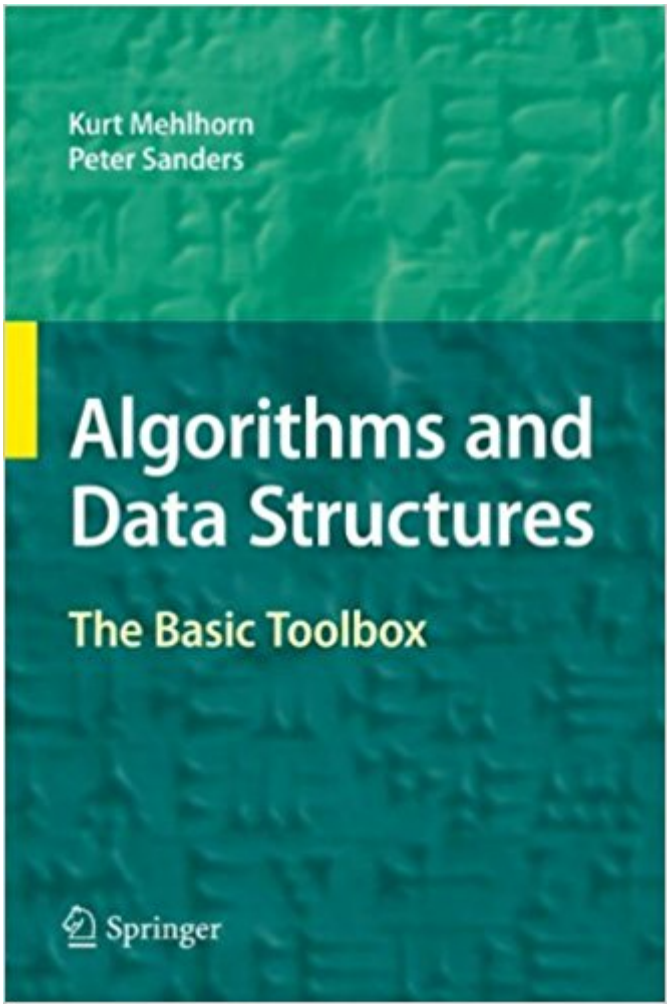
Algorithms And Data Structures: The Basic Toolbox



Synopsis

Algorithms are at the heart of every nontrivial computer application, and algorithmics is a modern and active area of computer science. Every computer scientist and every professional programmer should know about the basic algorithmic toolbox: structures that allow efficient organization and retrieval of data, frequently used algorithms, and basic techniques for modeling, understanding and solving algorithmic problems. This book is a concise introduction addressed to students and professionals familiar with programming and basic mathematical language. Individual chapters cover arrays and linked lists, hash tables and associative arrays, sorting and selection, priority queues, sorted sequences, graph representation, graph traversal, shortest paths, minimum spanning trees, and optimization. The algorithms are presented in a modern way, with explicitly formulated invariants, and comment on recent trends such as algorithm engineering, memory hierarchies, algorithm libraries and certifying algorithms. The authors use pictures, words and high-level pseudocode to explain the algorithms, and then they present more detail on efficient implementations using real programming languages like C++ and Java. The authors have extensive experience teaching these subjects to undergraduates and graduates, and they offer a clear presentation, with examples, pictures, informal explanations, exercises, and some linkage to the real world. Most chapters have the same basic structure: a motivation for the problem, comments on the most important applications, and then simple solutions presented as informally as possible and as formally as necessary. For the more advanced issues, this approach leads to a more mathematical treatment, including some theorems and proofs. Finally, each chapter concludes with a section on further findings, providing views on the state of research, generalizations and advanced solutions.

