Data Structures and Algorithms

481

Hi all, I need your help to make a list of most used data structures and algorithms along with their tutorials, implementation and some problems on them. It will be helpful to everyone in many ways. I request everyone to contribute to this list by providing links to tutorials, problems, etc. I will keep updating this list regularly.

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1. Binary Search : Tutorial, Problems, Tutorial, Implementation, Problem
2. Quicksort : Tutorial, Implementation, Tutorial
3. Merge Sort : Tutorial, Implementation, Tutorial
4. Suffix Array : Tutorial, Tutorial, Implementation, Tutorial, Implementation, Problem, Problem
5. Knuth-Morris-Pratt Algorithm (KMP) : Tutorial, Tutorial, Implementation, Tutorial, Problem
6. Rabin-Karp Algorithm : Tutorial, Implementation, Tutorial, Problem, Problem
7. Tries : Tutorial, Problems, Tutorial : I, II, Tutorial, Problem, Problem, Problem
8. Depth First Traversal of a graph : Tutorial, Impelementation, Tutorial, Problems, Problem, Problem, Problem
9. Breadth First Traversal of a graph : Tutorial, Impelementation, Tutorial, Problems, Problem, Problem, Problem, Flood Fill
10. Dijkstra's Algorithm : Tutorial, Problems, Problem, Tutorial(greedy), Tutorial (with heap), Implementation, Problem, Problem
11. Binary Indexed Tree : Tutorial, Problems, Tutorial, Original Paper, Tutorial, Tutorial, Problem, Problem, Problem, Problem, Problem, Problem, Problem
12. Segment Tree (with lazy propagation) : Tutorial, Implementation, Tutorial, Tutorial, Problems, Implementation, Tutorial, Implementation and Various Uses, Persistent Segment Tree, problems same as BIT, Problem, Problem/*HLD is used as well*/
13. Z algorithm : Tutorial, Problem, Tutorial, problems same as KMP.
14. Floyd Warshall Algorithm : Tutorial, Implementation, Problem, Problem
15. Sparse Table(RMQ) : Tutorial, Problems, Tutorial, Implementation(C++), Java implementation
16. Heap / Priority Queue / Heapsort : Implementation, Explanation, Tutorial, Implementation, Problem, Chapter from CLRS
17. Modular Multiplicative Inverse
18. nCr % M
19. Suffix Automaton : Detailed Paper, Tutorial, Implementation (I), Tutorial, Implementation (II), Problem, Problem, Problem, Problem, Tutorial, Implementation
20. Lowest Common Ancestor : Tutorial, Problems, Paper, Paper, Problem, Problem, Problem
21. Counting Inversions : Divide and Conquer, Segment Tree, Fenwick Tree, Problem
22. Euclid's Extended Algorithm
23. Suffix Tree : Tutorial, Tutorial, Intro, Construction : I, II, Implementation, Implementation, Problem, Problem, Problem, Problem
24. Dynamic Programming : Chapter from CLRS(essential), Tutorial, Problems, Problem, Problem, Problem, Problem, Tutorial, Problem, Problem, Problem, Longest Increasing Subsequence, Bitmask DP, Bitmask DP, Optimization, Problem, Problem, Problem, Problem, Problem, Problem, Problem, DP on Trees : I, II
25. Basic Data Structures : Tutorial, Stack Implementation, Queue Implementation, Tutorial, Linked List Implementation
26. Logarithmic Exponentiation
27. Graphs : Definition, Representation, Definition, Representation, Problem, Problem
28. Minimum Spanning Tree : Tutorial, Tutorial, Kruskal's Implementation, Prim's Implementation, Problem, Problem, Problem, Problem, Problem

