

WEEK 9

From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm

Code :

```
#include<stdio.h>
#include<conio.h>
#define INFINITY 9999
#define MAX 10
void dijkstra(int G[MAX][MAX],int n,int start);
int main()
{
    int G[MAX][MAX],i,j,n,u;
    printf("Enter the 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 start)
{
    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[start][i];
        pred[i]=start;
        visited[i]=0;
    }
    distance[start]=0;
    visited[start]=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!=start)
{
    printf("\nDistance of node%d=%d",i,distance[i]);
    printf("\nPath=%d",i);
    j=i;
    do

```

```

{
    j=pred[j];
    printf("<-%d",j);
}
while(j!=start);
}
}

```

Output :

```

Enter the no. of vertices: 6
Enter the adjacency matrix:
0 25 35 999 100 999
999 0 100 14 999 999
999 999 0 29 999 999
999 999 999 0 999 21
999 999 50 999 0 999
999 999 999 999 48 0
Enter the starting node: 0
Distance of node1=25
Path=1<-0
Distance of node2=35
Path=2<-0
Distance of node3=39
Path=3<-1<-0
Distance of node4=100
Path=4<-0
Distance of node5=60
Path=5<-3<-1<-0
Process returned 0 (0x0)   execution time : 61.951 s
Press any key to continue.

```