CSEN 901: Artificial Intelligence

R2D2 Project

Project Report



Team:

Youssuf Radi 31-2140 T10

Hazem Agaty 31-1079 T08

Mohamed Shokr 31-1802 T09

Implementation

The Grid:

\_ \_ \_

| p | O | p |

\_ \_ \_

| r | T | r |

\_ \_ \_

| | A | |

\_ \_ \_

?- run((agent(1,1,S),rock(0,0,S),rock(2,0,S))).

S = result(right, result(up, result(left, result(down, result(left, result(up, result(right, s0))))))) ;

S = result(right, result(up, result(left, result(left, result(down, result(up, result(right, s0))))))) ;

S = result(left, result(up, result(right, result(down, result(right, result(up, result(left, s0))))))) ;

S = result(left, result(up, result(right, result(right, result(down, result(up, result(left, s0))))))) ;

S = result(right, result(up, result(left, result(down, result(left, result(up, result(right, s0)))))))

The Grid:

\_ \_ \_

| | | p |

\_ \_ \_

| o | T | r |

\_ \_ \_

| p | r | A |

\_ \_ \_

?- run((agent(1,1,S),rock(2,0,S),rock(0,2,S))).

S = result(up, result(left, result(down, result(up, s0)))) ;

S = result(left, result(up, result(right, result(left, s0)))) ;

S = result(up, result(left, result(down, result(up, s0)))) ;

S = result(left, result(up, result(right, result(left, s0)))) ;

S = result(down, result(up, result(up, result(left, result(down, result(up, s0)))))) ;

S = result(down, result(up, result(left, result(up, result(right, result(left, s0)))))) ;

S = result(up, result(right, result(left, result(left, result(down, result(up, s0)))))) .

Syntax and Symantec

teleport(X,Y).

teleport initial positions declared at cell X,Y

obstacle(X,Y).

obstacle initial positions declared at cell X,Y

pad(X,Y).

pad initial positions declared at cell X,Y

w(W).

grid width declaration every predict defines a column with W for every column

h(H).

grid height declaration every predict defines a row with H for every row

run(Q):-

main predicate to run the code where Q represent query to be used

run\_helper(Q, I):-

helper for the main predicate just to have the initial starting depth called I default 1

run\_helper2(\_, \_, R):-

checks if R is not depth\_limit\_exceeded then the agent have found a solution so it stops and returns this solution

run\_helper2(Q, I, R):-

checks if R is depth\_limit\_exceeded then the agent have not found a solution so it increments the depth to search in a deeper level

agent(2,2,s0).

agent intial position at situation s0 at cell X,Y

agent(I, J, result(down,S)):-

agent fluent axioms to move the agent they check if an agent can be in position I,J as a result of an action A in a previous situation S

the possible actions are either down, up, right, left

This predicate is called with every possible action

move\_agent(I, J, \_, \_, S):-

move\_agent is used to check if agent can be in the I,J given the previous state S

moreover this predicate takes two extra parameters K,L they are used to generalize the method where K represent change in I and L represent change in J

Also it has 2 cases, case to check if the agent is moving to a cell I,J which was completely free in situation S and exists inside the grid, or the case to check if the agent is moving to a cell I,J which is not free and if it contains a rock that can be pushed so the agent will be also alowed to move

rock(0,1,s0).

rock intial position at situation s0 at cell X,Y

rock(I, J, result(down, S)):-

rock fluent axioms to move the rock they check if an agent can be in position I,J as a result of an action A in a previous situation S

the possible actions are either down, up, right, left

This predicate is called with every possible action

move\_rock(I, J, K, L, S):-

move\_rock is used to check if the rock can be in the I,J given the previous state S

%%moreover this predicate takes two extra parameters K,L they are used to generalize the method where K represent change in I and L represent change in J

Checks the case if the rock is moved to a cell I,J which was completely free in situation S and exists inside the grid and the rock in previous state was not on a pad

also it checks that an agent was just near the rock and did the same movement in order for the rock to move