Data Structures and Algorithms

543

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.

1. Binary Search : Tutorial, Problems, Tutorial, Implementation, Problem

417

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, 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

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Asked: **31 Jul '14, 23:29**
Seen: **166,254 times**
Last updated: **20 Jan, 21:53**

Related questions
- Algorithm Analysis
- What all algorithms?
- Machine Dependent constants
- new helper
- [closed] Good books on advanced data structures?
- build binary tree from start and end element of an array
- Worker Secluding algo
- Awesome resource for DS and Algorithms
- Help with the algorithm please!
- Some algorithms

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
49. Treap/Cartesian Tree : Tutorial(detailed), Tutorial, Implementation, Uses and Problems, Problem, Problem
50. Game Theory : Detailed Paper, Tutorial, Problems, Grundy Numbers, 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

This question is marked "community wiki".

wikified **13 Jun '15, 20:22**

asked **31 Jul '14, 23:29**

neo1tech9_7
8.5k●5●15●37
accept rate: 19%

24 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)

1 @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 '15, 21:33)

1 @neo1tech9_7 all topcoder links need to be updated from http://help.topcoder.com/data-science/competing-in-algorithm-challenges/algorithm-tutorials/introduction-to-string-searching-algorithms/ to http://www.topcoder.com/community/data-science/data-science-tutorials/introduction-to-string-searching-algorithms/

ankursmooth (28 Jun '15, 23:00)

showing 5 of 7 show all

94 Answers:

oldest newest most voted

1 2 3 4 5 ... 10 next »

A good initiative :)

30

link | award points

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

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

@its_pheonix

In what order should I start.

arpit728 (20 Jan, 21:52)

link

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

link | award points

answered **07 Aug '14, 10:54**

codemaster1994

2.2k●7●20●18
accept rate: 0%

Really good work.

26 God Bless you and you will win IOI :)

link | award points

answered **17 Aug '14, 11:59**
tech_boy
1.2k●4●19●31
accept rate: 7%

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)

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

17

link | award points

answered **07 Aug '14, 13:48**
rajat_dtc
1.8k●5●14●22
accept rate: 6%

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/

17

link | award points

answered **12 Aug '14, 21:49**
ravi0213
2.2k●4●13●24
accept rate: 14%

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/

12

link | award points

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

vicky002 ♦♦
226●1●2●8
accept rate: 27%

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

8

link | award points

answered **01 Aug '14, 00:02**
ravi0213
2.2k●4●13●24
accept rate: 14%

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.

8

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

link | award points

answered **04 Aug '14, 02:21**
johri21
436●1●3●6
accept rate: 12%

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

8

link | award points

answered **15 Aug '14, 14:35**
gdisastery1
1.8k●4●13●17
accept rate: 11%

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

damn_me (07 Jan '15, 14:27)

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

7

link | award points

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

1.1k●3●12●23
accept rate: 19%

1 2 3 4 5 ... 10 next »

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