DAA Assignment 4

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Dynamic Programming Method (Multistage graph)

Code Implementation :

```
#include <iostream>
#include <bits/stdc++.h>
#define MAX 20
using namespace std;
int stages,stage_vertices[MAX],c[MAX][MAX]={9999};
int cost[MAX]={0},q[MAX],n;

int get_min(int s,int n)
{
    int min= INT_MAX;//equal to infinity
    int min_vertex;
    for(int i=0; i<n; i++)
    {
        if(c[s][i]!=0)
        {
          if(min>(c[s][i]+cost[i]))
            {
```

```
                min=c[s][i]+cost[i];
                min_vertex=i;
            }
        }
    }
    return min_vertex;
}

int main() {
  int i,j,m,p,no_of_vertices=0;
    cout<<"Enter no of vertices: "<<endl;
    cin>>no_of_vertices;
    cout<<"Enter no of stages : "<<endl;
    cin>>stages;
    for(i=0; i<stages; i++)
    {
        cout<<"Enter no of vertices in stage: "<<i+1<<endl;
        cin>>stage_vertices[i];
    }
    i=0;
    j=stage_vertices[0];
    for(m=0; m<stages; m++)
    {
        j=i+stage_vertices[m];
        for(; i<j; i++)
        {
            for(p=0; p<stage_vertices[m+1]; p++)
            {
                cout<<"Enter cost for vertex:"<<i+1<<" to "<<p+j+1<<endl;
                cin>>c[i][p+j];
            }
        }
    }
    n = no_of_vertices;
    int x,r;
```

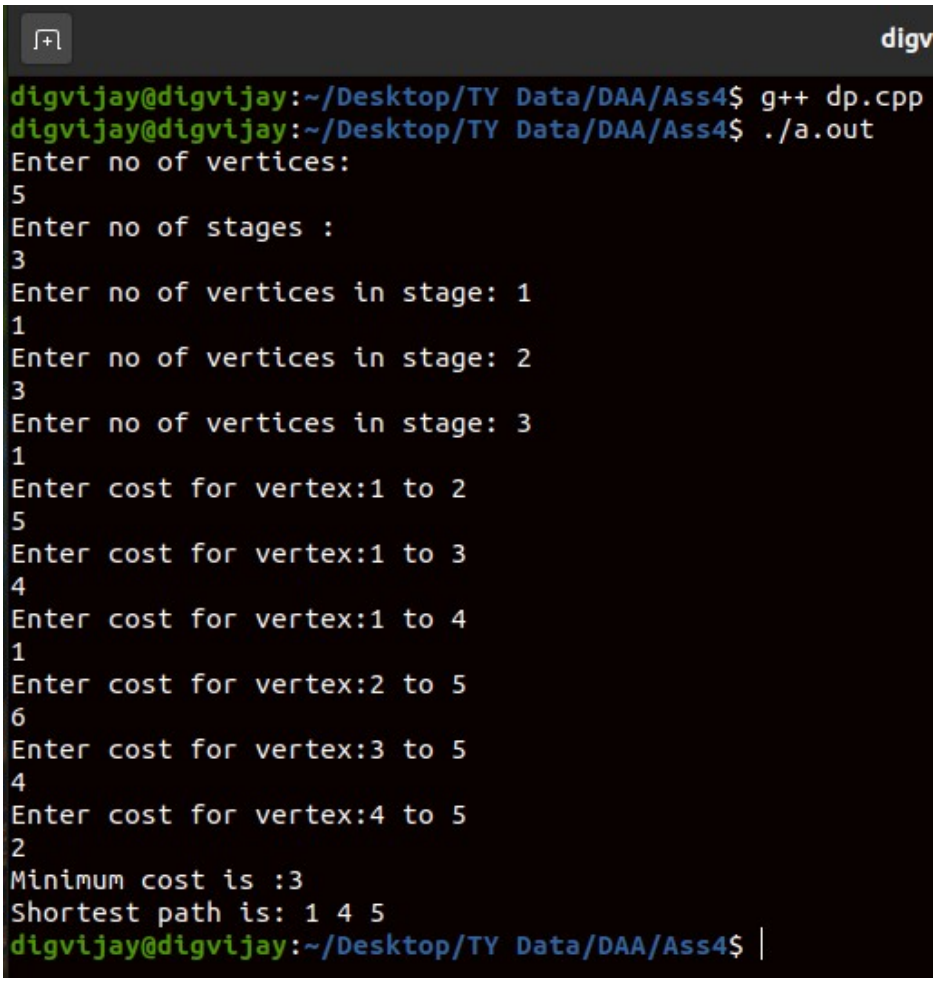
```
    int d[20];
    for(x=n-2; x>=0; x--)
    {
        r=get_min(x,n);
        cost[x]=c[x][r]+cost[r];
        d[x]=r;
    }

    std::cout << "Minimum cost is :"<<cost[0] << '\n';

    q[0]=0;
    q[stages-1]=n-1;
    for(i=1; i<stages-1; i++)
        q[i]=d[q[i-1]];
    int ind;
    cout<<"Shortest path is: ";
    for(ind=0; ind<stages-1; ind++)
        cout<<q[ind]+1<<" ";
    cout<<q[ind]+1<<endl;//printing target node

    return 0;
}
```

Output:


digv
digvijay@digvijay:~/Desktop/TY Data/DAA/Ass4$ g++ dp.cpp
digvijay@digvijay:~/Desktop/TY Data/DAA/Ass4$ ./a.out
Enter no of vertices:
5
Enter no of stages :
3
Enter no of vertices in stage: 1
1
Enter no of vertices in stage: 2
3
Enter no of vertices in stage: 3
1
Enter cost for vertex:1 to 2
5
Enter cost for vertex:1 to 3
4
Enter cost for vertex:1 to 4
1
Enter cost for vertex:2 to 5
6
Enter cost for vertex:3 to 5
4
Enter cost for vertex:4 to 5
2
Minimum cost is :3
Shortest path is: 1 4 5
digvijay@digvijay:~/Desktop/TY Data/DAA/Ass4$