29. Efficient Prime Factorization
30. Combinatorics : Tutorial, Problems, Problem, Tutorial
31. Union Find/Disjoint Set : Tutorial, Tutorial, Problems, Problem, Problem, Problem
32. Knapsack problem : Solution, Implementation
33. Aho-Corasick String Matching Algorithm : Tutorial, Implementation, Problem, Problem, Problem, Problem
34. Strongly Connected Components : Tutorial, Implementation, Tutorial, Problem, Problem, Problem
35. Bellman Ford algorithm : Tutorial, Implementation, Tutorial, Implementation, Problem, Problem
36. Heavy-light Decomposition : Tutorial, Problems, Tutorial, Implementation, Tutorial, Implementation, Implementation, Problem, Problem, Problem
37. Convex Hull : Tutorial, Jarvis Algorithm Implementation, Tutorial with Graham scan, Tutorial, Implementation, Problem, Problem, Problem, Problem, Problem
38. Line Intersection : Tutorial, Implementation, Tutorial, Problems
39. Sieve of Erastothenes
40. Interval Tree : Tutorial, Implementation, Problem, Problem, Problem, Problem, Problem, Problem, Tutorial
41. Counting Sort
42. Probabilities
43. Matrix Exponentiation : Tutorial, Tutorial
44. Network flow : (Max Flow)Tutorial : I, II, Max Flow(Ford-Fulkerson) Tutorial, Implementation, (Min Cut) Tutorial, Implementation, (Min Cost Flow)Tutorial : I, II, III, Dinic's Algorithm with Implementation, Max flow by Edmonds Karp with Implementation, Problem, Problem, Problem, Problem, Problem, Problem, Problem, Problem, Problem, Problem, Problem, Problem, Problem, Problem, Problem, Problem
45. K-d tree : Tutorial, Tutorial, Implementation, Problem
46. Deque
47. Binary Search Tree : Tutorial, Implementation, Searching and Insertion, Deletion
48. Quick Select : Implementation, Implementation

entation, Uses and Problems, Problem, Problem

umbers, Tutorial with example problems - I, II, III, IV, Tutorial, Problems, Problem, Problem, Problem, Problem, Problem, Problem, Problem, Problem, Problem, Problem, Problem, Nim

51. STL (C++) : I, II, Crash Course
52. Maximum Bipartite Matching
53. Manacher's Algorithm : Implementation, Tutorial, Tutorial, Implementation, Tutorial, Implementation, Problem, Problem, Problem
54. Miller-Rabin Primality Test : Code
55. Stable Marriage Problem
56. Hungarian Algorithm, Tutorial
57. Sweep line Algorithm : I, II
58. LCP : Tutorial, Implementation, Tutorial, Implementation
59. Gaussian Elimination
60. Pollard Rho Integer Factorization, problem
61. Topological Sorting
62. Detecting Cycles in a Graph : Directed - I, II Undirected : I
63. Geometry : Basics, Tutorial
64. Backtracking : N queens problem, Tug of War, Sudoku
65. Eulerian and Hamiltonian Paths : Tutorial, Tutorial, (Eulerian Path and Cycle)Implementation, (Hamiltonian Cycle)Implementation
66. Graph Coloring : Tutorial, Implementation
67. Meet in the Middle : Tutorial, Implementation
68. Arbitrary Precision Integer(BigInt), II
69. Radix Sort, Bucket Sort
70. Johnson's Algorithm : Tutorial, Tutorial, Implementation

71. Maximal Matching in a General Graph : Blossom/Edmond's Algorithm, Implementation, Tutte Matrix, Problem
72. Recursion : I, II, Towers of Hanoi with explanation
73. Inclusion and Exclusion Principle : I, II
74. Co-ordinate Compression
75. Sqrt-Decomposition : Tutorial, Tutorial, Problem, Problem
76. Link-Cut Tree : Tutorial, Wiki, Tutorial, Implementation, Problem, Problem, Problem, Problem
77. Euler's Totient Function : Explanation, Implementation, Problems, Explanation, Problems
78. Burnside Lemma : Tutorial, Tutorial, Problem
79. Edit/Levenshtein Distance : Tutorial, Introduction, Tutorial, Problem, Problem
80. Branch and Bound
81. Math for Competitive Programming
82. Mo's Algorithm : Tutorial and Problems

data-structure algorithms datastructure algorithm

edited **27 Jan, 22:59**

asked **31 Jul '14, 23:29**
neo1tech9_7
8.4k●5●15●36
accept rate: 19%

22 Just a suggestion. Sort this list according to their usage. Like, the algorithms which are most used would be ranked first, then the rarely used problems.

thespacedude (01 Aug '14, 15:10)

2 For BIT use this tutorial: http://stackoverflow.com/questions/15439233/bitusing-a-binary-indexed-tree - way better than all other resources. And thanks for the resource.

travis_bickle (09 Sep '14, 22:41)

