algorithms, Second Edition, organizes and presents that knowledge, fully introducing primary techniques and results in the field. Robert Sedgwick and the late Philippe Flajolet have drawn from both classical mathematics and computer science, integrating discrete mathematics, elementary real analysis, combinatorics, algorithms, and data structures. They emphasize the mathematics needed to support scientific studies that can serve as the basis for predicting algorithm performance and for comparing different algorithms on the basis of performance. Techniques covered in the first half of the book include recurrences, generating functions, asymptotics, and analytic combinatorics. Structures studied in the second half of the book include permutations, trees, strings, tries, and mappings. Numerous examples are included throughout to illustrate applications to the analysis of algorithms that are playing a critical role in the evolution of our modern computational infrastructure. Improvements and additions in this new edition include Upgraded figures and code An all-new chapter introducing analytic combinatorics Simplified derivations via analytic combinatorics throughout The book's thorough, self-contained coverage will help readers appreciate the field's challenges, prepare them for advanced results—covered in their*

*monograph Analytic Combinatorics and in Donald Knuth's The Art of Computer Programming books—and provide the background they need to keep abreast of new research. "[Sedgewick and Flajolet] are not only worldwide leaders of the field, they also are masters of exposition. I am sure that every serious computer scientist will find this book rewarding in many ways." —From the Foreword by Donald E. Knuth*

## The Algorithm Design Manual

Springer Science & Business Media *This newly expanded and updated second edition of the best-selling classic continues to take the "mystery" out of designing algorithms, and analyzing their efficacy and efficiency. Expanding on the first edition, the book now serves as the primary textbook of choice for algorithm design courses while maintaining its status as the premier practical reference guide to algorithms for programmers, researchers, and students. The reader-friendly Algorithm Design Manual provides straightforward access to combinatorial algorithms technology, stressing design over analysis. The first part, Techniques, provides accessible instruction on methods for designing and analyzing computer algorithms. The second part, Resources, is intended for browsing and reference, and comprises the catalog of algorithmic resources, implementations and an extensive bibliography. NEW to the second edition: • Doubles the tutorial material and exercises over the first edition • Provides full online support for lecturers, and a completely updated and improved website component with lecture slides, audio and video • Contains a unique catalog identifying the 75 algorithmic problems that arise most often in practice, leading the reader down the right path to solve them • Includes several NEW "war stories" relating experiences from real-world applications • Provides up-to-date links leading to the very best algorithm implementations available in C, C++, and Java*

## Speech & Language Processing

Pearson Education India

## Data Structures and Algorithms in Java

John Wiley & Sons *The design and analysis of efficient data structures has long been recognized as a key component of the Computer Science curriculum. Goodrich, Tomassia and Goldwasser's approach to this classic topic is based on the object-oriented paradigm as the framework of choice for the design of data structures. For each ADT presented in the text, the authors provide an associated Java*

interface. Concrete data structures realizing the ADTs are provided as Java classes implementing the interfaces. The Java code implementing fundamental data structures in this book is organized in a single Java package, `net.datastructures`. This package forms a coherent library of data structures and algorithms in Java specifically designed for educational purposes in a way that is complimentary with the Java Collections Framework.

## Planning Algorithms

Cambridge University Press *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.*

## An Introduction to Statistical Learning with Applications in R

Springer Science & Business Media *An Introduction to Statistical Learning provides an accessible overview of the field of statistical learning, an essential toolset for making sense of the vast and complex data sets that have emerged in fields ranging from biology to finance to marketing to astrophysics in the past twenty years. This book presents some of the most important modeling and prediction techniques, along with relevant applications. Topics include linear regression, classification, resampling methods, shrinkage approaches, tree-based methods, support vector machines, clustering, and more. Color graphics and real-world examples are used to illustrate the methods presented. Since the goal of this textbook is to facilitate the use of these statistical learning techniques by practitioners in science, industry, and other fields, each chapter contains a tutorial on implementing the analyses and methods*

presented in R, an extremely popular open source statistical software platform. Two of the authors co-wrote *The Elements of Statistical Learning* (Hastie, Tibshirani and Friedman, 2nd edition 2009), a popular reference book for statistics and machine learning researchers. *An Introduction to Statistical Learning* covers many of the same topics, but at a level accessible to a much broader audience. This book is targeted at statisticians and non-statisticians alike who wish to use cutting-edge statistical learning techniques to analyze their data. The text assumes only a previous course in linear regression and no knowledge of matrix algebra.

