Takehome1-Report

Introduction

The take-home1 assignment is about designing an intelligent strategy to move a block out of a maze using clips.

The design process

The intelligent strategy has been implemented in clips by constructing a number of rules and defining several templates. They are as follows

- Rule to find the position of the start and end cells
- Rule to move up, down, left, right
- Rule to backtrack
- Rule to check if the destination has been reached
- Rule to halt if the maze has no solution
- Rule to evaluate salience
- Template for the cells in the board
- Template for storing the position of current cell
- Template for storing the position of start and end cells

Summary of results

BOARD 1

xoxoxoxoxox

xoxoxoxoxox

xoxoxoxoxox

xoxoxoxoxox

xoxoxoxoxox

xoxooSxoxox

xoxoxoxoxox

xoxoxoxoxox

xoxoxoxoxox

xoxoxoxoxox

xoxoxExoxox

Final result

xoxoxoxoxox

xoxoxoxoxox

xoxoxoxoxox

xoxoxoxoxox

xoxoxoxoxox

xoxooSxoxox

xoxox*xoxox

xoxox*xoxox

xoxox*xoxox

xoxox*xoxox

xoxox*xoxox

Board1 is quite simple and the block finds its way out of the maze without any trouble.

BOARD 2

oExoxoxoxox

xoxoxxxxxox

xooooxoxox

xooooooxox

ooooooxoxox

xoxooSoooox

xoxoxoxoxox

xoxoxoxoxox

xoxxxxxxxox

xoxoooooxox

xxxxxxxoxox

Final result

o*x.xoxoxox

x*x.xxxxxox

x*****xoxox

xoooo*ooxox

ooooo*xoxox

xoxooSooooox

xoxoxoxoxox

xoxoxoxoxox

xoxxxxxxxox

xoxooooooxox

xxxxxxxoxox

In board 2,the block had taken wrong path near the end but then it has backtracked and found the exit.

BOARD 3

ooxoxoxoxox

oxxoooxxxox

oooxxoxoxox

xxxxoooooxox

oooooooxoxox

xoxooSooooox

xoxoxoxoxox

xoxoxoxxxoE

xoooxxxoooox

xoxoooooxox

xxxxxxxoxox

Final result

ooxoxoxoxox

oxxoooxxxox

oooxxoxoxox

xxxxooooxox

oooooxoxox

xoxooS****x

xoxoxoxox*x

xoxoxoxxx**

xoooxxxooox

xoxooooxox

xxxxxxxoxox

In board 3,the block has taken the shortest path .

BOARD 4

xoxoxoxoxox

xoxoxoxoxox

xoxoxoxoxox

xoxoxoxoxox

xoxoxoxoxox

xoxooSxoxox

xoxoxoxoxox

xoxoxoxoxox

xoxoxoxoxox

xExoxoxoxox

xoxoxxxoxox

Final result

xox.x.xoxox

xox.x.xoxox

xox.x.xoxox

xox.x.xoxox

xox.x.xoxox

xox..Sxoxox

xox.x.xoxox

xox.x.xoxox

xox.x.xoxox

xEx.x.xoxox

xox.xxxoxox

Board 4 has no solution and the block has gone in all possible paths available before coming back to halt at the start cell.

BOARD 5

xoxoxoxoxox

xoxoxoxoxox

xoxoxoooxox

xoxoxoxoxox

xoxoxoxoxox

xoxooSxoxox

xoxoxoxoxox

xoxoxoxoxox

xoxoxoxoxox

xoxoxoxoEox

xoxoxxxoxox

Final result

xox.xoxoxox

xox.xoxoxox

xox.x***xox

xox.x*x*xox

xox.x*x*xox

xox..Sx*xox

xox.x.x*xox

xox.x.x*xox

xox.x.x*xox

xox.x.x**ox

xox.xxx.xox

For board 5,the block has wandered in all the wrong directions before finding the right path.

Where's the artificial intelligence?

The method in which the clips code works is as follows:

- The value of start row and the end row are compared and if the start row is greater it implies that the start row is above the end row and hence the rule to move down is given more priority. If the value of end row is greater then the rule to move up is given more priority.
- Similarly, when comparing the start column and end column if the start column has a greater value then the rule to move left is given more priority and vice-versa.
- The block first visits the cells which have been visited least.
- Before each move, the block checks if the next cell is "E" or "o". If it is either of these, the block moves and changes the searched value of the block to 1.
- If all the neighboring cells either have contents as "x" or have searched value as 2 then the block cannot move in any direction and it halts and displays a message stating that the maze has no solution instead of moving indefinitely.

Efficiency of Solution

For BOARD 1,

Path length found	5
Shortest distance	5
No. of cycles	8

For BOARD 2,

Path length found	13
Shortest distance	9
No. of cycles	16

For BOARD 3,

Path length found	7
Shortest distance	7
No. of cycles	10

For BOARD 4,

No solution

No. of cycles	45

For BOARD 5,

Path length found	47

Shortest distance	13
No. of cycles	50

By comparing the path length and shortest distance given above ,it can be inferred that the block has found its way out of the maze without wandering around or moving in the wrong direction for all board configurations except board 5 and hence the clips code is quite efficient.

If I were to start again…

If I were start over, I would try to figure out a method to compare the absolute value of difference of rows and the absolute value of difference of columns so that the clips code would give more salience to whichever is greater (i.e.) if difference of rows were greater than difference of columns then it would mean going up or down is more important to the block than going left or right. Also, in the first board the end is in the line of sight of the block, I would have wanted the block to find the solution in one step.