

METADATA

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Abstract

The subject of Algorithms and Data Structures is extremely rich, and many relevant and valuable books exist in both international and Greek literature. This book represents an attempt to collectively capture the material and the experience gathered after many years of research and teaching in areas related to Algorithms, Data Structures, and Graph Theory. The purpose of this synthetic effort is the homogenized recording of a didactic approach that particularly focuses on Algorithm Analysis, as it is presented in classic books and articles, in combination with the analysis of fundamental Data Structures. The common denominator among the topics examined is a fundamentally mechanistic methodology aimed at solving each specific problem through multiple alternative techniques, which are compared and evaluated. This book serves as a valuable aid for students trying to understand the concept of Algorithms, as it offers a different perspective on these topics. The book

provides a comprehensive exploration of algorithms, beginning with an introduction that establishes their importance in computing. The background section covers the mathematical foundations essential for algorithm analysis. Fundamental algorithms introduce basic concepts and classic problems, while algorithmic techniques such as divide-andconquer and dynamic programming are discussed in detail. The book then examines search and sorting algorithms, presenting efficient methods for data organization and retrieval. Amortized and competitive analysis are introduced as alternative modes of evaluating algorithm performance. Complexity theory is explained to categorize problems based on their computational difficulty. Basic graph algorithms offer solutions for network-related problems, while string algorithms address issues in text processing. The book concludes with an overview of randomized algorithms, highlighting probabilistic approaches to problem-solving.