## Information Theory, Inference and Learning Algorithms

[Cambridge University Press](#) *Table of contents*

## Computational Geometry

## Algorithms and Applications

[Springer Science & Business Media](#) *This introduction to computational geometry focuses on algorithms. Motivation is provided from the application areas as all techniques are related to particular applications in robotics, graphics, CAD/CAM, and geographic information systems. Modern insights in computational geometry are used to provide solutions that are both efficient and easy to understand and implement.*

## Python for Data Analysis

## Data Wrangling with Pandas, NumPy, and IPython

["O'Reilly Media, Inc."](#) *Get complete instructions for manipulating, processing, cleaning, and crunching datasets in Python. Updated for Python 3.6, the second edition of this hands-on guide is packed with practical case studies that show you how to solve a broad set of data analysis problems effectively. You'll learn the latest versions of pandas, NumPy, IPython, and Jupyter in the process. Written by Wes McKinney, the creator of the Python pandas project, this book is a practical, modern introduction to data science tools in Python. It's ideal for analysts new to Python and for Python programmers new to data science and scientific computing. Data files and related*

material are available on GitHub. Use the IPython shell and Jupyter notebook for exploratory computing Learn basic and advanced features in NumPy (Numerical Python) Get started with data analysis tools in the pandas library Use flexible tools to load, clean, transform, merge, and reshape data Create informative visualizations with matplotlib Apply the pandas groupby facility to slice, dice, and summarize datasets Analyze and manipulate regular and irregular time series data Learn how to solve real-world data analysis problems with thorough, detailed examples

## An Introduction to Neural Networks

CRC Press Though mathematical ideas underpin the study of neural networks, the author presents the fundamentals without the full mathematical apparatus. All aspects of the field are tackled, including artificial neurons as models of their real counterparts; the geometry of network action in pattern space; gradient descent methods, including back-propagation; associative memory and Hopfield nets; and self-organization and feature maps. The traditionally difficult topic of adaptive resonance theory is clarified within a hierarchical description of its operation. The book also includes several real-world examples to provide a concrete focus. This should enhance its appeal to those involved in the design, construction and management of networks in commercial environments and who wish to improve their understanding of network simulator packages. As a comprehensive and highly accessible introduction to one of the most important topics in cognitive and computer science, this volume should interest a wide range of readers, both students and professionals, in cognitive science, psychology, computer science and electrical engineering.

## DESIGN AND ANALYSIS OF ALGORITHMS

PHI Learning Pvt. Ltd. This highly structured text provides comprehensive coverage of design techniques of algorithms. It traces the complete development of various algorithms in a stepwise approach followed by their pseudo-codes to build an understanding of their application in practice. With clear explanations, the book analyzes different kinds of algorithms such as distance-based network algorithms, search algorithms, sorting algorithms, probabilistic algorithms, and single as well as parallel processor scheduling algorithms. Besides, it discusses the importance of heuristics, benchmarking of algorithms, cryptography, and dynamic programming. Key Features : Offers in-depth treatment of basic and advanced topics. Includes numerous worked examples covering varied real-world situations to help students grasp the concepts easily. Provides chapter-end exercises to enable students to check their mastery of content. This text is especially designed for students of B.Tech and M.Tech (Computer Science and Engineering and Information Technology), MCA, and M.Sc. (Computer Science and Information Technology). It would also be useful to undergraduate students of

*electrical and electronics and other engineering disciplines where a course in algorithms is prescribed.*

