Registration Number: 19BCE2119

Name: Gaurav Kumar Singh

Course: Network and Communication CSE1004

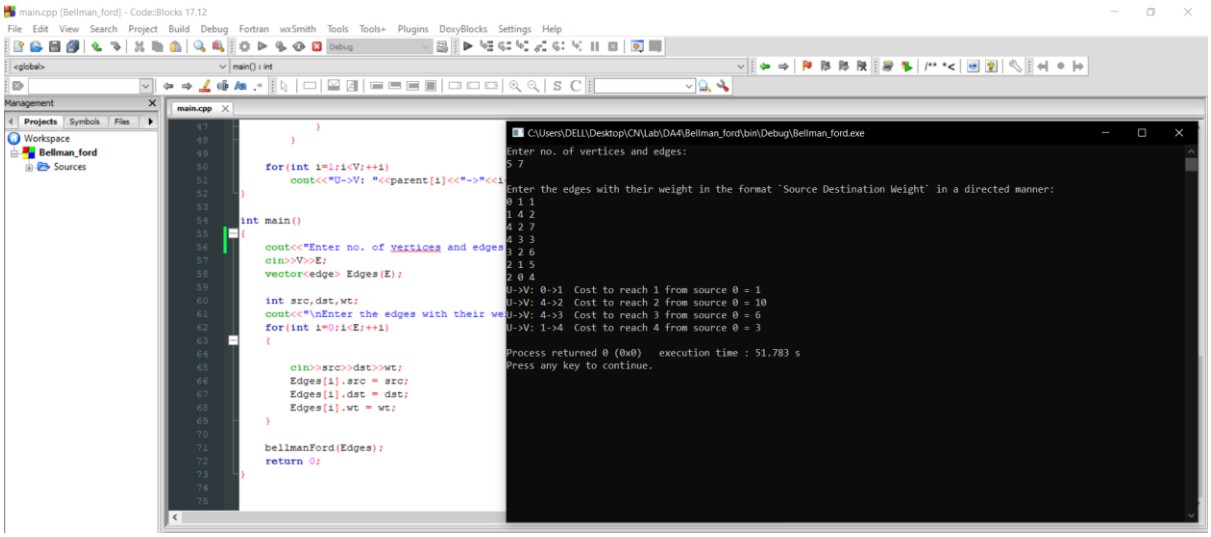
Digital Assignment 4

Bellman-Ford Algorithm

```
#include<bits/stdc++.h>
using namespace std;

struct edge{
	int src,dst,wt;
};
int V,E;

void bellmanFord(vector<edge>& Edges)
{
	int parent[V];
	int cost_parent[V];
	vector<int> value(V,INT_MAX);
	parent[0] = -1;
	value[0] = 0;

	bool updated;
	for(int i=0;i<V-1;++i)
	{
		updated = false;
		for(int j=0;j<E;++j)
		{
			int U = Edges[j].src;
			int V = Edges[j].dst;
			int wt = Edges[j].wt;
```

```
                        if(value[U]!=INT_MAX and value[U]+wt<value[V])
                        {
                                value[V] = value[U]+wt;
                                parent[V] = U;
                                cost_parent[V] = value[V];
                                updated = true;
                        }
                }
                if(updated==false)
                        break;
        }

        for(int j=0;j<E and updated==true;++j)
                {
                        int U = Edges[j].src;
                        int V = Edges[j].dst;
                        int wt = Edges[j].wt;
                        if(value[U]!=INT_MAX and value[U]+wt<value[V])
                        {
                                cout<<"Graph has -VE edge cycle\n";
                                return;
                        }
                }

        for(int i=1;i<V;++i)
                cout<<"U->V: "<<parent[i]<<"->"<<i<<"  Cost to reach "<<i<<" from source 0 =
"<<value[i]<<"\n";
}

int main()
{
```

```
    cout<<"Enter no. of vertices and edges:\n";
        cin>>V>>E;
        vector<edge> Edges(E);

        int src,dst,wt;
        cout<<"\nEnter the edges with their weight in the format `Source Destination Weight` in a directed manner: \n";
        for(int i=0;i<E;++i)
        {

            cin>>src>>dst>>wt;
            Edges[i].src = src;
            Edges[i].dst = dst;
            Edges[i].wt = wt;
        }

        bellmanFord(Edges);
        return 0;
}
```

