National University of Modern Languages

Artificial Intelligence - Lab

Lab # 08

BSSE - 5 - Morning

Submitted By:

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Submitted To:

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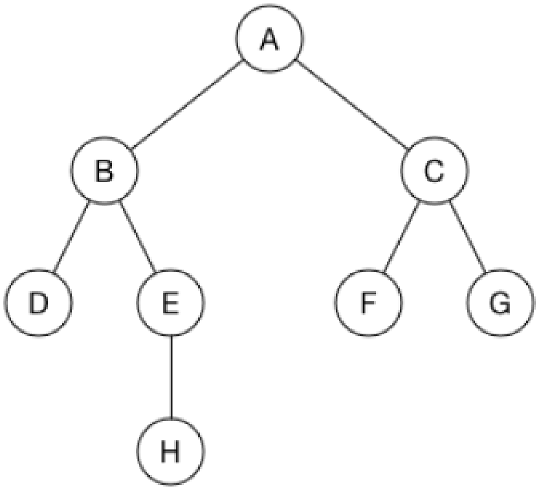
Lab 08

TASK: Consider the below graph;



Use BFS to find the shortest path between A and F. (Hint: the distance between any consecutive vertices is 1, i.e. distance between A and D is 2 ((A to B=1) + (B to D=1) = 2)

Code:

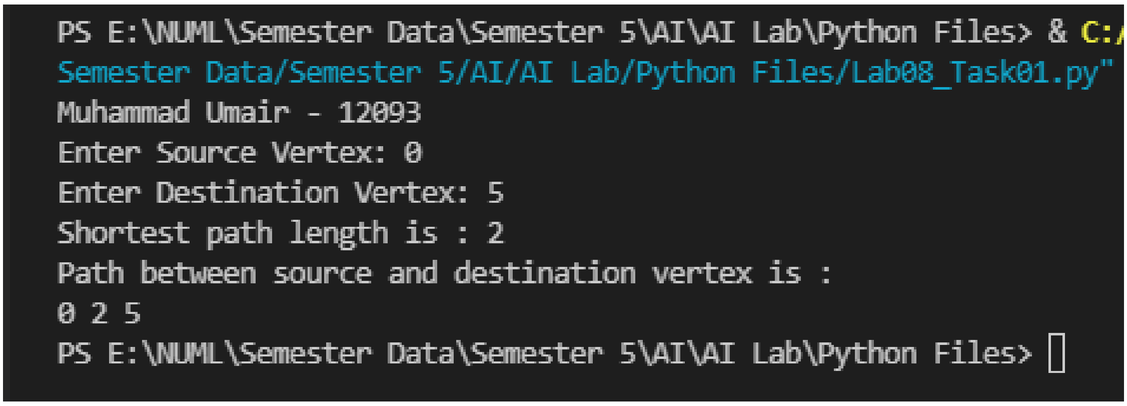
```
print("Muhammad Umair- 12093")
#Note: in this program A B C D E F G H are used as 1 2 3 4 5 6 respectively
def add_edge(adj, src, dest):
    adj[src].append(dest)
    adj[dest].append(src)

def BFS(adj, src, dest, v, pred, dist):
    queue = []
    visited = [False for i in range(v)]

    for i in range(v):
        dist[i] = 1000000
        pred[i] = -1

    visited[src] = True
    dist[src] = 0
    queue.append(src)

    while (len(queue) != 0):
        u = queue[0]
        queue.pop(0)
        for i in range(len(adj[u])):

            if (visited[adj[u][i]] == False):
                visited[adj[u][i]] = True
                dist[adj[u][i]] = dist[u] + 1
                pred[adj[u][i]] = u
                queue.append(adj[u][i])

                if (adj[u][i] == dest):
                    return True
    return False
def printShortestDistance(adj, s, dest, v):
    pred=[0 for i in range(v)]
    dist=[0 for i in range(v)]
    if (BFS(adj, s, dest, v, pred, dist) == False):
        print("Given source and destination are not connected")

    path = []
    crawl = dest
    crawl = dest
    path.append(crawl)
    while (pred[crawl] != -1):
        path.append(pred[crawl])
        crawl = pred[crawl]

    print("Shortest path length is : " + str(dist[dest]), end = ")

    print("\nPath between source and destination vertex is : ")
    for i in range(len(path)-1, -1, -1):
        print(path[i], end=' ')

# Main Function
vertex = 8
adj = [[] for i in range(vertex)]

add_edge(adj, 0, 1)
add_edge(adj, 0, 2)
add_edge(adj, 1, 3)
add_edge(adj, 1, 4)
add_edge(adj, 4, 7)
add_edge(adj, 2, 5)
add_edge(adj, 2, 6)
```

```
source = int(input("Enter Source Vertex: "))
dest = int(input("Enter Destination Vertex: "))
printShortestDistance(adj, source, dest, vertex)
```

Output:

Source: 0 (A)

Destination: 5 (F)



```
PS E:\NUML\Semester Data\Semester 5\AI\AI Lab\Python Files> & C:/
Semester Data/Semester 5/AI/AI Lab/Python Files/Lab08_Task01.py"
Muhammad Umair - 12093
Enter Source Vertex: 0
Enter Destination Vertex: 5
Shortest path length is : 2
Path between source and destination vertex is :
0 2 5
PS E:\NUML\Semester Data\Semester 5\AI\AI Lab\Python Files> ▯
```

Path between 0 (A) & 5 (F):

0 (A) > 2 (C) > 5 (F)