Competitive Programming

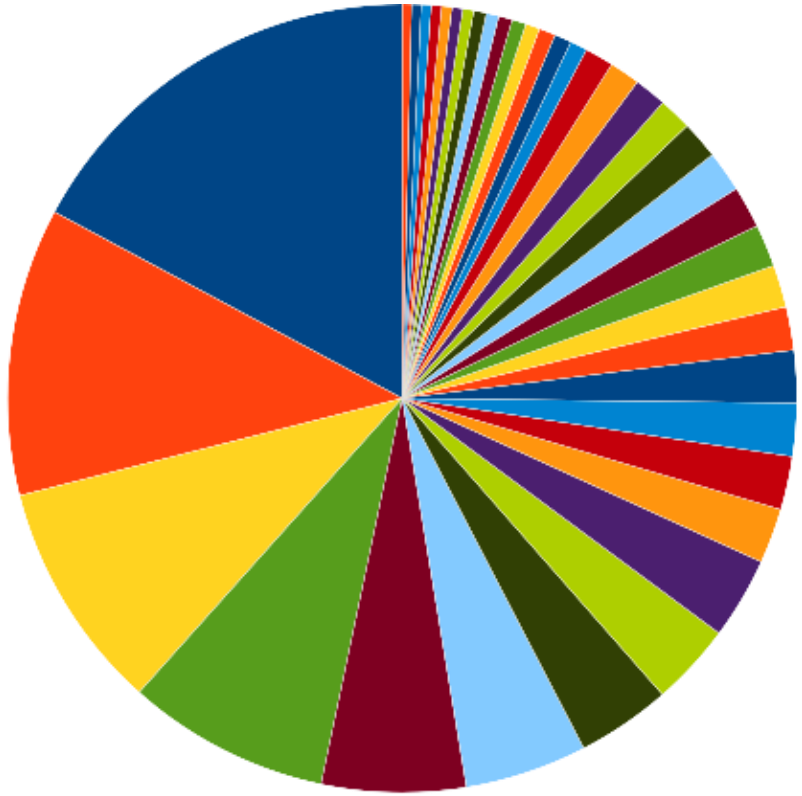
Problem Categories

and

Code Library

Problem Categories

- My classification of Kattis problems I've solved:

