

Data Structures and Algorithms

Mohammed Sarhat (MangoCodes)



Contents

1	Data Structure Introduction	2
2	Complexity Analysis	3
2.1	Measuring Time Complexity	3
2.1.1	Time Complexity and Space Complexity	3
2.1.2	Theoretical Time Complexity Analysis vs Experimental Complexity Analysis	3
2.2	Algorithmic Complexity	3
2.2.1	Time Complexity of An Algorithm	3
2.2.2	Algorithmic Correctness	3
2.2.3	Order of Growth	3
2.3	Asymptotic Notations	3
2.3.1	Θ -Notation	3
2.3.2	O -Notation	3
2.3.3	Λ -Notation	3
2.4	Complexity of Recursive Algorithms	3
2.5	P and NP	3
2.5.1	NP-Completeness	3
3	Arrays and Linked Lists	4
3.1	List as ADT	4
3.2	Arrays	4
3.3	Linked Lists	4
4	Stacks and Queues	5
5	Recursion	6
6	Sorting Algorithms	7
7	Searching Algorithms	8
8	Trees	9
9	Priority Queues and Heaps	10
10	Hashing	11
11	Graphs	12
12	Divide and Conquer	13
13	Greedy Algorithms	14
14	Dynamic Programming	15
15	Branch and Bound	16

Chapter 1

Data Structure Introduction

Chapter 2

Complexity Analysis

2.1 Measuring Time Complexity

2.1.1 Time Complexity and Space Complexity

2.1.2 Theoretical Time Complexity Analysis vs Experimental Complexity Analysis

2.2 Algorithmic Complexity

2.2.1 Time Complexity of An Algorithm

2.2.2 Algorithmic Correctness

2.2.3 Order of Growth

2.3 Asymptotic Notations

2.3.1 Θ -Notation

2.3.2 O -Notation

2.3.3 Λ -Notation

2.4 Complexity of Recursive Algorithms

2.5 P and NP

2.5.1 NP-Completeness

Chapter 3

Arrays and Linked Lists

3.1 List as ADT

3.2 Arrays

3.3 Linked Lists

Chapter 4

Stacks and Queues

Chapter 5

Recursion

Chapter 6

Sorting Algorithms

Chapter 7

Searching Algorithms

Chapter 8

Trees

Chapter 9

Priority Queues and Heaps

Chapter 10

Hashing

Chapter 11

Graphs

Chapter 12

Divide and Conquer

Chapter 13

Greedy Algorithms

Chapter 14

Dynamic Programming

Chapter 15

Branch and Bound