**Algorithm and programming Technique list (with relative links)**

**Good list from quora:**

<https://www.quora.com/What-are-the-algorithms-required-to-solve-all-problems-using-C++-in-any-competitive-coding-contest>

**Mathematics:**

* + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=math_for_topcoders>
* Sieve of Eratosthenes (prime finding)
  + <http://en.wikipedia.org/wiki/Sieve_of_Eratosthenes>
  + <http://www.shafaetsplanet.com/planetcoding/?p=624>
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/eratosthenes_sieve&usg=ALkJrhhwtnMHMOYCdg4BxIfMFpyTHN-_pA>
* Bitwise Sieve
  + <http://www.shafaetsplanet.com/planetcoding/?p=855>
* Segmented Sieve
  + <http://zobayer.blogspot.com/2009/09/segmented-sieve.html>
* prime factorization
  + <https://www.dropbox.com/s/ndai0fquchmazu7/factorization.pdf> (pdf by jan vai)
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=primeNumbers>
  + <http://zobayer.blogspot.com/2013/02/divisor-function.html>
* GCD, LCM
* Factorial
  + <http://alavolacoder.blogspot.com/2013/04/factorial-facts.html>
  + <http://alavolacoder.blogspot.com/2013/04/factorial-facts_9.html>
  + <http://zobayer.blogspot.com/2009/07/factorial.html>
* Fibonacci
* Counting, Permutation, combination
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=combinatorics>
* Exponentiation
* Modular Arithmetic
  + <http://www.shafaetsplanet.com/planetcoding/?p=936>
* Euclid, Extended euclid
  + <http://zobayer.blogspot.com/2009/07/extended-euclidean-algorithm.html>
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/euclid_algorithm&usg=ALkJrhhkz3tb4aXWHeD8eIJvJCQhe-jn7Q>
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/extended_euclid_algorithm&usg=ALkJrhgjyM7s9peFmIRPQqhXdBGE9-CeHw>

**Data Structure:**

* + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=dataStructures>
* Stack
  + <http://alavolacoder.blogspot.com/2013/02/stack.html>
* Queue
  + <http://alavolacoder.blogspot.com/2013/03/queue.html>
* Priority Queue
* Linked list
  + <http://alavolacoder.blogspot.com/2013/02/blog-post_19.html>
  + <http://alavolacoder.blogspot.com/2013/02/blog-post_24.html>
  + <http://zobayer.blogspot.com/2009/12/cse-102-linked-list-in-c.html>
* Heap
* Hash table
* Disjoint Set, Union Find
  + <http://www.shafaetsplanet.com/planetcoding/?p=763>
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=disjointDataStructure>
* Binary Search Tree
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/binarySearchTree.htm>
* Trie, Suffix Array
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=usingTries>
* Binary Indexed Tree(BIT)
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=binaryIndexedTrees>
* Segmented Tree
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=lowestCommonAncestor>
  + <http://www.shafaetsplanet.com/planetcoding/?p=1557>
  + <http://www.shafaetsplanet.com/planetcoding/?p=1591>
* Heavy Light decompositon
  + <http://wcipeg.com/wiki/Heavy-light_decomposition>
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/heavy_light&usg=ALkJrhjj3RdDbiiCaQoThkAzVfSqnJuJkA>

**Sorting:**

* + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=sorting>
  + <http://bongobani.blogspot.com/2010/06/blog-post_1625.html>
* Bubble Sort
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/bubbleSort.htm>
* Selection Sort
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/selectionSort.htm>
* Insertion Sort
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/insertionSort.htm>
* Shell Sort
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/shellSort.htm>
* Quick Sort
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/quickSort.htm>
* Merge Sort
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/mergeSort.htm>
  + <http://zobayer.blogspot.com/2010/08/merge-sort.html>
  + <http://zobayer.blogspot.com/2010/09/threaded-merge-sort.html>
  + <http://zobayer.blogspot.com/2010/11/merge-sort-improvement.html>
* Counting Sort
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/countingSort.htm>
* Radix Sort
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/radixSort.htm>
* Bucket Sort
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/bucketSort.htm>
* Heap Sort
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Sorting/heapSort.htm>

