34. Project : "490. The Maze" - LC - Depth-First Traversal
    - 490. The Maze - (local copy) - Medium
        - Process
            - Step 1: Manual process to demonstrate concepts

Robot	Clear Route (Street, Highway)	Unclear Route (Hotel, Hospital)
Without Wheel (Legged Robot)	Step 1.1: Tree ◦ Following the examples shown on Depth-First Traversal to manually solve the problem ▪ Maze example	
With Wheel (Self-driving Car)		Step 1.2: Matrix ◦ Following the examples shown on Depth-First Traversal to manually solve the problem ▪ Maze example -- assuming the ball can go through the empty spaces by rolling.

            - Step 2: Implement a Python solution using the algorithm Depth-First Traversal and test the Python code
                - To prove that you can convert a concept into a program (Sample code) and test the program based on all the test cases provided by LeetCode 490. The Maze - (local copy)
                    - Please study the programs. Since the program is provided, there is not much you can do if you decide not to study the programs.
            - Step 3: Update your portfolio about the Maze project
                - Please use this structure to describe the project

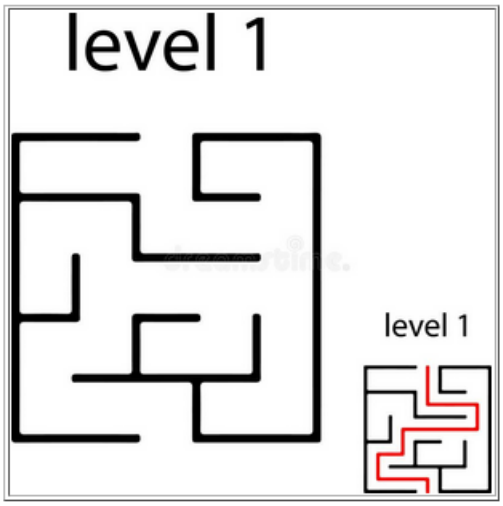
```
Algorithm
   Depthe First Search
      Maze
```

            - Step 4: Submit the URL of your GitHub webpage as the homework answer.

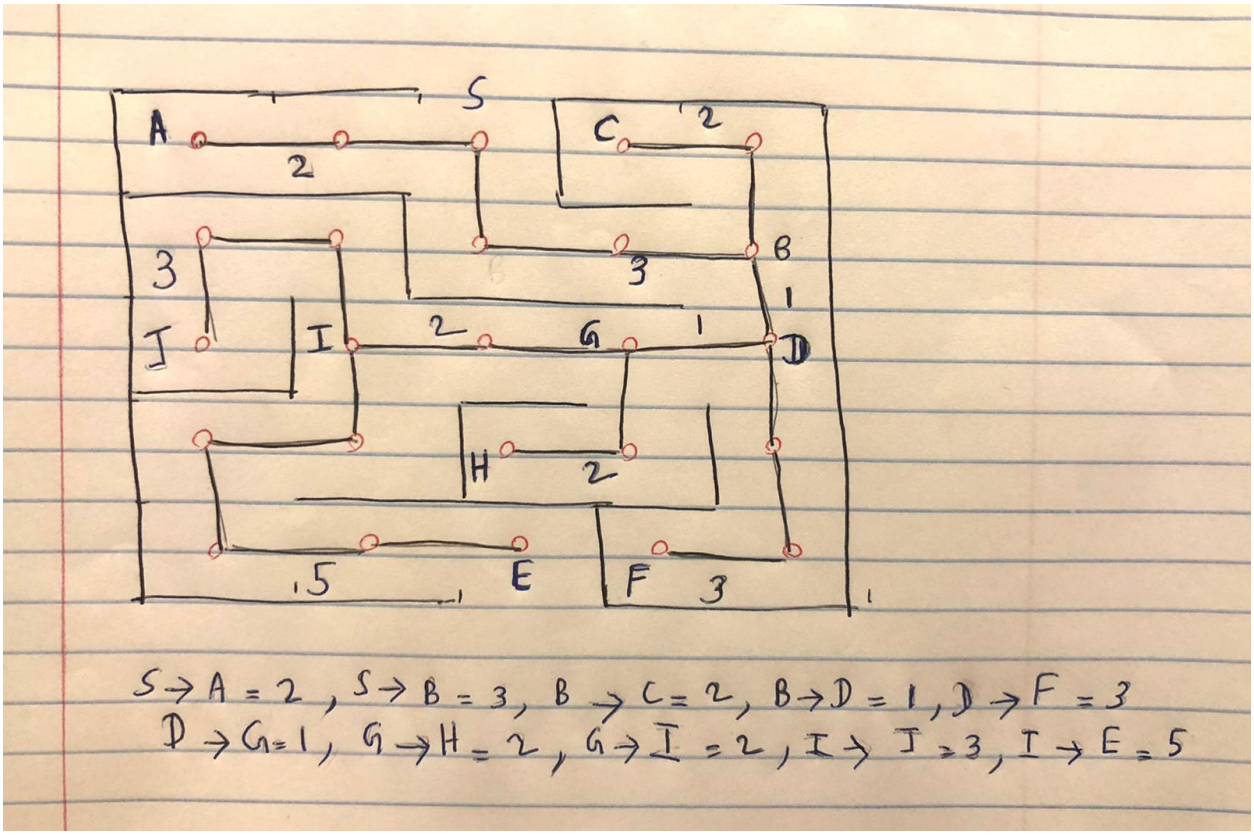
Step 1: Manual Process to Demonstrate Concepts

