Time & Space Complexity of Common Algorithms

Sorting Algorithms

Algorithm	Best Time	Average Time	Worst Time	Space
Bubble Sort	O(n)	O(n²)	O(n²)	O(1)
Selection Sort	O(n²)	O(n²)	O(n²)	O(1)
Insertion Sort	O(n)	O(n²)	O(n²)	O(1)
Merge Sort	O(n log n)	O(n log n)	O(n log n)	O(n)
Quick Sort	O(n log n)	O(n log n)	O(n²)	O(log n)
Heap Sort	O(n log n)	O(n log n)	O(n log n)	O(1)
Counting Sort	O(n+k)	O(n+k)	O(n+k)	O(k)
Radix Sort	O(nk)	O(nk)	O(nk)	O(n+k)
Bucket Sort	O(n)	O(n)	O(n²)	O(n)

Searching Algorithms

Algorithm	Best	Average	Worst	Space
Linear Search	O(1)	O(n)	O(n)	O(1)
Binary Search	O(1)	O(log n)	O(log n)	O(1)

Tree Algorithms

Operation/Algorithm	Time	Space
Binary Tree Traversal (DFS)	O(n)	O(h)
BST Search	O(log n)	O(1)
BST Worst Search	O(n)	O(1)
Insert in BST	O(log n)	O(1)
AVL/RB Tree Ops	O(log n)	O(1)
Heap Insert/Delete	O(log n)	O(1)

Graph Algorithms

Algorithm	Time	Space
BFS	O(V+E)	O(V)
DFS	O(V+E)	O(V)
Dijkstra (Min-Heap)	O((V+E) log V)	O(V)

Bellman-Ford	O(VE)	O(V)
Floyd-Warshall	O(V³)	O(V²)
Prim (Min-Heap)	O(E log V)	O(V)
Kruskal	O(E log V)	O(V)

Dynamic Programming

Problem	Time	Space
Fibonacci (DP)	O(n)	O(n) or O(1)
LCS	O(nm)	O(nm)
Knapsack	O(nW)	O(nW)
MCM	O(n³)	O(n²)
Edit Distance	O(nm)	O(nm)

Hashing

Operation	Time	Space
Insert/Search/Delete Avg	O(1)	O(n)
Worst Case	O(n)	O(n)

Linked List

Operation	Time	Space
Insert at Head	O(1)	O(1)
Insert at End	O(n)	O(1)
Search	O(n)	O(1)
Delete	O(n)	O(1)