

Artificial Intelligence for Robotics
- Homework 3 -

Due date: October 26, 2015

1. Does a finite state space always lead to a finite search tree? Can you be more precise about what types of state spaces always lead to finite search trees? (Adapted from Bender, 1996.)
2. In LEA you will find text files containing 2D maps in ASCII format. This maps can be interpreted as follows:
 - * Dirt
 - (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 construct an algorithm that reads the map and uses Breadth-First Search (BFS) and Depth-First Search (DFS) to plan a path for the agent to explore and find each dirt cell. The agent must follow the following rules:
 - * The agent can move from one cell to another at each step.
 - * The agent can only move to the left, right, up or down cells from the current position
 - * The agent does not have previous knowledge about the environment, such as dirt positions or obstacles. It has to explore.
 - * The agent cannot move through obstacles and the map is closed.
3. Compare the performance of DFS and BFS. Comment on which search algorithm works better for each map. You should provide data to support your conclusions.

Notes

- You are allowed to work in a team of two. Each team member should be able to present the submitted solution. Peer programming can be a useful resource.
- You can select between c++ and python to create your program.
- Please provide a read-me file with the instructions of how to run your code.