

ASSIGNMENT

ADA Lab

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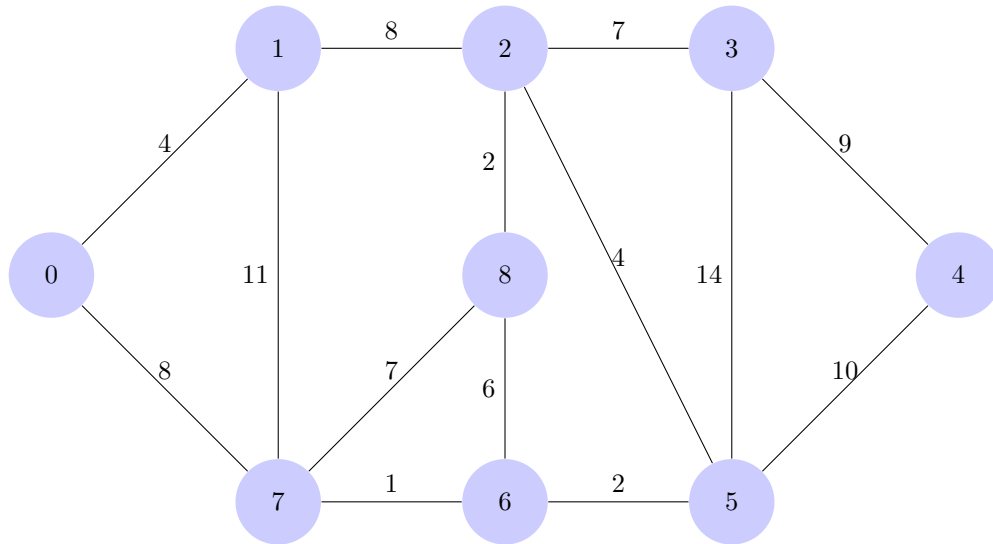
Dijkstra Algorithm



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Dijkstra Algorithm

Write a program to implement Dijkstra's algorithm. From vertex '1' in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm



Source Code

```

#include <bits/stdc++.h>

using namespace std;

int minDistance(int dist[], bool sptSet[])
{
    int min = INT_MAX, min_index;

    for (int v = 0; v < 9; v++)
        if (sptSet[v] == false && dist[v] <= min)
            min = dist[v], min_index = v;

    return min_index;
}

void printSolution(int dist[])
{
    cout << "Vertex \t\t Distance from Source\n";
    for (int i = 0; i < 9; i++)
        cout << i << "\t\t" << dist[i] << '\n';
}

void dijkstra(int graph[9][9], int src)
{
    int dist[9];
    bool sptSet[9];
    for (int i = 0; i < 9; i++)
        dist[i] = INT_MAX, sptSet[i] = false;
    dist[src] = 0;
    for (int count = 0; count < 8; count++)
    {
        int u = minDistance(dist, sptSet);