**Searching:**

* Linear Search
* Binary Search
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=binarySearch>
* Ternary Search
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/ternary_search&usg=ALkJrhgQ1I9JBNisS1NAVe5CcgYxCRhqtA>
* Map, HashMap

**Dynamic Programming:**

* + <https://sites.google.com/site/smilitude/recursion_and_dp>
  + <http://www.codechef.com/wiki/tutorial-dynamic-programming>
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=dynProg>
  + <http://www.shafaetsplanet.com/planetcoding/?p=1022>
  + <http://www.shafaetsplanet.com/planetcoding/?p=1211>
* Rod Cutting
* Maximum Sum (1D, 2D)
* Coin Change
  + <http://www.shafaetsplanet.com/planetcoding/?p=1158>
  + <https://sites.google.com/site/programinggconcept/algorithm>
* Longest Common Subsequence
* Longest Increasing subsequence, Longest Decreasing Subsequence
* Calculating nCr using DP
  + <http://zobayer.blogspot.com/2009/08/calculate-ncr-using-dp.html>
* Matrix Chain multiplication
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Dynamic/chainMatrixMult.htm>
* Edit Distance
* 0-1 Knapsack
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Greedy/knapscakIO.htm>
  + <http://www.shafaetsplanet.com/planetcoding/?p=1072>
  + <https://sites.google.com/site/programinggconcept/0-1-knapsack>
* Bitmask DP
  + <http://www.shafaetsplanet.com/planetcoding/?p=1357>
* Traveling Salesman problem
  + <http://www.shafaetsplanet.com/planetcoding/?p=571>
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/AproxAlgor/TSP/tsp.htm>
* Digit DP
  + <http://codeforces.com/blog/entry/7221>

**Greedy algorithm:**

* + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=greedyAlg>
* Activity selection/Task scheduling problem
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Greedy/activity.htm>
* Huffman coding
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Greedy/huffman.htm>
  + <http://zobayer.blogspot.com/2011/01/huffmans-code.html>
* Fractional knapsack problem
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/Greedy/knapscakFrac.htm>

