

Worksheet 1.2

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Semester: I

Subject Name: Artificial Intelligence Tools - I

UID: 25IMC13004

Section/Group: MAM-1 (A)

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Subject Code: 25CAP-614

1. Aim/Overview of the practical:

Experiment-2:

Implementation of Depth First Search

2(A). Coding:

```
import networkx as nx
```

```
import matplotlib.pyplot as plt
```

```
graph ={
    'A': ['B','C','D'],
    'B': ['D','E'],
    'C': ['F'],
    'D': ['E'],
    'E': ['F'],
    'F': []
}
```

```
G = nx.DiGraph(graph)
```

```
pos = nx.spring_layout(G)
```

```
nx.draw(G, pos, with_labels=True, node_color='skyblue', node_size=2000, font_size=16, font_weight='bold',
arrowsize=20)

plt.show()

def depth_first_search(graph, start_node):
    visited = set()

    def dfs(node):
        visited.add(node)
        print(node, end=" ")

        for neighbour in graph[node]:
            if neighbour not in visited:
                dfs(neighbour)

    dfs(start_node)

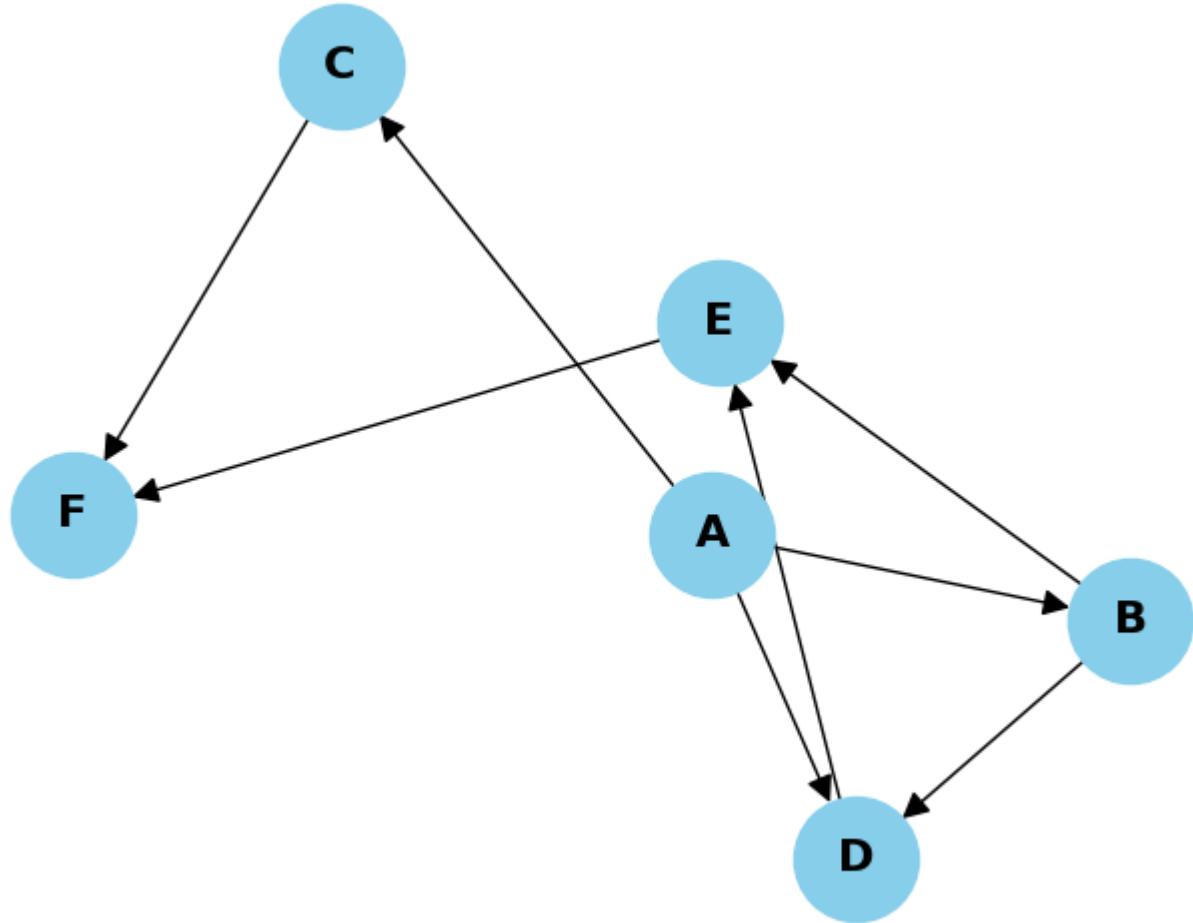
start_node = 'A'
depth_first_search(graph, start_node)
```

OUTPUT:-

```
PS E:\CLASS CODING> & C:/Users/Dell/AppData/Local/Programs/Python/Python310/python.exe "e:/CLASS CODING/AI/dfs1.py"
A B D E F C
PS E:\CLASS CODING>
```