# Algorithms and Theory of Computation Handbook, Second Edition, Volume 1

## General Concepts and Techniques

*CRC Press Algorithms and Theory of Computation Handbook, Second Edition: General Concepts and Techniques provides an up-to-date compendium of fundamental computer science topics and techniques. It also illustrates how the topics and techniques come together to deliver efficient solutions to important practical problems. Along with updating and revising many of the existing chapters, this second edition contains four new chapters that cover external memory and parameterized algorithms as well as computational number theory and algorithmic coding theory. This best-selling handbook continues to help computer professionals and engineers find significant information on various algorithmic topics. The expert contributors clearly define the terminology, present basic results and techniques, and offer a number of current references to the in-depth literature. They also provide a glimpse of the major research issues concerning the relevant topics.*

## Handbook of Algorithms and Data Structures

Addison-Wesley

## Mining of Massive Datasets

Cambridge University Press *Now in its second edition, this book focuses on practical algorithms for mining data from even the largest datasets.*

# Graph Drawing and Network Visualization

## 26th International Symposium, GD 2018, Barcelona, Spain, September 26-28, 2018, Proceedings

*Springer* This book constitutes the refereed proceedings of the 26th International Symposium on Graph Drawing and Network Visualization, GD 2018, held in Barcelona, Spain, in September 2018. The 41 full papers presented in this volume were carefully reviewed and selected from 85 submissions. They were organized in topical sections named: planarity variants; upward drawings; RAC drawings; orders; crossings; crossing angles; contact representations; specialized graphs and trees; partially fixed drawings, experiments; orthogonal drawings; realizability; and miscellaneous. The book also contains one invited talk in full paper length and the Graph Drawing contest report.

## Introduction to Cryptography with Open-Source Software

*CRC Press* Once the privilege of a secret few, cryptography is now taught at universities around the world. *Introduction to Cryptography with Open-Source Software* illustrates algorithms and cryptosystems using examples and the open-source computer algebra system of Sage. The author, a noted educator in the field, provides a highly practical learning experience by progressing at a gentle pace, keeping mathematics at a manageable level, and including numerous end-of-chapter exercises. Focusing on the cryptosystems themselves rather than the means of breaking them, the book first explores when and how the methods of modern cryptography can be used and misused. It then presents number theory and the algorithms and methods that make up the basis of cryptography today. After a brief review of "classical" cryptography, the book introduces information theory and examines the public-key cryptosystems of RSA and Rabin's cryptosystem. Other public-key systems studied include the El Gamal cryptosystem, systems based on knapsack problems, and algorithms for creating digital signature schemes. The second half of the text moves on to consider bit-oriented secret-key, or symmetric, systems suitable for encrypting large amounts of data. The author describes block ciphers (including the Data Encryption Standard), cryptographic hash functions, finite fields, the Advanced Encryption Standard, cryptosystems based on elliptical curves, random number generation, and stream ciphers. The book concludes with a look at

*examples and applications of modern cryptographic systems, such as multi-party computation, zero-knowledge proofs, oblivious transfer, and voting protocols.*

## Twenty Lectures on Algorithmic Game Theory

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

## Discrete Choice Methods with Simulation

Cambridge University Press *Table of contents*

## Graph Algorithms

## Practical Examples in Apache Spark and Neo4j

O'Reilly Media *Discover how graph algorithms can help you leverage the relationships within your data to develop more intelligent solutions and enhance your machine learning models. You'll learn how graph analytics are uniquely suited to unfold complex structures and reveal difficult-to-find patterns lurking in your data. Whether you are trying to build dynamic network models or forecast real-world behavior, this book illustrates how graph algorithms deliver value—from finding vulnerabilities and bottlenecks to detecting communities and improving machine learning predictions. This practical book walks you through hands-on examples of how to use graph algorithms in Apache Spark and Neo4j—two of the most common choices for graph analytics. Also included: sample code and tips for over 20 practical graph algorithms that cover optimal pathfinding, importance through centrality, and community*

*detection. Learn how graph analytics vary from conventional statistical analysis Understand how classic graph algorithms work, and how they are applied Get guidance on which algorithms to use for different types of questions Explore algorithm examples with working code and sample datasets from Spark and Neo4j See how connected feature extraction can increase machine learning accuracy and precision Walk through creating an ML workflow for link prediction combining Neo4j and Spark*