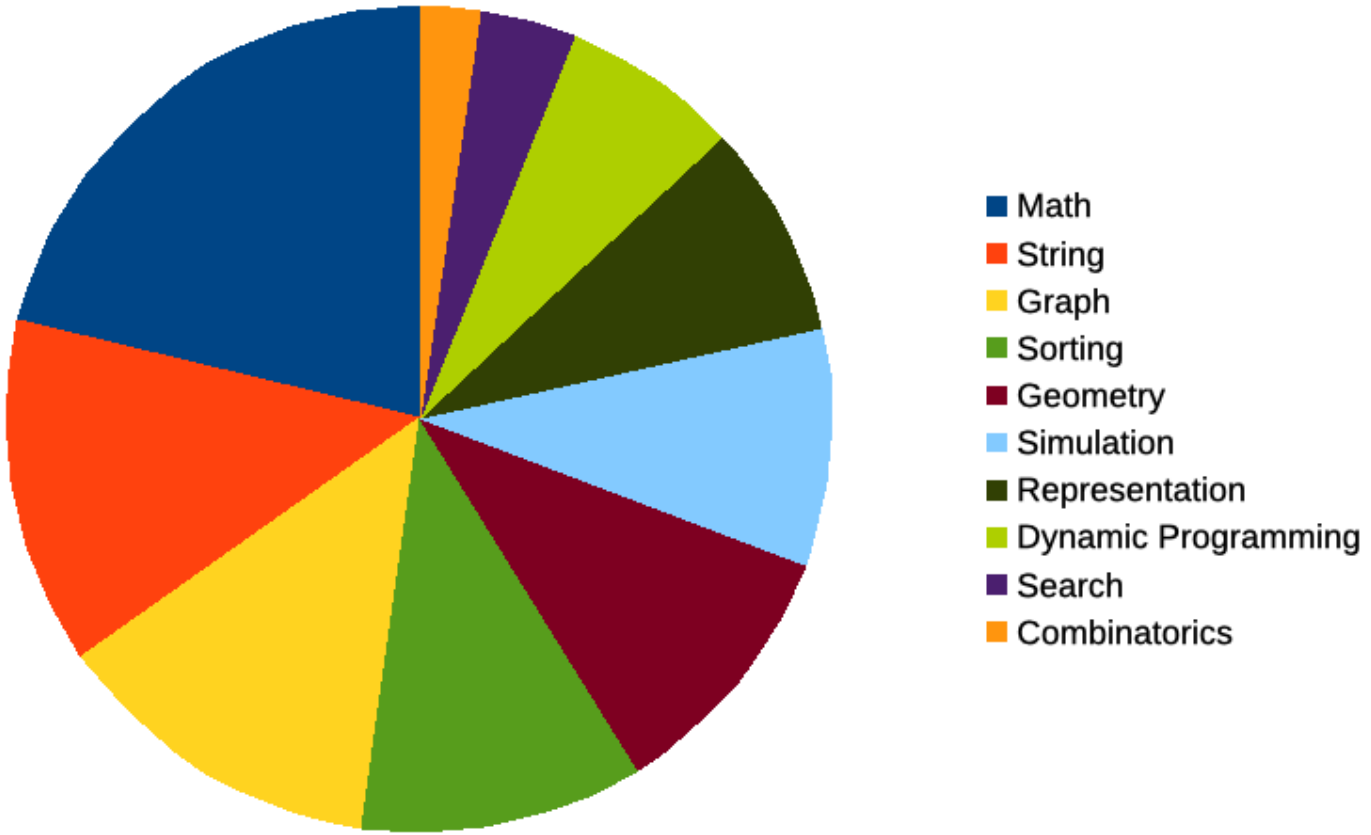


- Maybe we need a simplified set set of categories.

math
string
geometry
simulation
dynamic-programming
sorting
representation
graph
search
data-structure
grid
combinatorics
ad-hoc
parsing
tree
greedy
sort
shortest-path
BFS
trivial
binary-search
modulo-arithmetic
polynomial-search
offline
maximum-matching
graph-traversal
probability
gcd
disjoint-set
connected-components
number-theory
game
max-flow
subset-sum
strongly-connected-components
integer-math
spanning-tree
fenwick-tree

Problem Categories

- My simplified classification of Kattis problems I've solved:



Graph Problems

- Graph traversal (BFS, DFS)
- Connected Components
- Bridges and articulation points
- Cycle detection, topological sort, strongly connected components
- Minimum Spanning Tree
- Single-Source Shortest Path
- All-pairs shortest paths
- Trees, common ancestor
- Eulerian paths, bipartite graph checking
- Network flow
- Maximum matching

Math Problems

- Big integers
- Modulo arithmetic
- Factorization
- Avoiding real numbers
- Greatest Common Divisor (GCD) and Least Common Multiple (LCM)
- Extended GCD
- Chinese Remainder Theorem

Geometry Problems

- Line / circle distance and intersection problems
- Point inside a circle, polygon
- Circle, Triangle, Pie slice, Polygon area
- Line / Plane sweep
- Convex hull
- Closest pair of points

Dynamic Programming Problems

- Knapsack problem
- Edit distance
- Longest common subsequence
- Longest increasing subsequence
- Optimal matrix multiplication
- DP on a tree / DAG
- DP on subsets

String Problems

- Basic string operations
- Suffix trees / suffix arrays
- Knuth-Morris-Pratt

Representation

- Maps and Hash Tables
- Priority queues
- Disjoint sets
- Bitwise representation
- Segment trees / Fenwick trees
- Fast Fourier Transform

Simulation Problems

- Application area for representation techniques

Search Problems

- Polynomial search
- Combinatorial search
  - Combinations
  - Permutations
  - Caching
  - Pruning

Other Problem-Solving Techniques

- Greedy
- State cross-product
- Binary search