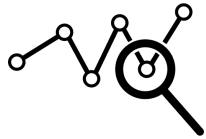


# Data Structures and Algorithms

## Checklist for learning & interviews



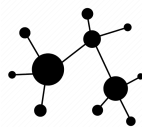
### Algorithm Analysis



- Big O notation
- Master's theorem
- Time complexity
- Space complexity

## Data Structures

### Basic Data Structures



- Array
- Stack
- Set
- Tree
- LinkedList
- Queue
- HashMap
- Graph

### Advanced Data Structures



- Suffix Array
- Heap (Priority Queue)
- Segment Tree
- Binary Indexed Tree
- Trie (Prefix tree)
- Suffix Tree
- Self balancing tree
- Disjoint set

## Paradigms



### Basic algorithmic paradigms

- Brute force
- Divide & Conquer
- Sliding window
- Recursion
- Two pointers

### Advanced algorithmic paradigms

- Greedy technique
- Backtracking
- Branch & Bound
- Dynamic Programming

# Algorithms

## Search Algorithms



- Linear search

- Binary search

## Basic Sorting algorithms

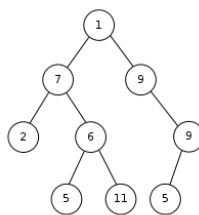


- Bubble sort
- Selection sort
- Insertion sort

## Advanced Sorting algorithms

- Heap sort
- Quick sort
- Merge sort

## Basic Tree algorithms



- In-order Traversal
- Pre-order Traversal
- Post-order Traversal
- Node insert & remove

## Advanced Tree algorithms

- Rooting a tree
- Euler's tour
- RMQ Algorithm
- BST validation

## String algorithms



- Rabin-Karp
- Knuth Morris Pratt
- Boyer-Moore Algorithm

- Z algorithm
- Manachar's algorithm

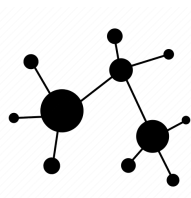
## Basic Graph Algorithms



- Depth First Search
- Breadth First Search
- Topological Sort
  - DFS based
  - Kahn's algorithm

- Flood Fill algorithm
- Shortest distance
  - Lee's algorithm
  - A\* algorithms

## Advanced Graph algorithms



- Minimum Spanning Tree
  - Kruskal
  - Prim
- Strongly Connected Components
  - Tarjan
  - Kosaraju
- Minimum Cost algorithms
  - Cycle Cancelling
  - Hungarian
- Hierholzer's algorithm
- Shortest Path algorithms
  - Topological sorted min path
  - Dijkstra
  - Bellman Ford
  - Floyd Warshall
  - Johnson
- Maximum flow algorithms
  - Ford Fulkerson
  - Push-relabel
  - Dinic's

## Implementations



- Fibonacci numbers
- Bit manipulation
- Tower of Hanoi
- Strassen's algorithm
- Kadane's Algorithm
- Knapsack 0/1
- Knapsack Fractional
- Huffman code
- Task-scheduling
- Levenshtein distance
- Biconnected Components
- Bipartite detection
- Isomorphic graphs
- Hamiltonian Path
- Vertex Coloring
- Articulation Point
- Articulation Bridge
- Travelling salesman Problem