Artificial and Computational Intelligence

DSECLZG557 - Assignment #1

- Date of Posting : 06th Nov 2020
- Deadline : 30th Nov 2020
- Weightage : 13M

Bloxorz Game!

Bloxorz is a 3-D block sliding puzzle game consists of a terrain that is built by 1×1 tile with a special shape and size, and a 1×1×2 size block. This game is a single agent path-finding problem that involves moving the block from its initial position using four directions (right, left, up, and down) and ensuring that its ends are always within the terrain boundary, until it falls into a 1×1 square hole in the terrain that represents our goal state.

The block can be in three states, standing, lying horizontally, and lying vertically. When the block reaches the hole, it must be in standing state to fall in it.

The level-1 of the game begins with the size of the terrain as 6×10 rows and columns, starting position is at row 2 and column 2 or as user determines it, and goal position is at row 5 and column 8. The shape of the terrain in the first level is shown in Fig.1. First lets have some fun by playing this game at https://www.miniclip.com/games/bloxorz/en/#

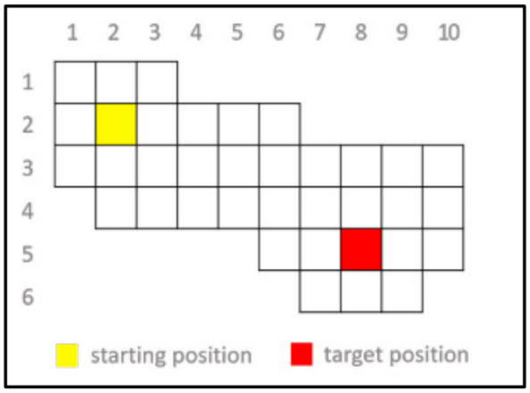
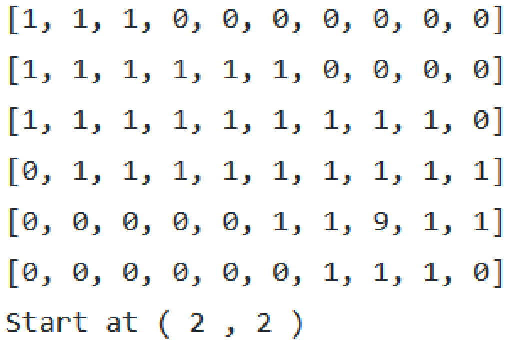


Fig. 1. Terrain shape, starting and target positions of Bloxorz first level.

Now that you have played the game and also understood its nature, answer the following questions :

1) Formulate the Bloxorz problem as a search problem by depicting its states representation, initial state, actions, transition model, goal state. [1M].
2) Can BFS/DFS be used to solve this problem ? If so, explain how it can be used by providing an algorithm/pseudocode [2M]
3) Can A* search be used to solve this problem ? If so, explain how it can be used by providing an algorithm/pseudocode [2M]
4) Implement an agent to solve level-1 of Bloxorz game using python. [8M]
    a. You may choose to represent the game as a map using of 0,1 as shown here. 1's represents the tile and 0's is void spaces & 9 represents goal.
    b. Show/Print the step by step process your agent takes to reach the goal.
    c. You may use "X" to indicate the current position at each step.



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[1, 1, 1, 0, 0, 0, 0, 0, 0, 0]
[1, 1, 1, 1, 1, 1, 0, 0, 0, 0]
[1, 1, 1, 1, 1, 1, 1, 1, 1, 0]
[0, 1, 1, 1, 1, 1, 1, 1, 1, 1]
[0, 0, 0, 0, 0, 1, 1, 9, 1, 1]
[0, 0, 0, 0, 0, 0, 1, 1, 1, 0]
Start at ( 2 , 2 )
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    d. Also print the number of steps taken by your agent to reach the goal.
    e. You can choose any uninformed search or informed search strategies to implement this in python.

NOTE:

- The implementation code must be completely original. Try avoiding libraries such as boost for A* etc. The code must be well commented and intended.
- Please keep your work (code, documentation) confidential. If your code is found to be plagiarized, you will be penalized severely. Parties involved in the copy will be considered equal partners and will be penalized severely. The code and report will be checked for plagiarism using Turnitin and for a similarity score of >40%, the team will be awarded 0.
- You are expected to submit 1 python file containing the solution of (4) and a PDF file containing the solution for (1) to (3) and the output screenshots of (4).
- Submissions after the deadline will NOT be considered.

********** ALL THE BEST **********