1 after spending hours reading KMP from several sites and failing to understand, i found this one very straight forward and well explaining: http://keithschwarz.com/interesting/code/?dir=knuth-morris-pratt

nishant2002 (03 Nov '14, 19:00)

@nishant2002 added :)

neo1tech9_7 (10 Nov '14, 00:52)

@neo1tech9_7 it seems the first link for Binary Search isn't valid (http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/binary-search/). Look into it.

nisargshah95 (31 Mar, 21:33)

61 Answers:

oldest newest most voted

1 2 3 4 5 ... 7 next »

29 A good initiative :)

link

answered **01 Aug '14, 05:18**

its_pheonix
2.3k●6●20●21
accept rate: 11%

link

28 The above link has lesser known but useful data structures.

link

answered **07 Aug '14, 10:54**
codemaster1994
2.1k●7●20●18
accept rate: 0%

Thanks a lot :)

neo1tech9_7 (07 Aug '14, 14:41)

24 Really good work.

God Bless you and you will win IOI :)

link

answered **17 Aug '14, 11:59**
tech_boy
1.1k●4●19●31
accept rate: 7%

1 Amen, brother. :D and thanks

neo1tech9_7 (17 Aug '14, 13:06)

More concise collection of STL... http://www.sgi.com/tech/stl/

tech_boy (31 Aug '14, 14:13)

3 Thanks friends .These links are really useful for newbies like us. May Allah(swt) bless and guide all those who contributed

in collecting these links.

ahsankamal (13 Sep '14, 01:05)

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17 For heavy-light decomposition - http://wcipeg.com/wiki/Heavy-light_decomposition

link

answered **07 Aug '14, 13:48**

rajat_dtc
1.7k●5●14●22
accept rate: 7%

Thanks a lot :)

neo1tech9_7 (07 Aug '14, 23:27)

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17 Matrix exponentiation : http://zobayer.blogspot.in/2010/11/matrix-exponentiation.html
related problem : http://www.hackerearth.com/problem/algorithm/long-walks-from-office-to-home-sweet-home-1/

link

answered **12 Aug '14, 21:49**

ravi0213
2.1k●4●13●24
accept rate: 15%

Thanks a lot :)

neo1tech9_7 (13 Aug '14, 23:39)

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11 Take a look of this website once....Explanation of all the algorithms from different sources can be found at one place!!! http://algorithm.daqwest.com/

link

answered **05 Aug '14, 19:49**

vicky002
196●1●1●4
accept rate: 22%

Awesome :D . Thanks you just made making this list a lot easier.

neo1tech9_7 (05 Aug '14, 20:02)

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7 we already have a topic for list of imp algo
http://discuss.codechef.com/questions/18752/what-are-the-must-known-algorithms-for-online-programming-contests

link

answered **01 Aug '14, 00:02**

ravi0213
2.1k●4●13●24
accept rate: 15%

6 I know, but it doesn't contain implementation , tutorial, problems, etc.

neo1tech9_7 (01 Aug '14, 00:06)

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7 Nice Initiative I would recommend http://e-maxx.ru/algo/ for the implementation and theory. Make use of google translate. It also have a good set of questions in the end.

For DP I would recommend this the topic is nicely explained by Mimino.(For starters)

link

answered **04 Aug '14, 02:21**

johri21
426●1●3●6
accept rate: 14%

1 Added :). Though i prefer geeksforgeeks for implementation they comment their code in detail :) .

neo1tech9_7 (04 Aug '14, 03:06)

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7 One might try http://e-maxx.ru/ :) It's in Russian though, but Google translator might help.

link

answered **15 Aug '14, 14:35**

gdisastery1
1.7k●4●13●17
accept rate: 12%

See this: http://codeforces.com/blog/entry/5651 and https://onedrive.live.com/?cid=a7b8002ee242b572&id=A7B8002EE242B572!3746

damn_me (07 Jan, 14:27)

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6 I think stackoverflow can also be of immense help.
Really awesome effort.

link

answered **07 Aug '14, 12:42**

ronakymca
1.1k●3●12●23
accept rate: 19%

Yeah, I have added some links from stackoverflow

neo1tech9_7 (08 Aug '14, 04:15)

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1 2 3 4 5 ... 7 next »

[hide preview] community wiki

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