Book Information

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Customer Reviews

"This is another mainstream textbook on algorithms and data structures, mainly intended for undergraduate students and professionals Ã¢â ¬Â¦ . The two-layer index table is also detailed and helpful. I do enjoy reading the informative sections of historical notes and further findings at the end of each chapter. Ã¢â ¬Â¦ This book is very well written, with the help of Ã¢â ¬Â¦ clear figures and tables, as well as many interesting and inspiring examples." Zhizhang Shen, Zentralblatt MATH, Vol. 1146, 2008"... the book develops the basic fundamental principles underlying their design and analysis without sacrificing depth or rigor. The authors' insight, knowledge and active research on algorithms and data structures provide a very solid approach to the book. I particularly liked their "as informally as possible and as formally as necessary" writing style, and I enjoyed a lot their decision to not only discuss classical results, but to broaden the view to alternative implementations, memory hierarchies and libraries, which transmits novelty and increases interest...I think that this book will be a superb addition particularly useful for teachers of undergraduate courses, to graduate students in Computer Science, and to researchers that work, or intend to work, with algorithms." Jordi Petit, Computer Science Review 3, 2009Ã Â "Mehlhorn and Sanders write well, and the well-organized presentation reflects their experience and interest in the various topics... it is an excellent reference, and could possibly be used in a transition course, serving students coming to graduate CS courses from other technical fields. [...]This text is intended for undergraduate computer science (CS) majors, and focuses on algorithm analysis. Ã¢â ¬Â¦ it is an excellent reference, and could possibly be used in a transition course, serving students coming to graduate CS courses from other technical fields. Finally, the book contains interesting tidbits that are not readily available elsewhere." M. G. Murphy, ACM Computing Reviews, October 2008"A 'Toolbox' should be portable, practical, and useful. This book is all these, covering a nice swath of the classic CS algorithms but addressing them in a way that is accessible to the student and practitioner. Furthermore, it manages to incorporate interesting examples as well as subtle examples of wit compressed into its 300 pages. Although it is not tied to any one language or library, it provides practical references to efficient open-source implementations of many of the algorithms and data structures; these should be the first refuge of the commercial developer. I can easily recommend this book as an intermediate undergraduate text, a refresher for those of us who only dimly remember our intermediate

undergraduate courses, and as a reference for the professional development craftsman." Hal C. Elrod, SIGACT News Book Review Column 42(4) 2011

Prof. Kurt Mehlhorn was appointed a Fellow of the ACM (1999) "for important contributions in complexity theory and in the design, analysis, and practice of combinatorial and geometric algorithms." A Professor of Computer Science at Saarland University since 1975, and a director of the Max-Planck-Institut fÃƒÂ r Informatik in SaarbrÃƒÂ cken, he has coauthored over 250 refereed papers/articles, in collaboration with 200 researchers. Other awards include the Leibniz Award of the German Research Foundation in 1986 and the Konrad Zuse Medal of the German Society for Informatics in 1995.Prof. Peter Sanders is a Professor of Computer Science at the University of Karlsruhe. A leading researcher in the area of theoretical and experimental algorithm analysis, in particular related to efficient algorithms for parallel processing and communication in networks, his responsibilities include organizing the European Symposium on Algorithms in Karlsruhe in 2008.The authors have considerable experience teaching on the topic of algorithms and working on related industrial projects.

Great for university, describes many fundamental algorithms and data structures concisely. Requires some work to fully understand everything. If you’re looking for "Algorithms and Data Structures for Dummies", this is not the book for you, and it won’t replace a good lecture---it’ll supplement it. I keep coming back to this book when I need to look up some concept I should remember but forgot, and it’s almost always helpful. You can tell it was written by someone doing "applied theoretical CS"---nearly everything in the book can be implemented easily and efficiently, and it doesn’t contain the things that look good in theory but are worthless when implemented.

Lousy book.The presentation and the explanations are too superficial.Few graphics or pictures of the algorithm’s workings.The authors spend all their time debiting mathematical formulas with little or no explanations at all.This book seems to be copied from some course lectures, with little or no effort spent in making it more user-friendly.

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