Figure 1

- □ ×



(x, y) = (0.264, 0.638)

(B). CODING:

```
import networkx as nx
import matplotlib.pyplot as plt
```

```
graph ={
    'A': ['B','G'],
    'B': ['A','C','E'],
    'C': ['B','D'],
    'D': ['C','J','I'],
    'E': ['B','F','I'],
    'F': ['G','E'],
    'G': ['A','F','H','L'],
    'H': ['G','I'],
    'I': ['D','E','H','K'],
    'J': ['D','M','N'],
    'K': ['I','L','M'],
    'L': ['G','K','M','O'],
    'M': ['L','K','J'],
    'N': ['J','O'],
    'O': ['N','L']
}
```

```
G = nx.Graph(graph)
pos = nx.spring_layout(G)
```

```
nx.draw(G,pos,with_labels=True, node_color='skyblue', node_size=2000, font_size=16, font_weight='bold',
arrowsize=20)
```

```
plt.show()
```

```
def depth_first_search(graph, start_node):
    visited = set()
```

```
def dfs(node):
    visited.add(node)
    print(node, end=" ")
```

```
for neighbour in graph[node]:
    if neighbour not in visited:
        dfs(neighbour)

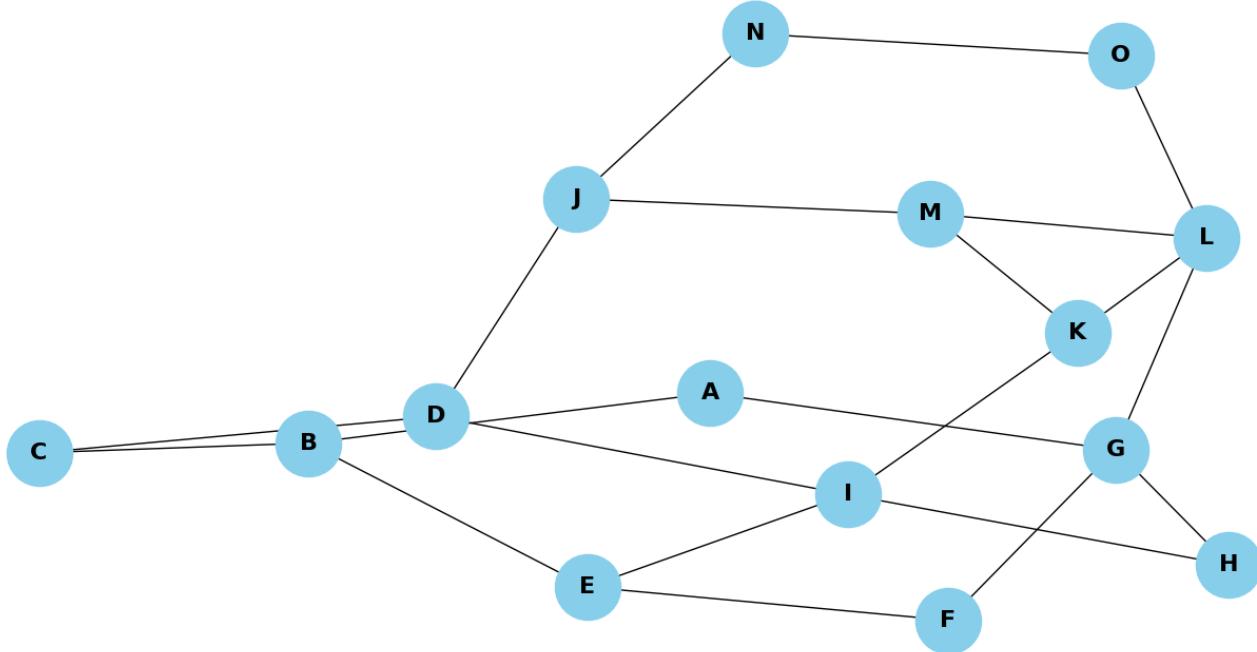
dfs(start_node)

start_node = 'O'
depth_first_search(graph, start_node)
```

(B). OUTPUT:

```
PS E:\CLASS CODING> & C:/Users/Dell/AppData/Local/Programs/Python/Python310/python.exe "e:/CLASS CODING/AI/dfs2.py"
O N J D C B A G F E I H K L M
PS E:\CLASS CODING>
```

Figure 1



(x, y) = (-0.273, 1.036)

3. Learning outcomes (What I have learnt):

- Understand the working principle of the Depth First Search (DFS) algorithm.
- Learn how to implement DFS using recursion and stack-based approaches.
- Analyze the time and space complexity of DFS.
- Compare DFS with other graph traversal algorithms such as Breadth First Search (BFS).
- Develop problem-solving skills in applications like pathfinding, cycle detection, and topological sorting.