

Lecture 5.1 Shortest Paths Algorithms Quiz ANS

1. What data structures are used in Dijkstra's Algorithm to track the shortest distance (SD) and previous node (PN)?

- A) Stack and Queue
- B) Priority Queue and Hash Map
- C) Two maps: one for SD and one for PN
- D) Adjacency List and Array

Answer:

2. Dijkstra's Algorithm is NOT suitable for graphs with:

- A) Non-negative edge weights
- B) Directed edges
- C) Negative edge weights
- D) Undirected edges

Answer:

3. What is the time complexity of Dijkstra's Algorithm using a binary min-heap?

- A) $O(V + E)$
- B) $O((V + E) \log V)$
- C) $O(V^2)$
- D) $O(E \log V)$

Answer:

4. During edge relaxation, if a shorter path to node v is found through node u , what happens?

- A) $SD[v]$ and $PN[v]$ are updated
- B) $SD[u]$ is reset to infinity
- C) $PN[u]$ is set to v
- D) The edge $u \rightarrow v$ is removed

Answer:

5. In Dijkstra's algorithm, how is the priority queue used to select the next node to visit?

- A) The node with the largest known distance is chosen first.
- B) The node with the smallest Shortest Distance (SD) is chosen first.
- C) Nodes are processed in alphabetical order.
- D) Nodes are selected based on the number of edges.

Answer:

6. In the Shortest Path Tree (SPT), what does the PN map store?

- A) The shortest distance from the source
- B) The previous node in the shortest path
- C) The weight of edges
- D) The next node to visit

Answer:

7. What is the first step in Dijkstra's Algorithm?

- A) Relax all edges
- B) Initialize SD for the source node to 0 and others to ∞
- C) Mark all nodes as known
- D) Sort edges by weight

Answer:

8. In BFS, nodes are visited in order of:

- A) Increasing edge weights
- B) Decreasing distance from the source
- C) Increasing distance from the source
- D) Alphabetical order

Answer:

9. After running Dijkstra's Algorithm, how is the shortest path reconstructed?

- A) Using the adjacency list
- B) Following backpointers in the PN map
- C) Sorting the SD map
- D) Reversing the visit order

Answer:

10. During the edge relaxation step in Dijkstra's algorithm, which condition must be met to update the shortest distance (SD) to node v ?

- A) $SD[v] < SD[u] + w(u,v)$
- B) $SD[v] > SD[u] + w(u,v)$
- C) $SD[u] < SD[v] + w(u,v)$
- D) $SD[v] == SD[u] + w(u,v)$

Answer:

11. True or false: Given a graph where all edges have positive weights, the shortest paths produced by Dijkstra and Bellman Ford algorithm may be different but path weight would always be same.

Answer: