

Data structures Lab

Lab 8

Date: 28.08.25

Observation Questions

1. Differentiate between **directed** and **undirected** weighted graphs with real-world examples.
2. Explain **Dijkstra's Algorithm** and its limitations when negative weights are present.
3. Compare **Prim's Algorithm** and **Kruskal's Algorithm** for finding MST. Which is better for dense graphs?
4. Why is the **shortest path problem** important in real-time systems like GPS navigation?
5. Write the adjacency matrix representation of the following directed weighted graph:

Vertices = {A, B, C, D}

Edges = A→B (3), A→C (2), B→D (4), C→D (1).

Execution Questions

1. An airline wants to find the cheapest route between cities. Implement Dijkstra's algorithm to find the minimum cost from a source city to all others.

Number of cities: 5

Edges:

0 1 10

0 2 3

1 2 1

2 1 4

2 3 2

1 3 2

3 4 7

2. In a computer network, routers may have negative delay due to data compression. Use Bellman-Ford to find shortest paths.

Vertices: 5, Edges: 8

Edges:

0 1 -1

0 2 4

1 2 3

1 3 2

1 4 2

3 2 5

3 1 1

4 3 -3

Source = 0

3. A power company wants to lay wires connecting cities with **minimum cost**. Implement Kruskal's algorithm.

Number of cities: 4

Edges:

0 1 10

0 2 6

0 3 5

1 3 15

2 3 4

4. A cable TV company wants to connect houses with the minimum cable length. Implement Prim's algorithm.

Number of houses: 5

Cost adjacency matrix:

0 2 0 6 0

2 0 3 8 5

0 3 0 0 7

6 8 0 0 9

0 5 7 9 0

5. A delivery company wants to calculate the shortest travel time between **every pair of warehouses**. Implement Floyd-Warshall algorithm.

Number of warehouses: 4

Adjacency matrix:

0 5 INF 10

INF 0 3 INF

INF INF 0 1

INF INF INF 0