Shortest Path Algorithms Algorithms Computer Programming

What is the best shortest path algorithm?

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3 Answers

Kaleem Ullah, Advance Algorithm, sorting algorithms, graph algorithms, network flow algorithms

Answered Aug 2, 2015

@Bellman–Ford algorithm :

Shortest path from Source to all other nodes in weighted directed graph even with -eve edge weight (not cycle). slower but versatile than Dijsktra.
Complexity: O(|V|.|E|)

BFS: Find path from one given vertex to other nodes in un-weighted un-directed graph.
Complexity: O(|V|+|E|). it is faster when you know vertices ahead and use appropriate data structure i.e FIFO Que for figuring out which vertex already processed than complexity can be reduced to O(|V|)

DFS: Find Shortest path from source to other nodes. in Tree and also in Graph. Graph may contain cycle which means a node could be visited again and again. so we can use boolean array to keep track of visited nodes. otherwise algorithm won't stop.
more over it look deeper and deeper and go as far to the end of branch in tree.
Complexity: O(|V|+|E|). and Complexity: O(|V|) space to store vertices.

Warshal Algorithm:
ll pair shortest path in Directed unweighted graph with +eve, -eve (not cycle) edge weight. but it doesn't return details of the paths themselves.
it can be used to detect -eve weight cycle in graph. when it find one it terminates. it compare all possible path through graph between each pair of vertices . so it uses Dynamic approach not greedy approach.
Complexity: O(|V^3|)

Johnson's Algorithm: find all pair shortest path in directed weighted sparse graph when edge weight is +eve, -eve but not -eve cycle.
it first uses belman-ford algorithm to compute transformed graph from original graph. it removes -eve weight edges. then Dijkstra is applied to find paths.
Complexity: O(V^2 Log V + VE)

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O(E+ V log V). and it is faster single source shortest path algorithm. it works by assigning a tentative weight to visited node and infinity to un-visited nodes for visited node look for its all not visited edges and select with minimum weight. and add it to path set.

Krushkal's Algorithm: to find MST where it finds an edge of least possible weight that connects any two tree in forest on un-directed, weighted graph.
this is greedy algorithm.
it also find Minimum Spanning Forest.
Complexity: O(E log V)

Prim's Algorithm: it finds subset of edges that form a tree on un-directed, weighted graph. but can't find MS Forest like Krushkal's Algorithm does.

Brouvka's Algorithm: Problem with this algorithm is that weights should be unique in graph. it find MST by examining each vertex then putting with smaller weight. this algorithm is parallel in nature but not faster than Prim's Algorithm.

Same Complexity as Krushkal's Algorithm.

Anonymous

Answered May 27, 2015

Dijkstra's it is!! :D

For more info: Dijkstra's algorithm

There are some arguable answers to this question too. Check them here:

What is the fastest algorithm for finding all shortest paths in a sparse graph?

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sparsing. Its complexity is $O(V^2*\log V+V*E)$.

If your graph is unweighted then Breadth First Search(BFS) is more suitable. The complexity of BFS is O(V^2)

If your graph is weighted and undirected then Djikstra Algorithm is the best pick.