Step 1.1: Tree

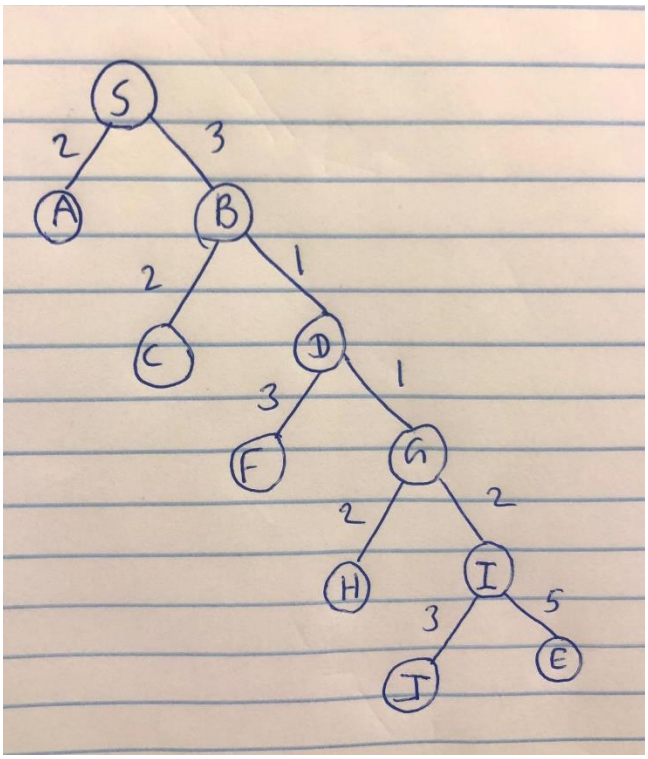
35. Conduct Depth First Traversal (DFT) on a maze - Level 1 Maze



- References
    - Maze
    - Depth First Traversal (DFT)

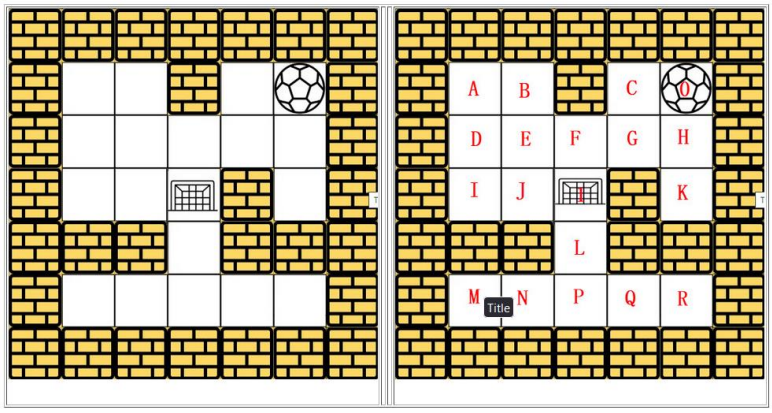


$S \to A = 2$, $S \to B = 3$, $B \to C = 2$, $B \to D = 1$, $D \to F = 3$
$D \to G = 1$, $G \to H = 2$, $G \to I = 2$, $I \to I = 3$, $I \to E = 5$