```

```

    sptSet[u] = true;

    for (int v = 0; v < 9; v++)
        if (!sptSet[v] && graph[u][v] && dist[u] != INT_MAX && dist[u] + graph[u][v] < dist[v])
            dist[v] = dist[u] + graph[u][v];
    }

    printSolution(dist);
}

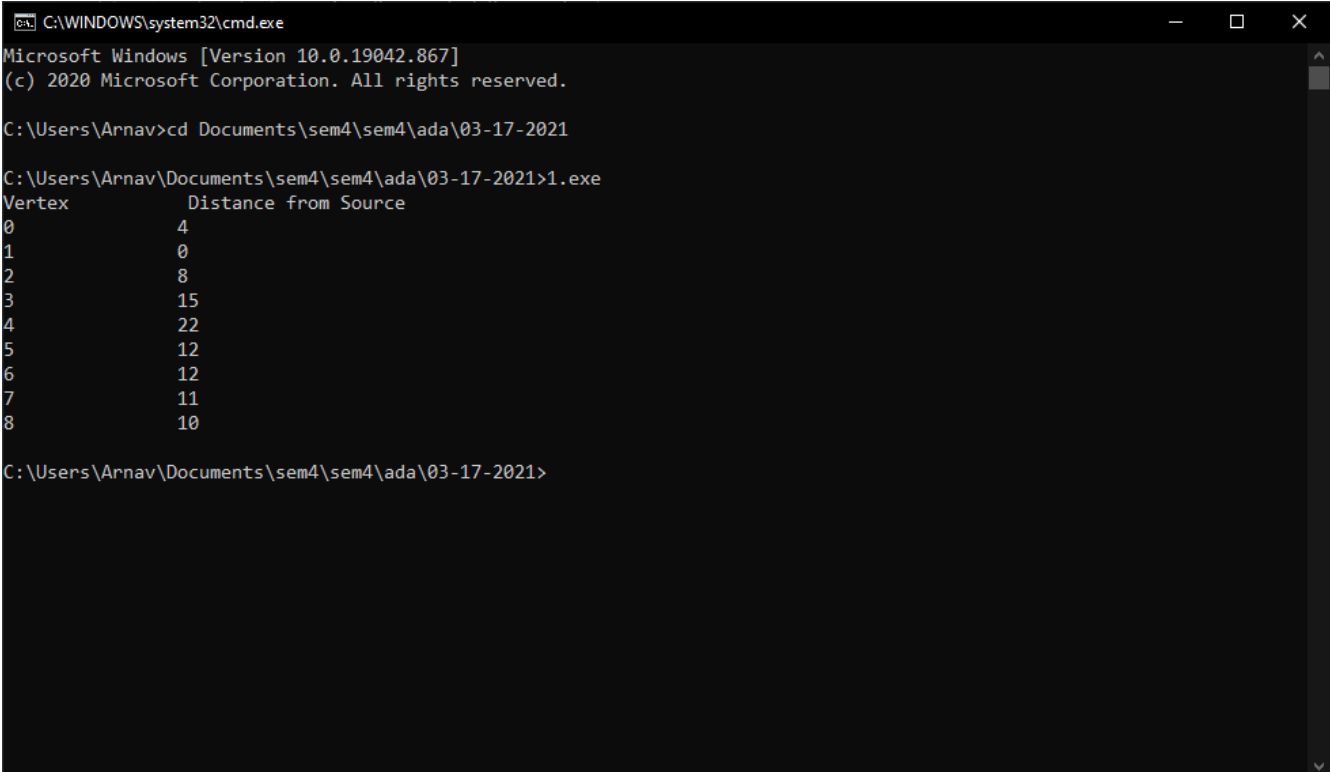
int main()
{
    int graph[9][9] = {{0, 4, 0, 0, 0, 0, 0, 8, 0},
                       {4, 0, 8, 0, 0, 0, 0, 11, 0},
                       {0, 8, 0, 7, 0, 4, 0, 0, 2},
                       {0, 0, 7, 0, 9, 14, 0, 0, 0},
                       {0, 0, 0, 9, 0, 10, 0, 0, 0},
                       {0, 0, 4, 14, 10, 0, 2, 0, 0},
                       {0, 0, 0, 0, 0, 2, 0, 1, 6},
                       {8, 11, 0, 0, 0, 0, 1, 0, 7},
                       {0, 0, 2, 0, 0, 0, 6, 7, 0}};

    dijkstra(graph, 1);

    return 0;
}

```

Output



```

C:\WINDOWS\system32\cmd.exe
Microsoft Windows [Version 10.0.19042.867]
(c) 2020 Microsoft Corporation. All rights reserved.

C:\Users\Arnav>cd Documents\sem4\sem4\ada\03-17-2021

C:\Users\Arnav\Documents\sem4\sem4\ada\03-17-2021>1.exe
Vertex      Distance from Source
0           4
1           0
2           8
3          15
4          22
5          12
6          12
7          11
8          10

C:\Users\Arnav\Documents\sem4\sem4\ada\03-17-2021>

```

Figure 1: Dijkstra Algorithm