

Assignment No:2

Title: Breadth First Search(BFS)

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Abstract—Breadth-First Search (BFS) is an algorithm used for traversing graphs or trees. Traversing means visiting each node of the graph. Breadth-First Search is a recursive algorithm to search all the vertices of a graph or a tree. BFS in python can be implemented by using data structures like a dictionary and lists. Breadth-First Search in tree and graph is almost the same. The only difference is that the graph may contain cycles, so we may traverse to the same node again. **Index Terms**—BFS This paper introduced for Breadth-First Search(BFS) problem solved using Python language.

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Index Terms—Here I mostly used in My report Python language and Anaconda(Jupyter notebook) editor.

I. INTRODUCTION

Breadth-first search (BFS) is an algorithm that is used to graph data or searching tree or traversing structures. The full form of BFS is the Breadth-first search.

The algorithm efficiently visits and marks all the key nodes in a graph in an accurate breadthwise fashion. This algorithm selects a single node (initial or source point) in a graph and then visits all the nodes adjacent to the selected node. Remember, BFS accesses these nodes one by one.

Once the algorithm visits and marks the starting node, then it moves towards the nearest unvisited nodes and analyses them. Once visited, all nodes are marked. These iterations continue until all the nodes of the graph have been successfully visited and marked.

II. LITERATURE REVIEW

BFS and its application in finding connected components of graphs were invented in 1945 by Konrad Zuse, in his (rejected) Ph.D. thesis on the Plankalkul programming language, but this " was not published until 1972. It was reinvented in 1959 by Edward F. Moore, who used it to find the shortest path out of a maze,[5][6] and later developed by C. Y. Lee into a wire routing algorithm (published 1961). In 2012 Farhad S. et. al. [4] proposed new resolution for solving N-queens by using combination of DFS (Depth First Search) and BFS (Breadth First Search) techniques.

III. ALGORITHM FOR BFS

Step 1: Choose the starting node and insert it into queue.
Step 2: Find the vertices that have direct edges with the vertex(node).
Step 3: Insert all the vertices found in step 3 into queue.
Step 4: Remove the first vertex(node) in queue
Step 5: Continue this process until all the vertices are visited.

A. Equations

sentence, as in:

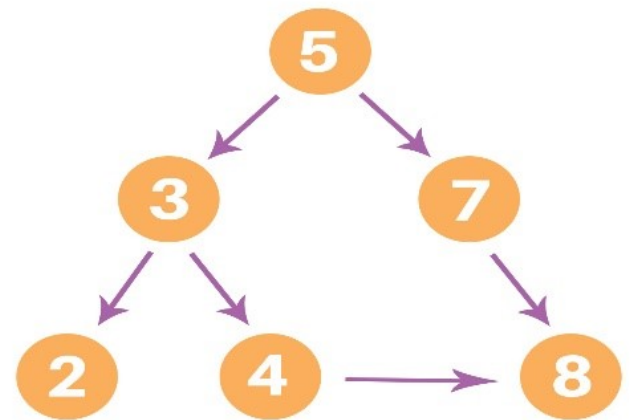
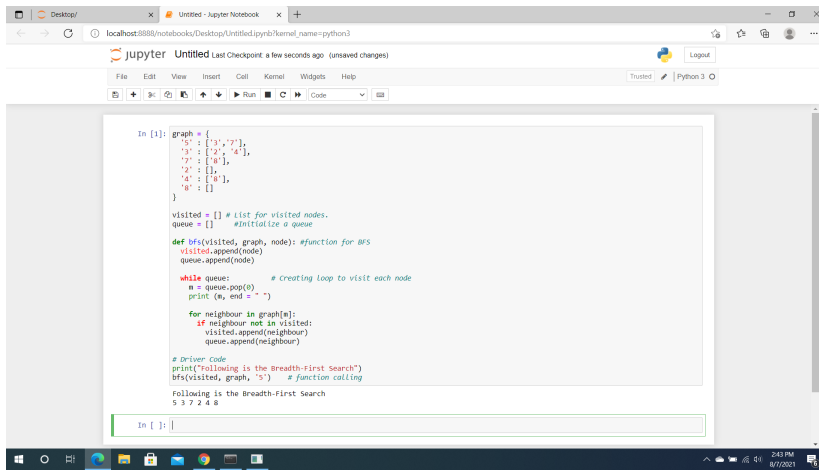


FIGURE 0

(1)

IV. CONCLUSION

Breadth Search Algorithm comes with some great advantages to recommend it. One of the many applications of the BFS algorithm is to calculate the shortest path. It is also used in networking to find neighbouring nodes and can be found in social networking sites, network broadcasting, and garbage collection.



```
In [1]: graph = {
    '5': ['3','7'],
    '3': ['2','4'],
    '7': ['8'],
    '2': [],
    '4': [],
    '8': []
}

visited = [] # list for visited nodes.
queue = [] # initialize a queue

def bfs(visited, graph, node): #function for BFS
    visited.append(node)
    queue.append(node)

    while queue:
        w = queue.pop(0) # Creating Loop to visit each node
        print (w, end = " ")

        for neighbour in graph[w]:
            if neighbour not in visited:
                visited.append(neighbour)
                queue.append(neighbour)

# Driver Code
print("Following is the Breadth-First Search")
bfs(visited, graph, '5') # function calling

Following is the Breadth-First Search
5 3 7 2 4 8
```

Fig. 1. Example of BFS Algorithm.

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REFERENCES

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