Step 1.2: Matrix

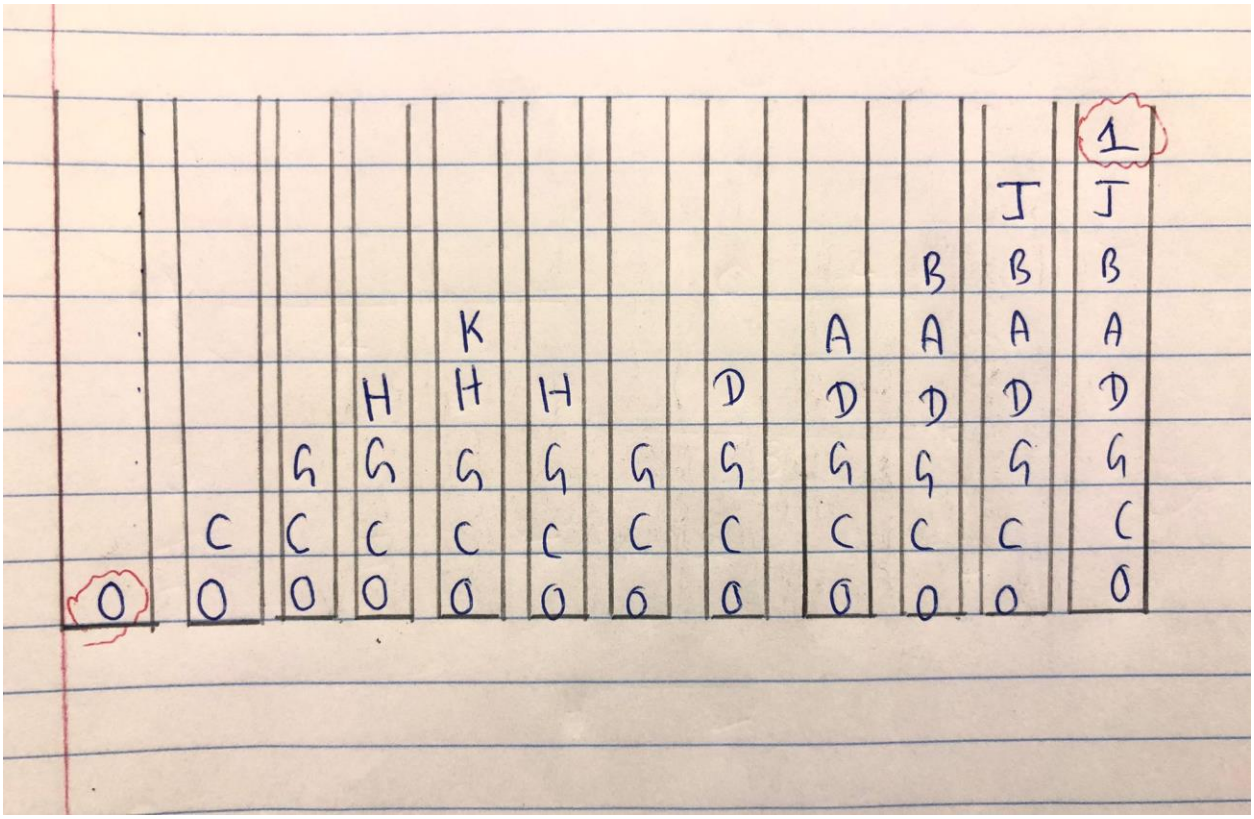
39. Depth-First Traversal for matrix maze
    - Please refer the concepts shown on Maze to draw the detailed steps on using Depth-First Traversal to find the path.



      - The search sequence is

```
Right ==> Left ==> Top ==> Bottom
```

    - References
      - Depth-First Traversal



Step 2: 490. The Maze (DFS)

```
class Solution:
    def hasPath(self, maze, start, destination):
        m, n, stopped = len(maze), len(maze[0]), set()

        def dfs(x, y):
            if (x, y) in stopped:
                return False
            stopped.add((x, y))
            if [x, y] == destination:
                return True
            for i, j in (-1, 0), (1, 0), (0, -1), (0, 1):
                newX, newY = x, y
                while 0 <= newX + i < m and 0 <= newY + j
< n and maze[newX + i][newY + j] != 1:
                    newX += i
                    newY += j
                if dfs(newX, newY):
                    return True
            return False

        return dfs(*start)


maze = [[0, 0, 1, 0, 0], [0, 0, 0, 0, 0], [0, 0, 0, 1,
0], [1, 1, 0, 1, 1], [0, 0, 0, 0, 0]]
start = [0, 4]
destination = [4, 4]
obj = Solution()
print(obj.hasPath(maze, start, destination))
```