**Graph Theory:**

* + <https://sites.google.com/site/smilitude/shortestpath>
  + <https://sites.google.com/site/smilitude/shortestpath_problems>
  + <http://www.codechef.com/wiki/tutorial-graph-theory-part-1>
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=graphsDataStrucs1>
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=graphsDataStrucs2>
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=graphsDataStrucs3>
* Graph Representation(matrix, list/vector)
  + <http://www.shafaetsplanet.com/planetcoding/?p=143>
  + <http://www.shafaetsplanet.com/planetcoding/?p=184>
  + <http://www.shafaetsplanet.com/planetcoding/?p=211>
* Breadth First Search(BFS)
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/breadthSearch.htm>
  + <http://www.shafaetsplanet.com/planetcoding/?p=604>
  + <http://www.shafaetsplanet.com/planetcoding/?p=639>
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/bfs&usg=ALkJrhinv0P87U0v_VXJhm3L6aGS5KEuPA>
* Depth First Search(DFS)
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/depthSearch.htm>
  + <http://www.shafaetsplanet.com/planetcoding/?p=973>
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/dfs&usg=ALkJrhiWHq30PgqeB1q11ZSAJrvMeOJksw>
* Bipartite Graph checking
  + <http://zobayer.blogspot.com/2010/03/testing-bipartite-graph.html>
* Topological Sort
  + <https://sites.google.com/site/smilitude/topsort>
  + <http://www.shafaetsplanet.com/planetcoding/?p=848>
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/topoSort.htm>
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/topological_sort&usg=ALkJrhhAS83fGpkoZIfziKQZIpYQy4JZ9A>
* Strongly Connected Component(SCC)
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/strongComponent.htm>
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/strong_connected_components&usg=ALkJrhip3cmRxf-Uk_1COz-PHg57GuwEGg>
* Minimum Spanning Tree(MST)
  + Kruskal’s Algorithm
    - <http://www.shafaetsplanet.com/planetcoding/?p=692>
    - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/kruskalAlgor.htm>
    - <http://zobayer.blogspot.com/2010/01/kruskals-algorithm-in-c.html>
  + Prim’s Algorithm
    - <http://www.shafaetsplanet.com/planetcoding/?p=825>
    - <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/primAlgor.htm>
    - <http://www.graph-magics.com/articles/min_spantree.php>
  + Directed MST
    - <http://www.ce.rit.edu/~sjyeec/dmst.html>
* All pair's shortest path(Floyd Warshall)
  + <http://www.graph-magics.com/articles/all_shortest_paths.php>
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/floyd_warshall_algorithm&usg=ALkJrhgoQbn-45TnSyPYBa0T2o__DDuJSw>
* Djkastra algorithm
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/dijkstraAlgor.htm>
  + <http://www.shafaetsplanet.com/planetcoding/?p=1500>
  + <http://zobayer.blogspot.com/2009/12/dijkstras-algorithm-in-c.html>
* Bellman Ford Algorithm
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/bellFordAlgor.htm>
* Directed Acyclic Graph
* Bipartite Matching
  + <http://zobayer.blogspot.com/2010/05/maximum-matching-with-dfs.html>
  + <http://zobayer.blogspot.com/2010/05/maximum-matching.html>
* Max-Flow, Min-cost max-flow
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=maxFlowRevisited>
* Cayley's Theorem
* Articulation Point
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/cutpoints&usg=ALkJrhiSuFiBqY_EBgCC68vfrvW2o5vZnA>
* Bridge
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/bridge_searching&usg=ALkJrhjv4XdY8Jh7vYLW0UbVsCIgscwhWg>
* Euler tour/path
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/GraphAlgor/eulerTour.htm>
  + <http://zobayer.blogspot.com/2010/06/euler-tour.html>
  + <http://www.graph-magics.com/articles/euler.php>
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/euler_path&usg=ALkJrhhfu-QYqtQCLEcIXxB-nQ1lbebqvw>
* Hamiltonian Cycle
* Stable Marriage problem
  + <http://www.shafaetsplanet.com/planetcoding/?p=1187>
* Chinese Postman problem
* Minimum Vertex Cover(Graph+DP)
  + <http://www.shafaetsplanet.com/planetcoding/?p=582>
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/AproxAlgor/vertexCover.htm>

**Number Theory:**

* Josephus Problem
  + <http://en.wikipedia.org/wiki/Josephus_problem>
  + <http://www.cut-the-knot.org/recurrence/flavius.shtml>
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/joseph_problem&usg=ALkJrhgMHDKM8tt5iI-GjN79rqFrWqWtFg>
* Farey Sequence,Stern-brocot Tree
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/stern_brocot_farey&usg=ALkJrhgnF7douyHovchr9Cid9vqFp4yuZw>
* Catalan numbers
  + <http://en.wikipedia.org/wiki/Catalan_number>
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/catalan_numbers&usg=ALkJrhhRH_RJQQbF1YaUhncPRlLVkzJQYw>
* Euler's phi
  + <http://zobayer.blogspot.com/2013/02/euler-totient-function.html>
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/euler_function&usg=ALkJrhidn-VzTqkKA2YBticLAs-ZDj_LKg>
* Burnside's lemma/circular permutation
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/burnside_polya&usg=ALkJrhhc0pVhgwbXKi01y2l8Ve8IOiSlxg>
* Modular inverse
  + <https://www.facebook.com/notes/emtiaj-hasan/%E0%A6%AE%E0%A6%A1-%E0%A6%A8%E0%A6%BF%E0%A7%9F%E0%A7%87-%E0%A6%AE%E0%A6%A1%E0%A6%B0-%E0%A6%AE%E0%A6%A1%E0%A6%B0-%E0%A6%87%E0%A6%A8%E0%A6%AD%E0%A6%BE%E0%A6%B0%E0%A7%8D%E0%A6%B8-%E0%A6%AE%E0%A6%A1%E0%A7%87%E0%A6%B0-%E0%A6%B8%E0%A6%BE%E0%A6%A5%E0%A7%87-%E0%A6%B8%E0%A6%BF-%E0%A6%86%E0%A6%B0-%E0%A6%9F%E0%A6%BF-%E0%A6%B0-%E0%A6%95%E0%A6%9A%E0%A6%95%E0%A6%9A%E0%A6%BE%E0%A6%A8%E0%A6%BF/448341041903611>
* Probability
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=probabilities>
* Chinese Remainder Theorem
  + <http://translate.googleusercontent.com/translate_c?act=url&depth=1&hl=en&ie=UTF8&prev=_t&rurl=translate.google.com&sl=auto&tl=en&twu=1&u=http://e-maxx.ru/algo/chinese_theorem&usg=ALkJrhhib5yTDIZ1VJE7vt1YuEMWyuOm0A>
* Gaussian Elmination method
  + <http://zobayer.blogspot.com/2009/12/gaussjordan-elimination.html>
* Dilworth's Theorem
* Matrix Exponentiation
  + <http://zobayer.blogspot.com/2010/11/matrix-exponentiation.html>
* Determinant of a matrix
* RSA public key crypto System

