1 The wolf and the rabbit

Once upon a time there was a wolf and a rabbit who lived in a grid world where every space was either open path or solid stone. Each second the rabbit would jump in one of eight directions (N,NW,W,SW,S,SE,E,NE) followed by the wolf likewise pouncing in one of these directions. Neither the wolf nor the rabbit could jump through stone. The wolf always knew where the rabbit was and likewise the rabbit knew where the wolf was.

Now on the first day the wolf and rabbit were placed in a $6 \times 6$ yard - a space completely encircled by stone\(^1\). It was a sad day for the rabbit. For no matter how the rabbit jumped, the wolf closed in. And soon enough our good friend rabbit found himself being ripped to shreds in the mouth of the hungry wolf. Now in this magical world rabbits are reincarnated at midnight and earthquakes reshape the land. Also, for his trouble, the rabbit earns a carrot for each second he survives.

On the second day the world looked quite different. Although it was still a $6 \times 6$ world, there was now a complex (though non-cyclic) maze. Now the rabbit ran to the farthest corner of the maze and jumped back and forth there waiting for his inevitable end. Again it was not a great day for our rabbit.

On the third day the world and rabbit were born anew. And this time there was a maze, but one with a cycle. This time our rabbit ran the whole day long and the wolf went to bed tired and hungry. And moreover the rabbit earned a fortune in carrots for his efforts!

2 The Assignment

Working in groups of up to two, students are to implement a rational rabbit and present an interface so that we can play the role of the wolf. Be able to accept data files like the following to initiate the game\(^2\)

```
6 6
0000
O O
O O
R O W
O O O
OO O

```

We recommend that you implement game-tree search with alpha-beta pruning but other approaches are welcome as long as they produce an acceptable result. You may use any programming language of your choice.

3 Extra Credit 33pts (optional)

(15 pts) Make your rabbit interruptible. That is when playing the game, have it so that one can hit a button and Rabbit immediately makes the best move he has found thus far.

(18 pts) Make a playable (i.e. can give jump decision within 20 seconds) for a rational rabbit for board sizes of 20x20.

4 Report

You should hand in a complete and well written report in the box marked 5DV019. Also provide a link to your source code, residing in your edu folder, along with runnable files (compiled binaries or scripts) that can be easily run on the departments Linux systems.

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\(^1\)Assume any map is bounded on all sides by stone.
\(^2\)The Rabbit should be able to survive this world.