1 Conditions for Shortest Path Algorithms

Suppose that we want to find the shortest path between two nodes in the following graph. Which algorithms can we use?

- Dijkstra
- Bellman-Ford
- All of the above
- Dijkstra and Bellman-Ford
- Neither

We have a graph with negative edge weights. Can we use Dijkstra to find shortest paths?
- No
- Yes

We have a directed graph with positive edge weights. Can we use Dijkstra to find shortest paths?
- No
- Yes

We have an undirected graph with positive edge weights. Can we use Dijkstra to find shortest paths?
- No
- Yes

Dijkstra Forensics

Suppose we run Dijkstra on a graph with nodes A, B, C, D, E, F that has nonnegative (≥0) edge weights, starting from the node A (in the middle of the algorithm of our computer code). We look through the memory dump, and see that the state of E was last accessed when the crash happened.

Suppose that we implement Dijkstra with a red-black tree. What is the asymptotically smallest upper bound on runtime in terms of

- \( m \)
- \( n \)
- \( m + n \)
- \( n \log m \)
- \( m \log n \)

3 Runtime

Suppose that we implement Dijkstra with a red-black tree. What is the asymptotically smallest upper bound on runtime in terms of \( n \) (the number of nodes) and \( m \) (the number of edges)?

- \( O(m \log n) \)
- \( O(m) \)
- \( O(n \log m) \)

Correct

We have a graph with negative edge weights. Can we use Dijkstra to find shortest paths?
- Yes
- No

We have an undirected graph with positive edge weights. Can we use Dijkstra to find shortest paths?
- Yes
- No

2 Dijkstra Forensics

Suppose we run Dijkstra on a graph with nodes A, B, C, D, E, F that has nonnegative (≥0) edge weights, starting from the node A (in the middle of the algorithm of our computer code). We look through the memory dump, and see that the state of E was last accessed when the crash happened.

Correct

We have a graph with no negative edge weights. Can we use Dijkstra to find shortest paths?
- Yes
- No

We have a directed graph with positive edge weights. Can we use Dijkstra to find shortest paths?
- Yes
- No

We have a directed graph with positive edge weights. Can we use Dijkstra to find shortest paths?
- Yes
- No

Stanford Oval, which of the following locations will become the current node first?

- Tresidder Union
- The Hollywood Sign
- Times Square in New York
- All of the above

Correct

A

What is the maximum possible length of the shortest path from node A to node E?
- 4
- 5
- 6

Correct

What is the minimum possible length of the shortest path from node A to node E?
- 2
- 3
- 4

Correct

What is the maximum possible length of the shortest path from node A to node F?
- 5
- 6
- 7

Correct

What is the minimum possible length of the shortest path from node A to node F?
- 3
- 4
- 5

Correct

We have a graph with negative edge weights. Can we use Dijkstra to find shortest paths?
- Yes
- No

We have a directed graph with positive edge weights. Can we use Dijkstra to find shortest paths?
- Yes
- No

We have an undirected graph with positive edge weights. Can we use Dijkstra to find shortest paths?
- Yes
- No

We have a directed graph with positive edge weights. Can we use Dijkstra to find shortest paths?
- Yes
- No

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