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
    - Priority Queues
    - Deques
    - Trees
      * Binary Trees
        + In-Order Recursive Traversal
        + In-Order Iterative Traversal
      * Threaded Binary Trees
      * Balanced Binary Trees
        + AVL Trees
        + Red-Black Trees
      * Skip Lists
      * 2-3 Trees
      * Splay Trees
      * Multiway Trees
    - Trie
    - Sparse Matrix
    - 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
    - Advanced Concepts
      * Matrices
        + Matrix Addition and Transposition
        + Complex Matrix Concepts

Identity Matrix

Matrix Multiplication

Determinants

Euclidean Norm

Gaussian Elimination

Gaussian Elimination with Partial Pivot Maximization

Normalized Determinant

Gauss-Jordan elimination

Solving Linear Equations

* + 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
      * Singleton-Sort
      * Shell-Sort
      * Stable-Sort
      * Tim-Sort
  + Asymptotic Analysis
  + Systems
    - Compilers
    - Linkers
    - Loaders
    - Operating Systems
  + Specialty
    - Computational Geometry
    - Geo-Spatial