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CSC 4301, Project 2

**Wumpus**

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1. Introduction

The Wumpus world is a simple world example to illustrate the worth of a knowledge-based agent and to represent knowledge representation. The Wumpus world is a cave that has 16 rooms. The Wumpus is a beast that eats anyone who enters the room; the Wumpus is located in only one of the rooms and he can be shot by the agent, but the agent has a single arrow. In the Wumpus world, there are some Pits rooms that are bottomless, and if an agent falls into Pits, then he will be stuck there forever. The goal is to search for the gold without falling into the pits or entering the Wumpus room. We will discuss the game details in this report.

1. Key Predicates and the meaning of the Variables.

* Safe (X,Y): it will return all the adjacent rooms (X,Y) that are safe.
* grabGold(): it will return “Gold found in: (X,Y), PICK IT!” if the gold is in (X,Y) else it will return false. (X,Y) are the coordinates of the agent.
* shootWumpus(): it will return true if the Wumpus is in one of the adjacent rooms and false if not.
* agent\_position(X,Y): return the agent position.
* breeze(X,Y): return yes if there is a breeze in room R(X,Y), else it returns no.
* pit\_position(X,Y): return whether the pit is in the room (X,Y) or not.
* wumpus\_position(X,Y): return whether the Wumpus is in the room (X,Y) or not.
* stench(X,Y): return yes if the Wumpus is in one of the adjacent rooms else return no.
* grab(): grab the gold in the current room
* shoot\_arrow(): it will shoot the arrow if there is one.
* can\_leave\_cave(): it will return yes if the agent can leave else no.
* climb(): it will leave the cave if the agent is able to.
* check\_down\_room(): return ‘Room (~d,~d) is safe.’ If the below room is safe else return false.
* check\_up\_room(): return ‘Room (~d,~d) is safe.’ If the upper room is safe else return false.
* check\_right\_room(): return ‘Room (~d,~d) is safe.’ If the right room is safe else return false.
* check\_left\_room(): return ‘Room (~d,~d) is safe.’ If the left room is safe else return false.

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the variables X and Y refer to the coordinates of the rooms.

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We used some variables and lists to implement the matrix that will show us where the agent is located.

1. Testing:

For example, we will test the world 1:

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Diagram

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Graphical user interface, text, application

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Wumpus was killed and gold was grabbed.

We interact with the game by typing up, down, left, or right to move the agent. In addition, we use the predicates to know some information for example we can know whether the adjacent rooms are safe or not, etc. (from the predicates above)

In addition to this, we can see that the game return yes or no for each room depending on whether there is a Wumpus or pit (in the adjacent rooms) or gold (in the same room).

In this code, we got the Wolds or situations from the code that was given to us on the assignment.

We will try other worlds to make sure that our program is efficient. The goal is to kill the Wumpus so we will try to kill the Wumpus and grab the gold.

if the world is green, it is successful.

If the world is red, we died.

If it is yellow, we cannot grab the gold.

* World 2:

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Diagram

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Table

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* World 5:

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Table

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For this world, the game did not return false when asking for the safe predicate so it did not check the room at the right. Here is one limitation.

* World 7:

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Table

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Wumpus killed and gold grabed.

* World 42:

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In this world, we cannot grab the gold because the gold is in the room that contains a pit so if we go there, we will die.

We will continue our tests on a table:

|  |  |  |  |
| --- | --- | --- | --- |
| Worlds | Wumpus killed(winnable) | Gold grabbed | Comments(if there is a problem) |
| 50 | Yes | Yes |  |
| 51 | Yes | Yes |  |
| 52 | Yes | Yes |  |
| 53 | No | Yes | In this world, we have a limitation because when we get to (3,4) we do not know in which room the Wumpus is located because safe() does not tell us whether the room has a pit or a Wumpus. Therefore, we could shoot on the wrong direction. |
| 105 | No | No | In this world, we have a limitation because we have a pit in (1,2) and another in (2,1); so, it is impossible to move without getting killed. |
| 106 | Yes | No | In this world, we have another limitation, we cannot grab the gold because the gold is in the room that contains a pit so if we go there, we will die. |
| 107 | Yes | Yes |  |
| 108 | Yes | Yes |  |
| 109 | Yes | Yes |  |
| 110 | No | No | In this world, we have a limitation because we have a pit in (1,2) and another in (2,1); so, it is impossible to move without getting killed. |
| 111 | No | No | In this world the pits are forming a wall for the agent so he cannot go to the gold or to kill the Wumpus. |
| 112 | Yes | No | In this world, we have another limitation, we cannot grab the gold because the gold is in the room that contains a pit so if we go there, we will die. |
| … | … | … | … |

1. Summary:

After making 100 tests the win rate that I got is 62%. The solution to solve these limitations that we got is to:

* Specify to the agent the rooms that contain the Wumpus and that contains the pits.
* We should modify the worlds to not get stuck and not be able to neither kill the Wumpus nor grab the gold.
* Modify the test to check all the rooms (because sometimes it does not tell us false about certain room)