Vivekanand Education Society's
Institute of Technology
Approved by AICTE & Affiliated to University of Mumbai

Artificial Intelligence and Data Science Department.
AOA / Even Sem 2021-22 / Experiment 5.

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47 / D6AD.
EXPERIMENT - 5.

Aim: Write a program in C to implement Dijkstra's Single source shortest path algorithm.

Theory:

The Dijkstra algorithm is also called the single source shortest path algorithm. It is based on greedy technique.

The algorithm maintains a list visited[ ] of vertices, whose shortest distance from the source is already known.

If visited[1], equals 1, then the shortest distance of vertex i is already known. Initially, visited[i] is marked as, for source vertex.

At each step, we mark visited[v] as
1. Vertex v is a vertex at the shortest distance from the source vertex.

At each step of the algorithm, the shortest distance of each vertex is stored in an array distance[ ].

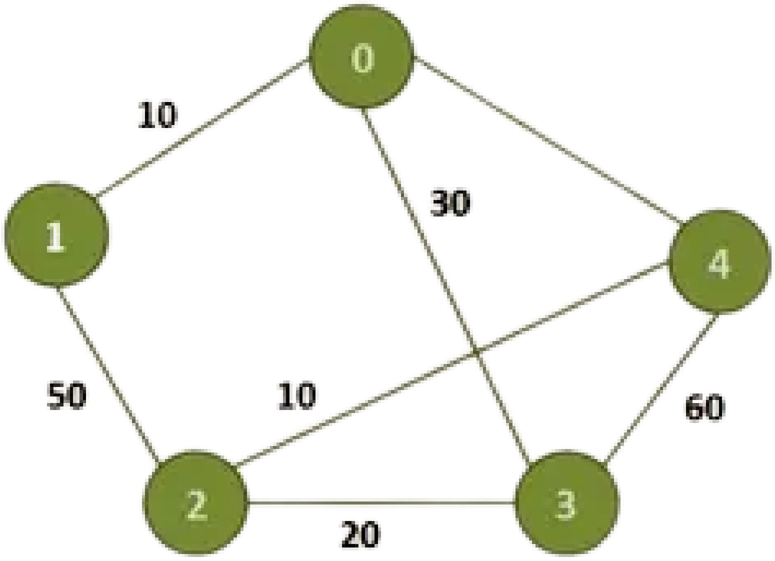
Time Complexity:
The program contains two nested loops each of which has a complexity of O(n). n is the number of vertices. So the complexity of the algorithm is O(n2).

Auxiliary Space: O(1)

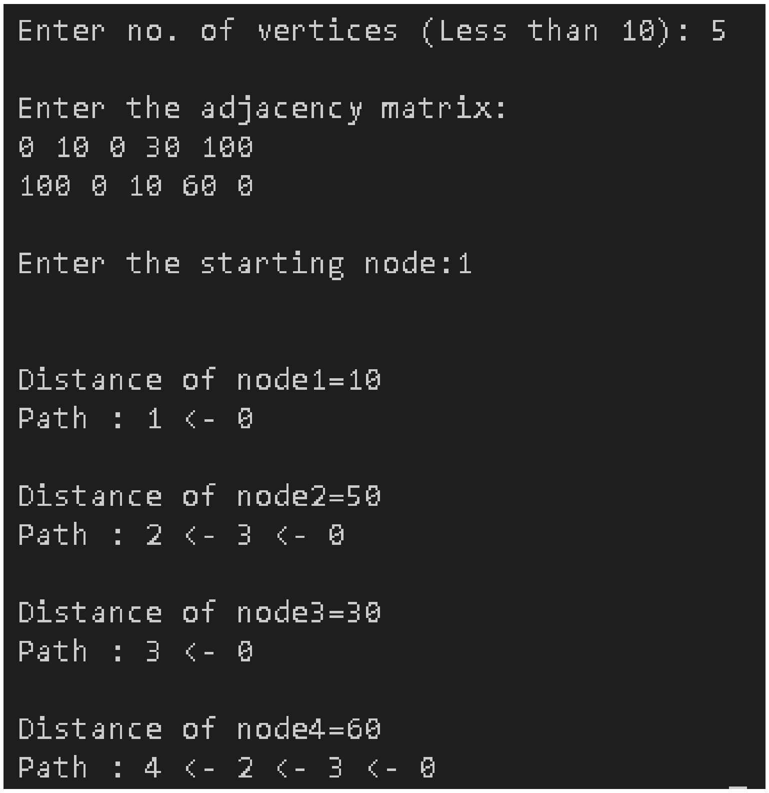
CODE:

Code in the Djikstra.c file attached along with this doc.

INPUT:



OUTPUT:



```
Enter no. of vertices (Less than 10): 5

Enter the adjacency matrix:
0 10 0 30 100
100 0 10 60 0

Enter the starting node:1


Distance of node1=10
Path : 1 <- 0

Distance of node2=50
Path : 2 <- 3 <- 0

Distance of node3=30
Path : 3 <- 0

Distance of node4=60
Path : 4 <- 2 <- 3 <- 0
```

CONCLUSION:

By performing this experiment, we conclude that :
The Time Complexity of the implementation is O(n^2), If the input graph is represented using an adjacency list, but it can be reduced to O(E log V) with the help of a binary heap.