**Computation Geometry:**

* + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=geometry1>
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=geometry2>
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=geometry3>
  + <http://www.personal.kent.edu/~rmuhamma/Compgeometry/compgeom.html>
* Pick's Theorem
* Convex hull
  + <http://zobayer.blogspot.com/2010/02/convex-hull.html>
* Line Intersection
* Segment circle intersection
  + <http://zobayer.blogspot.com/2009/11/geometry-segment-circle-intersection.html>
* Point in a polygon
* Area of a polygon
* Line Sweeping
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=lineSweep>
* Polygon intersection
* Closest Pair

**Game Theory:**

* + <http://potasiyam.com/farsan/>
* Take Away game
  + <http://zobayer.blogspot.com/2010/08/simple-take-away-game.html>
* Nim
* Sprague-grundy Number

**String:**

* + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=stringSearching>
  + <http://doinik-iut.com/archives/23106>
* Naive String matching
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/StringMatch/naiveStringMatch.htm>
* Rabin karp Algo
  + <http://www.infoarena.ro/blog/rolling-hash>
* Finite Automata
* Knuth-Marris-Pratt Algo
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/StringMatch/kuthMP.htm>
* Manacher's Algo
* Aho korasick's Algo
* Boyer-Moore Algorithm
  + <http://www.personal.kent.edu/~rmuhamma/Algorithms/MyAlgorithms/StringMatch/boyerMoore.htm>

**Others:**

* Recursion
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=recursionPt1>
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=recursionPt2>
  + <http://zobayer.blogspot.com/2009/12/cse-102-attacking-recursion.html>
  + <http://zobayer.blogspot.com/2009/12/cse-102-practice-recursions.html>
* Backtracking
  + <http://www.shafaetsplanet.com/planetcoding/?p=1266>
  + <http://www.academic.marist.edu/~jzbv/algorithms/Backtracking.htm>
* Hungarian Algorithm
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=hungarianAlgorithm>
* C++ STL(Standard Template Library)
  + <https://sites.google.com/site/smilitude/cpp>
  + <https://sites.google.com/site/smilitude/stl>
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=standardTemplateLibrary>
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=standardTemplateLibrary2>
* Bitwise operations
  + <http://www.codechef.com/wiki/tutorial-bitwise-operations>
  + <http://community.topcoder.com/tc?module=Static&d1=tutorials&d2=bitManipulation>
  + <http://zobayer.blogspot.com/2009/12/bitwise-operations-in-cc-part-1.html>
  + <http://zobayer.blogspot.com/2009/12/bitwise-operations-in-c-part-2.html>
  + <http://zobayer.blogspot.com/2009/12/bitwise-operations-in-c-part-3.html>