## JavaScript Data Structures and Algorithms

### An Introduction to Understanding and Implementing Core Data Structure and Algorithm Fundamentals

*Apres Explore data structures and algorithm concepts and their relation to everyday JavaScript development. A basic understanding of these ideas is essential to any JavaScript developer wishing to analyze and build great software solutions. You'll discover how to implement data structures such as hash tables, linked lists, stacks, queues, trees, and graphs. You'll also learn how a URL shortener, such as bit.ly, is developed and what is happening to the data as a PDF is uploaded to a webpage. This book covers the practical applications of data structures and algorithms to encryption, searching, sorting, and pattern matching. It is crucial for JavaScript developers to understand how data structures work and how to design algorithms. This book and the accompanying code provide that essential foundation for doing so. With JavaScript Data Structures and Algorithms you can start developing your knowledge and applying it to your JavaScript projects today. What You'll Learn Review core data structure fundamentals: arrays, linked-lists, trees, heaps, graphs, and hash-table Review core algorithm fundamentals: search, sort, recursion, breadth/depth first search, dynamic programming, bitwise operators Examine how the core data structure and algorithms knowledge fits into context of JavaScript explained using prototypical inheritance and native JavaScript objects/data types Take a high-level look at commonly used design patterns in JavaScript Who This Book Is For Existing web developers and software engineers seeking to develop or revisit their fundamental data structures knowledge; beginners and students studying JavaScript independently or via a course or coding bootcamp.*

# Introduction to Evolutionary Computing

Springer Science & Business Media *The first complete overview of evolutionary computing, the collective name for a range of problem-solving techniques based on principles of biological evolution, such as natural selection and genetic inheritance. The text is aimed directly at lecturers and graduate and undergraduate students. It is also meant for those who wish to apply evolutionary computing to a particular problem or within a given application area. The book contains quick-reference information on the current state-of-the-art in a wide range of related topics, so it is of interest not just to evolutionary computing specialists but to researchers working in other fields.*

# Computer Arithmetic Algorithms

CRC Press *This text explains the fundamental principles of algorithms available for performing arithmetic operations on digital computers. These include basic arithmetic operations like addition, subtraction, multiplication, and division in fixed-point and floating-point number systems as well as more complex operations such as square root extraction and evaluation of exponential, logarithmic, and trigonometric functions. The algorithms described are independent of the particular technology employed for their implementation.*

# Ideals, Varieties, and Algorithms

# An Introduction to Computational Algebraic Geometry and Commutative Algebra

Springer Science & Business Media *Written at a level appropriate to undergraduates, this book covers such topics as the Hilbert Basis Theorem, the Nullstellensatz, invariant theory, projective geometry, and dimension theory. Contains a new section on Axiom and an update about MAPLE, Mathematica and REDUCE.*

# Algorithms

## Computational Science – ICCS 2009

### 9th International Conference Baton Rouge, LA, USA, May 25-27, 2009 Proceedings

Springer Science & Business Media *“There is something fascinating about science. One gets such wholesale returns of conjecture out of such a trifling investment of fact.” Mark Twain, Life on the Mississippi* The challenges in succeeding with computational science are numerous and deeply affect all disciplines. NSF’s 2006 Blue Ribbon Panel of Simulation-Based 1 Engineering Science (SBES) states ‘researchers and educators [agree]: computational and simulation engineering sciences are fundamental to the security and welfare of the United States. . . We must overcome difficulties inherent in multiscale modeling, the development of next-generation algorithms, and the design. . . of dynamic data-driven application systems. . . We must determine better ways to integrate data-intensive computing, visualization, and simulation. - portantly, we must overhaul our educational system to foster the interdisciplinary study. . . The payoff for meeting these challenges are profound. ‘The International Conference on Computational Science 2009 (ICCS 2009) explored how computational sciences are not only advancing the traditional hard science disciplines, but also stretching beyond, with applications in the arts, humanities, media and all aspects of research. This interdisciplinary conference drew academic and industry leaders from a variety of fields, including physics, astronomy, mathematics, music, digital media, biology and engineering. The conference also hosted computer and computational scientists who are designing and building the better infrastructure necessary for next-generation computing. Discussions focused on innovative ways to collaborate and how computational science is changing the future of research. ICCS 2009: ‘Compute. Discover. Innovate. ’ was hosted by the Center for Computation and Technology at Louisiana State University in Baton Rouge.

