



ICPC Notes

Bistromaticians

References for study:-

- Geeksforgeeks
- E-maxx.ru
- <http://codeforces.com/blog/entry/23054#open-courses-for-algorithms-and-data-structures>
- <https://discuss.codechef.com/questions/48877/data-structures-and-algorithms>
 - -> Our entire syllabus mainly!
- <https://docs.google.com/document/d/1MlbFmE6ji3Yb6mNmZDHcNIBiZzlhzf31iz2wUe3iS0M/edit?authkey=COyc9Uc&authkey=COyc9Uc>
- Competitive programming 3 -
<https://drive.google.com/file/d/0B7RBrJBsud5YMEJZVUVmYUNGSzA/view>
- Intro to Algorithms

Topics

- Dynamic Programming
 - Solve lots of different variety of problems
 - Convex optimization
- DataStructures
 - IMPORTANT:-
 - *Stl (topcoder article)*
 - *Segment tree(lazy propagation) / fenwick tree*
 - *Disjoint set union*
 - *Heaps ***** new******
 - LESS IMPORTANT:-
 - *Tries*
 - Sparse table
 - Treap(aka cartesian tree)/BST
 - Splay Trees / KD Trees
 - RARE:-
 - Wavelet trees
- Graph theory and Algorithms
 - Dfs/bfs, types of edges(back,forward,cross)
 - Djisktra
 - LCA (Binary lifting)
 - Minimum spanning tree
 - Bellman ford/Floyd warshall
 - Strongly connected components, articulation points, bridges
 - Graph coloring
 - Heavy light decomposition
 - Max flow, min cost max flow etc...
- Misc.:-
 - Implementation , brute force problems(backtracking)
 - Greedy (MST, dijkstra,
 - Divide and conquer (binary exponentiation, binary lifting

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- Sqrt decomposition aka giant step baby step
 - Meet in the middle
 - Sqrt decomposition on queries
 - Mo's algo
 - 0-1 BFS
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- Do complete all above topics first^^. We will have max of 1 or 2 question from below topics combined!
 - Strings:- (Anay)
 - Suffix tree/array /automata
 - Kmp
 - Rabin karp
 - Z algorithm
 - Manacher's algo
 - Aho-corsaick (important)** But first understand above algorithms
 - Kasai's algo
 - Maths - siddartha
 - Try problems on topcoder and its tutorial.. It has a lot of variety of questions on maths.. most probably should cover all topics..
 - Basics - euclidean algorithm(inverse modulo) , power calculation for no and matrices , bit manipulation , sieve and prime factorization , euler totient function , biginteger(in java/Python) , binomial coefficients($nCr \% m$) calculation.
 - Gaussian elimination (calculate inverse , rank and stuff)
 - Inverse in $O(N)$ time
 - Generating functions, Catalan numbers, generalised catalan numbers
 - Number theory - Mobius inversion, multiplicative functions
 - Game theory , Game of Nim
 - pollard rho integer factorization
 - Inclusion and exclusion
 - Geometry - convex hull, line intersection , graham scan. E-maxx.ru has good explanations to all the different geometry algorithms. Geeksforgeeks also contains theory of many of those



Schedule

- Data structures and DP and graph by 22.09.17

Done by-

Anay - DP (did some lvl 5 probs)

- String and maths (source to be decided) by october end

