**Data Structures**

* Basic data structures
  + - Array
    - Vector
    - String
* Linked Lists
* Stacks
* Queues
* Priority Queues
* Trees
  + Binary Trees
  + Binary Search Trees
  + AVL Trees
* Heaps
* Hashmaps, Hashtables
* Sets
* Trie
* Segment Tree
* Fenwick Tree or Binary Indexed Tree(BIT)
* RMQ
* Sqrt Decomposition
* Disjoint Data Structures

**Algorithms**

* Sorting
  + - Merge Sort
    - Quick Sort
    - Counting Sort
* Searching
  + - Linear Search
    - Binary Search
    - Ternary Search
* Bit Manipulation
* Number Theory
  + - Prime Numbers (Sieve of Eratosthenes)
    - GCD and LCM Euclid’s Algorithm
    - Modular Exponentiation
    - Long arithmetic (Multi, Add)
    - Efficient Prime Factorization
    - Fermat’s Theorem
    - Euler’s Totient Function
    - Chinese Remainder Theorem
    - Lucas Theorem
* Combinatorics
  + - Permutations & Combinations
    - Probability
    - Expected Value
* Dynamic programming
  + - Knapsack
    - Matrix chain multiplication
    - Coin Change
    - Kadane
    - Longest increasing Subsequence (with RMQ)
    - DP with bitmasking
* Strings
  + - Z algorithm
    - Suffix Trees/Arrays
    - Knuth-Morris-Pratt Algorithm (KMP)
    - Rabin-Karp Algorithm
    - Hash
    - Aho Corasick Algorithm
    - Finite Automata
* Graph Theory
  + - Depth First Search (DFS)
    - Breadth First Search (BFS)
    - Topological Sorting
    - Dijkstra’s Shortest Path
    - Minimum Spanning Tree
    - Ford Bellman
    - Floyd Warshall
    - Articulation Points
    - Bridges
    - Union Find
    - LCA (Lowest Common Ancestor)
    - HLD (Heavy Light Decomposition)
    - Graph Coloring
    - Max Flow / Min Cut
* Game theory
  + - Nim game
    - Grundy numbers
    - Sprague-Grundy theorem
* Computational geometry
  + - Primitive Operations
    - Intuition
    - Polygon Inside, Outside
    - Implementing CCW
    - Immutable Point ADT
    - Convex Hull
    - Closest pair problem
    - Line intersection
* Others
  + Mo’s Algorithm
  + Graph Matching