Artificial Intelligence for Robotics

- Homework 4 -

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1. On LEA you will find the template of your first programming assignment. The search agent can perform in three different types of maps. These maps can be interpreted as follows:

   - (*) Dirt/Goal.
   - (Space) Free space.
   - (s) Initial position of the agent.
   - Any other character represents an obstacle.
   - Each character in the text file represents a cell in the map.

   (a) **Your first task** is to implement the **Breadth-First Search (BFS) and Depth-First Search (DFS)** methods in the file src/agent.cpp to explore and find each dirt cell. The agent must follow these 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 surrounding cells should be considered as the children at the current agent's position.
   - The agent does not have previous knowledge about the environment (such as dirt positions or obstacles) so it has to "explore".
   - The agent cannot move through obstacles and the map is closed.

   (b) **Your second task** is to **comprehensively describe and compare the performance of DFS and BFS** (Comment on which search algorithm works better for each map and provide data to support your conclusions).

Notes

- Your 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.
- In the "example" folder you can find a sample solution for this exercise. You can run it by typing: ./assignmet04
- You can use any editor to complete this assignment. The following steps will show you how to use eclipse to compile and run your code:
  - Extract the files.
  - Open a terminal and go into the "air_assignment_04/build" directory.
  - Generate the MakeFile by running the command: cmake ..
  - Compile your code by running the command: make
  - Open eclipse.
  - Select File − > New − > MakeFile Project from Existing Code.
    - Project Name: Set this field to "air_assignment_04".
    - Exiting Code Location: Browse and select the "air_assignment_04" folder.
    - Toolchain for Indexer Settings: Select the option "Linux GCC".
    - Press finish.
  - Select your project in the Project Explorer and carry out the following actions:
    - Right click
    - Select properties
    - Select C/C++ Build
      - Change the build directory from ${workspace_loc:/air_assignment_04}/ to ${workspace_loc:/air_assignment_04}/build/
    - Select Run/Debug settings:
      - Select New
      - Select C/C++ Application
      - Press "OK"
      - Under the "Main" tab:
        1. Set "C/C++ Application:" to "bin/assignmet04".
      - Under the "Arguments" tab:
        1. Uncheck "Use default" under "Working Directory:".

2. Change "Working Directory:" from ${workspace_loc:/air_assignment_04} to ${workspace_loc:/air_assignment_04}/bin/

– Run your program.