**(4) Assignment: Dijkstra's Algorithm**

**Code:**

#include <iostream>

#include <limits.h>

#include <list>

#include <queue>

using namespace std;

#define Vertex 9

int minDistance(int distance[], bool sptSet[])

{

int min = INT\_MAX, min\_index;

for (int v = 0; v < Vertex; v++)

if (sptSet[v] == false && distance[v] <= min)

min = distance[v], min\_index = v;

return min\_index;

}

void printSolution(int distance[], int n)

{

printf("Vertex Distance from Source\n");

for (int i = 0; i < Vertex; i++)

printf("%d tt %d\n", i, distance[i]);

}

void dijkstra(int graph[Vertex][Vertex], int src)

{

int distance[Vertex];

bool sptSet[Vertex];

for (int i = 0; i < Vertex; i++)

distance[i] = INT\_MAX, sptSet[i] = false;

distance[src] = 0;

for (int count = 0; count < Vertex - 1; count++) {

int u = minDistance(distance, sptSet);

sptSet[u] = true;

for (int v = 0; v < Vertex; v++)

if (!sptSet[v] && graph[u][v] && distance[u] != INT\_MAX

&& distance[u] + graph[u][v] < distance[v])

distance[v] = distance[u] + graph[u][v];

}

printSolution(distance, Vertex);

}

int main()

{

int graph[Vertex][Vertex] = { { 0, 4, 0, 0, 0, 0, 8, 0 },

{ 4, 0, 8, 0, 0, 0, 11, 0 },

{ 0, 8, 0, 7, 0, 4, 0, 2 },

{ 0, 0, 7, 0, 9, 14, 0, 0 },

{ 0, 0, 0, 9, 0, 10, 0, 0 },

{ 0, 0, 4, 14, 10, 0, 2, 0 },

{ 0, 0, 0, 0, 0, 2, 1, 6 },

{ 8, 11, 0, 0, 0, 0, 1, 7 },

{ 0, 0, 2, 0, 0, 0, 6, 7 } };

dijkstra(graph, 0);

return 0;

}

**Output:**

Vertex Distance from Source

0 tt 0

1 tt 4

2 tt 12

3 tt 19

4 tt 20

5 tt 10

6 tt 8

7 tt 14

8 tt 2147483647

Answer the following questions and paste them into the top of the submission box for each homework assignment for the class.

* **How long did you spend on this assignment?**

I spent approximately one day on this assignment for a clear understanding of the Dijkstra’s Algorithm and the way of finding the shortest path vertex node and the next upcoming vertex node.

* **Based on your effort, what letter grade would you say you earned?**

I grade an A letter for this assignment.

* **Based on your solution, what letter grade would you say you earned?**

Based on my solution I earn an A grade

* **Provide a summary of what doesn't work in your solution, along with an explanation of how you attempted to solve the problem and where you feel you struggled.**

During this question, Initially, I faced some issues in dealing with how to find graph Data Structure that represents all of the nodes and the connecting weights, but you can represent the graph’s data however you want. Then after a lot of research and practicing the network concept on the paper then the process flow obtained a clear visual. The based on the graph network structure calculation of the minimum and maximum edge points the next vertex node is obtained. Building the code became some what difficult because analysis the concept is easily but implementing that concept into the code format made me to work more and referred many textbook and the various authors implementation steps. But finally I achieved the code algorithm for finding the shortest path through vertex nodes