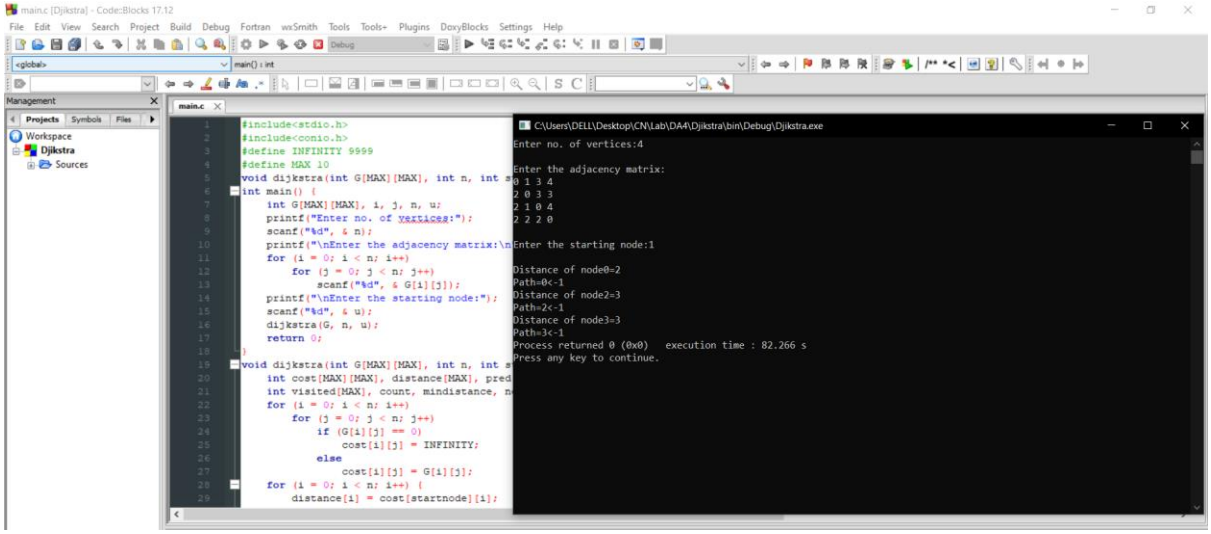


Dijkstra Algorithm

```
#include<stdio.h>
#include<conio.h>
#define INFINITY 9999
#define MAX 10
void dijkstra(int G[MAX][MAX], int n, int startnode);
int main() {
   int G[MAX][MAX], i, j, n, u;
   printf("Enter no. of vertices:");
   scanf("%d", & n);
   printf("\nEnter the adjacency matrix:\n");
   for (i = 0; i < n; i++)
      for (j = 0; j < n; j++)
         scanf("%d", & G[i][j]);
   printf("\nEnter the starting node:");
   scanf("%d", & u);
   dijkstra(G, n, u);
   return 0;
}
void dijkstra(int G[MAX][MAX], int n, int startnode) {
   int cost[MAX][MAX], distance[MAX], pred[MAX];
   int visited[MAX], count, mindistance, nextnode, i, j;
   for (i = 0; i < n; i++)
      for (j = 0; j < n; j++)
         if (G[i][j] == 0)
            cost[i][j] = INFINITY;
         else
            cost[i][j] = G[i][j];
   for (i = 0; i < n; i++) {
      distance[i] = cost[startnode][i];
      pred[i] = startnode;
```

```
    visited[i] = 0;
}
distance[startnode] = 0;
visited[startnode] = 1;
count = 1;
while (count < n - 1) {
    mindistance = INFINITY;
    for (i = 0; i < n; i++)
        if (distance[i] < mindistance && !visited[i]) {
            mindistance = distance[i];
            nextnode = i;
        }
    visited[nextnode] = 1;
    for (i = 0; i < n; i++)
        if (!visited[i])
            if (mindistance + cost[nextnode][i] < distance[i]) {
                distance[i] = mindistance + cost[nextnode][i];
                pred[i] = nextnode;
            }
    count++;
}
for (i = 0; i < n; i++)
    if (i != startnode) {
        printf("\nDistance of node%d=%d", i, distance[i]);
        printf("\nPath=%d", i);
        j = i;
        do {
            j = pred[j];
            printf("<-%d", j);
        } while (j != startnode);
    }
```

}


main.c [Djikstra] - Code::Blocks 17.12
File Edit View Search Project Build Debug Fortran wxSmith Tools Tools+ Plugins DoxyBlocks Settings Help
Management
Projects Symbols Files
Workspace
Djikstra
Sources
main.c
#include<stdio.h>
#include<conio.h>
#define INFINITY 9999
#define MAX 10
void dijkstra(int G[MAX][MAX], int n, int s
int main() {
int G[MAX][MAX], i, j, n, u;
printf("Enter no. of vertices:");
scanf("%d", &n);
printf("\nEnter the adjacency matrix:\n
for (i = 0; i < n; i++)
for (j = 0; j < n; j++)
scanf("%d", &G[i][j]);
printf("\nEnter the starting node:");
scanf("%d", &u);
dijkstra(G, n, u);
return 0;
}
void dijkstra(int G[MAX][MAX], int n, int s
int cost[MAX][MAX], distance[MAX], pred
int visited[MAX], count, mindistance, n
for (i = 0; i < n; i++)
for (j = 0; j < n; j++)
if (G[i][j] == 0)
cost[i][j] = INFINITY;
else
cost[i][j] = G[i][j];
for (i = 0; i < n; i++) {
distance[i] = cost[startnode][i];
C:\Users\DELL\Desktop\CN\Lab\DA4\Djikstra\bin\Debug\Djikstra.exe
Enter no. of vertices:4
Enter the adjacency matrix:
0 1 3 4
2 0 3 3
2 1 0 4
2 2 2 0
Enter the starting node:1
Distance of node0=2
Path=0<-1
Distance of node2=3
Path=2<-1
Distance of node3=3
Path=3<-1
Process returned 0 (0x0) execution time : 82.266 s
Press any key to continue.