Artificial Intelligence for Robotics - Assignment 04

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For this assignment, you can work in a team of two. Each one in the team should be able to present all submitted material.

1. Describe an example state space or problem in which iterative deepening search performs much worse than depth-first search.

2. In LEA you will find some text files containing a 2D map in ASCII format, which can be interpreted as the following:

   - `(Numbers from 1 to 9)` goals in the order to be visited.
   - `(Space)` free space.
   - `(s)` is the initial position of the robot.
   - Any other character represents an obstacle.

   Each character in the text file represents a "cell" in the map. Your job is to implement **iterative deepening depth-first search** to **find a path for the robot** to reach the goal cells in the numered order. When a goal is reached, you should backtrack the visited nodes and print the found path in the map. For goal 1, robot start would be the start position and for goal 2, goal 1 would be the start postion and so on.

   The rules for the Robot are the following:

   - At each step, the robot can move from one cell to another.
   - The robot can only move to the left, right, up or down cells from the current position.
   - The robot does not have previous knowledge about the environment, such as goal positions or obstacles. It has to "explore" and find the path.
   - Of course, the robot cannot move through obstacles and the map is closed.
   - The robot has a knowledge about number of goals to be reached.
   - If a goal is not reachable, robot should skip and the next goal should be considered.

   Describe the performance of the algorithm in each map.