CS Base – Knowledge Tree

Computer Science Body of Knowledge Tree

* Root
  + Data Structures
    - Arrays
      * Fixed Size Arrays
        + One Dimensional Fixed Size Array
        + Two Dimensional Fixed Size Array
        + N-Dimensional Fixed Size Array
      * Resizable Arrays
        + One Dimensional Resizable Array
        + Two Dimensional Resizable Array
        + N Dimensional Resizable Array
      * Arrays of Pointers
      * Arrays of Pointers to Functions
      * Arrays of Heterogeneous Objects
    - Linked Lists
      * Singly Linked Lists
      * Doubly Linked Lists
      * Circularly Linked Lists
    - Stacks
    - Queues
      * Binomial Queues
    - Priority Queues
    - Deques
    - Trees
      * Binary Trees
        + In-Order Recursive Traversal
        + In-Order Iterative Traversal
        + Pre-order traversal
        + In-order traversal
        + Post-order traversal
        + Recursive Traversal
        + Level-order traversal
      * Binary Search Trees
      * Digital Search Trees
      * Balanced Trees
      * Threaded Binary Trees
      * Balanced Binary Trees
        + AVL Trees
        + Red-Black Trees
      * B-Trees
        + B-Tree Search
        + B-Tree insertion
      * Skip Lists
      * 2-3 Trees
      * Splay Trees
      * Multiway Trees
    - Trie
      * Multiway Trie
      * Patricia Trie
        + Patricia Trie Search
        + Patricia Trie Sort
    - Sparse Matrix
    - Heaps
    - Hash Tables
    - Graphs
      * Types
        + Directed Graphs
        + Undirected Graphs
        + Connected Graphs
      * Representations
        + Adjacency Matrix
        + Adjacency Lists
      * Operations
        + Search

Depth First Search

Depth First Search Spanning Forest

* + - * + Topological Sorting
        + Finding Euler Paths
        + Finding Euler Circuits
        + Shortest Path Algorithms

Dijkstra’s Algorithm

Travelling Salesperson Problem

* + - * + Finding Hamiltonian Cycles
        + Bellman Ford
        + Floyds Algorithm
        + Minimum Spanning Trees
        + Kruskal’s Algorithm
        + Prims Algorithm
        + Warshalls Algorithm
      * Concepts
        + Transitive Closure
        + Euclidean Graphs
        + Isomorphic Graphs
        + Paths

Simple Paths

Cyclic Path

Tour

Path Length

Disjoint Paths

* + - * + Parallel Edges
        + Disjoint
        + Disjoint Paths
        + Vertex Disjoint
        + Edge Disjoint
        + Connected Graph
        + Connected Components
        + Maximal Connected Subgraphs
        + Acyclic Connected Graph => Tree
        + Forest (Set of trees)
        + Spanning Tree
        + Spanning Forest
        + Acyclic Connected Graph
        + Complete Graphs
        + Complement of a Graph
        + Union of two Graphs
        + Clique (Complete Subgraph)
        + Graph Density
        + Dense Graph
        + Sparse Graph
        + Bipartite Graph
        + Undirected Graphs
        + Directed Graphs, Digraphs
        + Directed Edges
        + Arc
        + Directed Edges

Source

Destination

* + - * + Indegree
        + Outdegree
        + Directed Cycle
        + Directed Acyclic Graph
        + Underlying Undirected Graph
        + Weighted Graph
        + Weight
        + Networks
        + Flow Networks
* Algorithms
  + Sorting
    - Bucket-Sort
    - Bubble-Sort
    - Cocktail-Sort
    - Comb-Sort
    - Counting-Sort
    - Comparison-Sort
    - Cookie-Cutter Merge-Sort
    - Distributive-Sort
    - Exchange-Sort
    - External-Sort
    - Flash-Sort
    - Heap-Sort
    - Insertion-Sort
    - Intro-Sort
    - Internal-Sort
    - In-Place Sort
    - Lightning-Sort
    - Merge-Sort
    - Quick-Sort
    - Radix-Sort
      * LSD Radix-Sort
      * MSD Radix-Sort
    - Selection-Sort
    - Shaker-Sort
    - Singleton-Sort
    - Shell-Sort
    - Stable-Sort
    - Tim-Sort
  + Search
    - Union-Find
    - Sequential Search
    - Binary Search
    - Digital Search Trees
    - Radix Search
  + Miscellaneous
    - Sieve of Eratosthenes
    - Josephus problem
    - Euclids Algorithm
    - Towers of Hanoi
    - Fibonacci
      * Knapsack Problem
  + Asymptotic Analysis
  + Systems
    - Compilers
    - Linkers
    - Loaders
    - Operating Systems
  + Specialty
    - Computational Geometry
    - Geo-Spatial
    - Matrices
      * Matrix Addition and Transposition
      * Complex Matrix Concepts
        + Identity Matrix
        + Matrix Multiplication
        + Determinants
        + Euclidean Norm
        + Inverse Matrix
        + Gaussian Elimination
        + Gaussian Elimination with Partial Pivot Maximization
        + Normalized Determinant
        + Gauss-Jordan elimination
        + Solving Linear Equations
    - Digital Signal Processing
    - Compression
    - Genetic Algorithms
    - Natural Language Processing