

EX.NO:2

DATE:4/9/2024

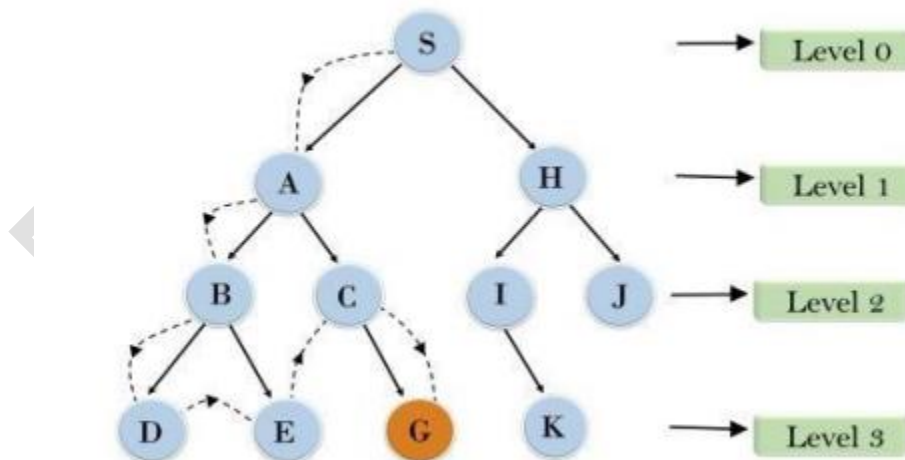
Reg.no:220701025

## DEPTH-FIRST SEARCH

**AIM:** To implement a depth-first search problem using Python

- Depth-first search (DFS) algorithm or searching technique starts with the root node of graph G, and then travel deeper and deeper until we find the goal node or the node which has no children by visiting different node of the tree.
- The algorithm, then backtracks or returns back from the dead end or last node towards the most recent node that is yet to be completely unexplored.
- The data structure (DS) which is being used in DFS Depth-first search is stack. The process is quite similar to the BFS algorithm.
- In DFS, the edges that go to an unvisited node are called discovery edges while the edges that go to an already visited node are called block edges

### Depth First Search



### CODE:

```
def dfs_recursive(graph, start, visited=None):
```

```
if visited is None:
    visited = set()

visited.add(start)
print(start)

for neighbor in graph[start]:
    if neighbor not in visited:
        dfs_recursive(graph, neighbor, visited)

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

print("DFS Recursive:")
dfs_recursive(graph, 'A')

def dfs_iterative(graph, start):
    visited = set()
    stack = [start]

    while stack:
```

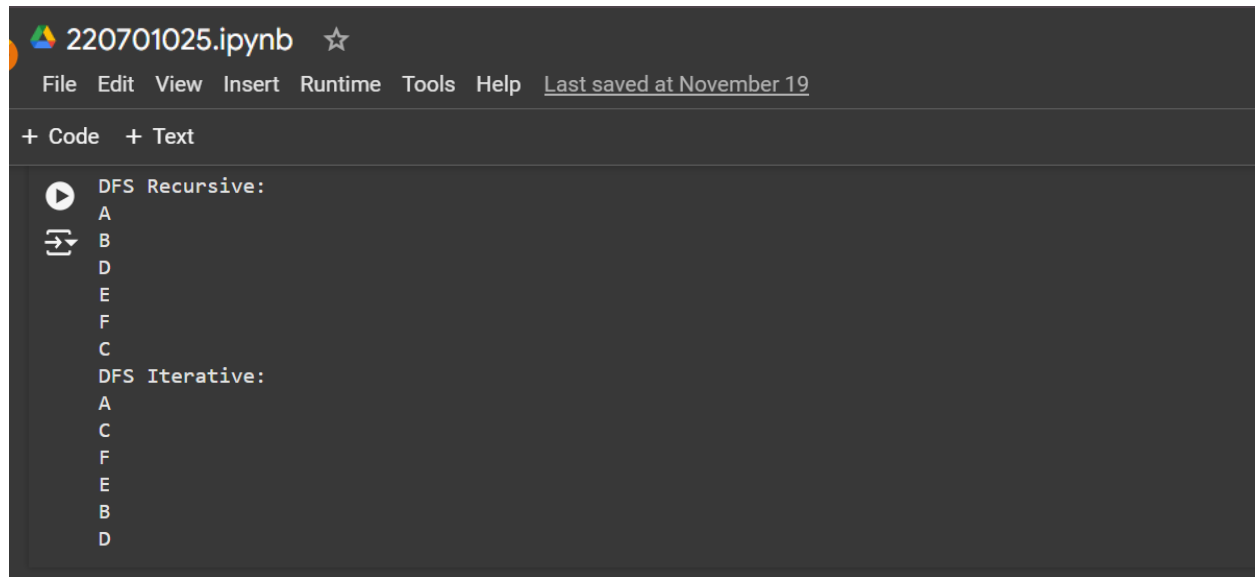
```
vertex = stack.pop()

if vertex not in visited:
    print(vertex)
    visited.add(vertex)
    stack.extend(neighbor for neighbor in graph[vertex] if neighbor not in visited)

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

print("DFS Iterative:")
dfs_iterative(graph, 'A')
```

## OUTPUT:



A screenshot of a Jupyter Notebook interface. The top bar shows the filename '220701025.ipynb' and a star icon. Below it is a menu bar with 'File', 'Edit', 'View', 'Insert', 'Runtime', 'Tools', and 'Help', followed by the text 'Last saved at November 19'. A toolbar below the menu bar contains '+ Code' and '+ Text'. The main area displays the output of a DFS algorithm. It starts with a play button icon and the text 'DFS Recursive:'. Below this, the nodes A, B, D, E, F, and C are listed vertically. To the left of this list is a tree icon. Below the recursive output, the text 'DFS Iterative:' is shown, followed by the nodes A, C, F, E, B, and D listed vertically.

```
DFS Recursive:  
A  
B  
D  
E  
F  
C  
DFS Iterative:  
A  
C  
F  
E  
B  
D
```