Artificial Intelligence (AI)

Assignment No 1

Total Marks: 10 **Due Date: 11 Nov 2023**

In this assignment, you are tasked with navigating a complex maze from a start point to a goal point while avoiding obstacles. You will implement three search algorithms:

Uninformed Search (BFS and DFS): Implement(create functions) the Breadth-First Search and Depth-First Search algorithms to navigate the maze without any additional information other than the maze layout in Python. BFS algorithm should find the shortest path through the maze. The maze is represented as a grid, where each cell can be one of the following:

'#': Wall (cannot pass through)
'S': Start point
'G': Goal point
'.': Open path (can be traversed)

Example Maze:

Here's an example of a maze:

```
#############
#S..........#
#.###########
#.#...#...#.#
#.#.#.#.#.#.#
#...#...#...#
#.#.#.#.#.#.#
#.#...#...#.#
#.###########
#....G......#
#############
```

You will be provided with the maze description as a 2D grid. The maze will be represented as a list of strings in your code or any other data structure you like. Your program should output the path for both search algorithms. The maze with the optimal path from the start ('S') to the goal ('G') marked with a special character (e.g., 'X'). Display the length of the optimal path, total number of steps taken by the algorithm. Also handle if there is no path to the goal.

Note: A quiz and a viva will be conducted after the submission. Failing the viva or quiz will result in zero marks.