# The EM Algorithm and Extensions

John Wiley & Sons *The only single-source—now completely updated and revised—to offer a unified treatment of the theory, methodology, and applications of the EM algorithm Complete with updates that capture developments from the past decade, The EM Algorithm and Extensions, Second Edition successfully provides a basic understanding of the EM algorithm by describing its inception, implementation, and applicability in numerous statistical contexts. In conjunction with the fundamentals of the topic, the authors discuss convergence issues and computation of standard errors, and, in addition, unveil many parallels and connections between the EM algorithm and Markov chain Monte Carlo algorithms. Thorough discussions on the complexities and drawbacks that arise from the basic EM algorithm, such as slow convergence and lack of an in-built procedure to compute the covariance matrix of parameter estimates, are also presented. While the general philosophy of the First Edition has been maintained, this timely new edition has been updated, revised, and expanded to include: New chapters on Monte Carlo versions of the EM algorithm and generalizations of the EM algorithm New results on convergence, including convergence of the EM algorithm in constrained parameter spaces Expanded discussion of standard error computation methods, such as methods for categorical data and methods based on numerical differentiation Coverage of the interval EM, which locates all stationary points in a designated region of the parameter space Exploration of the EM algorithm's relationship with the Gibbs sampler and other Markov chain Monte Carlo methods Plentiful pedagogical elements—chapter introductions, lists of examples, author and subject indices, computer-drawn graphics, and a related Web site The EM Algorithm and Extensions, Second Edition serves as an excellent text for graduate-level statistics students and is also a comprehensive resource for theoreticians, practitioners, and researchers in the social and physical sciences who would like to extend their knowledge of the EM algorithm.*

## Convex Optimization

Cambridge University Press *A comprehensive introduction to the tools, techniques and applications of convex optimization.*

## Learning SQL

# Master SQL Fundamentals

*O'Reilly Media Updated for the latest database management systems -- including MySQL 6.0, Oracle 11g, and Microsoft's SQL Server 2008 -- this introductory guide will get you up and running with SQL quickly. Whether you need to write database applications, perform administrative tasks, or generate reports, Learning SQL, Second Edition, will help you easily master all the SQL fundamentals. Each chapter presents a self-contained lesson on a key SQL concept or technique, with numerous illustrations and annotated examples. Exercises at the end of each chapter let you practice the skills you learn. With this book, you will: Move quickly through SQL basics and learn several advanced features Use SQL data statements to generate, manipulate, and retrieve data Create database objects, such as tables, indexes, and constraints, using SQL schema statements Learn how data sets interact with queries, and understand the importance of subqueries Convert and manipulate data with SQL's built-in functions, and use conditional logic in data statements Knowledge of SQL is a must for interacting with data. With Learning SQL, you'll quickly learn how to put the power and flexibility of this language to work.*

# Introduction to Algorithms, fourth edition

*MIT Press A comprehensive update of the leading algorithms text, with new material on matchings in bipartite graphs, online algorithms, machine learning, and other topics. Some books on algorithms are rigorous but incomplete; others cover masses of material but lack rigor. Introduction to Algorithms uniquely combines rigor and comprehensiveness. It covers a broad range of algorithms in depth, yet makes their design and analysis accessible to all levels of readers, with self-contained chapters and algorithms in pseudocode. Since the publication of the first edition, Introduction to Algorithms has become the leading algorithms text in universities worldwide as well as the standard reference for professionals. This fourth edition has been updated throughout. New for the fourth edition • New chapters on matchings in bipartite graphs, online algorithms, and machine learning • New material on topics including solving recurrence equations, hash tables, potential functions, and suffix arrays • 140 new exercises and 22 new problems • Reader feedback-informed improvements to old problems • Clearer, more personal, and gender-neutral writing style • Color added to improve visual presentation • Notes, bibliography, and index updated to reflect developments in the field • Website with new supplementary material*

# Algorithms in a Nutshell

*"O'Reilly Media, Inc." 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.*