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## Review

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### Algorithms and programming

Shen A., Birkhäuser Boston Inc., Cambridge, MA, 1997. Type: Book

Date Reviewed: Feb 1 1998

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Programming techniques and algorithms are presented in this textbook, which is divided into 14 chapters.

Chapter 1 treats the problem of arrays and inductive functions, applying them to well-known mathematical problems such as the Fibonacci sequence. Chapter 2 deals with combinatorial objects, including partitions and Gray codes. Chapter 3 presents the backtracking method using trees, and applies it to the classical non-attacking-queens problem. Chapter 4 considers sorting algorithms, including insertion sort, merge sort, heap sort, and quicksort. Shen compares the speed and complexity of these methods.

Chapter 5 is dedicated to finite-state algorithms for text processing. Chapter 6 covers stacks, queues, sets, and priority queues, including methods of implementing them and typical applications. Chapter 7 discusses the use of recursion for computing factorials, working with trees, object searching, and topological sorting.

Chapter 8 compares recursive and nonrecursive programs. Several problems are solved using both approaches, and the author compares the speed and complexity of the solutions. Chapter 9 deals with graph algorithms. It presents shortest-paths methods (Ford-Bellman, Floyd, and Dijkstra) and depth-first and breadth-first search methods. Chapter 10, on pattern-matching, presents methods of parsing text to find occurrences of a string of characters; the Knuth-Morris-Pratt, Boyer-Moore, and Rabin-Karp algorithms; and automata for pattern searching.

Chapter 11 treats set representations, with an emphasis on hashing methods. Chapter 12 is dedicated to sets, trees, and balanced trees. It outlines the concepts of sets and trees, explains how they are related, and gives methods to switch from an unbalanced tree to a balanced one. Chapter 13 covers context-free grammars related to parsing algorithms, recursive descent parsing, and related topics. Chapter 14 discusses LR parsing algorithms, following up on the discussion of LL parsing in chapter 13.

This book is intended for students, engineers, and other people who want to improve their computer skills. Readers should have a general background in programming and mathematics (including combinatorics, probability, and algorithms). Throughout the book, useful exercises give the readers a feeling for how to apply the theory. The author provides answers to the exercises.

The author is a mathematician and stresses the theoretical aspects of the subject, even when giving examples; some readers will find the material dry. The index is adequate, but there are only 12 references.

Reviewer: [Claudiu Bulaceanu](#)

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