Fall 2024 – CS 303 Algorithms and Data Structures
Lab 11

Preliminary:

• Implement the algorithm and analyze the results using the give input files

Objectives:

- Implement Dijkstra's Algorithm to find the single source shortest paths for a directed graph.
- Write a detailed report on your program

Problems:

1. Implement Dijkstra's algorithm using the pseudocode algorithm.
2. Write a driver program, which reads input files tinyDG.txt, mediumDG.txt, and largeDG.txt (downloadable from Canvas) and run Dijkstra's algorithm on each of them to find the Single Source Shortest Path within these graphs considering 0 as the source. Your output should be the shortest path

```
DIJKSTRA(G, w, s)
1  INITIALIZE-SINGLE-SOURCE(G, s)
2  S = ∅
3  Q = G.V
4  while Q ≠ ∅
5      u = EXTRACT-MIN(Q)
6      S = S ∪ {u}
7      for each vertex v ∈ G.Adj[u]
8          RELAX(u, v, w)
```

```
RELAX(u, v, w)
1  if v.d > u.d + w(u, v)
2      v.d = u.d + w(u, v)
3      v.π = u
```

```
initialize_single_source( Graph g, Node s )
   for each vertex v in Vertices( g )
       d[v] := infinity
       pi[v] := nil
   d[s] := 0;
```

DATA

largeDG.txt

mediumDG.txt

tinyDG.txt

***************No submission for this lab**