

<<数据结构与算法分析>>

图书基本信息

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作者：韦斯(Mark Allen Weiss)

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前言

This book describes data structures, methods of organizing large amounts of data, and algorithm analysis, the estimation of the running time of algorithms. As computers become faster and faster, the need for programs that can handle large amounts of input becomes more acute. Paradoxically, this requires more careful attention to efficiency, since inefficiencies in programs become most obvious when input sizes are large. By analyzing an algorithm before it is actually coded, students can decide if a particular solution will be feasible. For example, in this text students look at specific problems and see how careful implementations can reduce the time constraint for large amounts of data from 16 years to less than a second. Therefore, no algorithm or data structure is presented without an explanation of its running time. In some cases, minute details that affect the running time of the implementation are explored. Once a solution method is determined, a program must still be written. As computers have become more powerful, the problems they must solve have become larger and more complex, requiring development of more intricate programs. The goal of this text is to teach students good programming and algorithm analysis skills simultaneously so that they can develop such programs with the maximum amount of efficiency. This book is suitable for either an advanced data structures (CS7) course or a first-year graduate course in algorithm analysis. Students should have some knowledge of intermediate programming, including such topics as pointers and recursion, and some background in discrete math.

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内容概要

本书曾被评为20世纪顶尖的30部计算机著作之一，作者在数据结构和算法分析方面卓有建树，他的数据结构和算法分析的著作尤其畅销，并受到广泛好评，已被世界500余所大学选作教材。

在本书中，作者精炼并强化了他对算法和数据结构方面创新的处理方法。

通过C程序的实现，着重阐述了抽象数据类型的概念，并对算法的效率、性能和运行时间进行了分析

。着重讨论了算法设计技巧。

包括贪婪算法、分治算法、动态规划、随机化算法以及回溯算法。

系统介绍了当前流行的论题和新的数据结构，如斐波那契堆、斜堆、二项队列、跳跃表和伸展树。

详细讨论了摊还分析，考查书中介绍的一些高级数据结构。

增加了高级数据结构及其实现的内容，包括红黑树、自顶向下伸展树、treap树、k-d树、配对堆等

。整合了堆排序平均情况分析的一些新结果。

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作者简介

Mark Allen Weiss 1987年在普林斯顿大学获得计算机科学博士学位。
师从Robert Sedgwick, 现任美国佛罗里达国际大学计算与信息科学学院教授。
他曾担任全美AP(Advanced Placement)考试计算机学科委员会主席。
其主要研究方向是数据结构、算法和教育学。

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章节摘录

插图：This example illustrates what we call randomized algorithms. At least once during the algorithm, a random number is used to make a decision. The running time of the algorithm depends not only on the particular input, but also on the random numbers that occur. The worst-case running time of a randomized algorithm is almost always the same as the worst-case running time of the nonrandomized algorithm. The important difference is that a good randomized algorithm has no bad inputs, but only bad random numbers (relative to the particular input). This may seem like only a philosophical difference, but actually it is quite important, as the following example shows. Consider two variants of quicksort. Variant A uses the first element as pivot, while variant B uses a randomly chosen element as pivot. In both cases, the worst-case running time is (N^2) , because it is possible at each step that the largest element is chosen as pivot. The difference between these worst cases is that there is a particular input that can always be presented to variant A to cause the bad running time. Variant A will run in (N^2) time every single time it is given an already-sorted list. If variant B is presented with the same input twice, it will have two different running times, depending on what random numbers occur.

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