Report of Project #2

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CSC 4301

SUMMER 2022

I. *Introduction :*

In the Wumpus universe, units are connected to one another through narrow tunnels. The deadly Wumpus, a creature that devours anyone who enters its room, is hiding somewhere in the cave. An agent can fire the Wumpus, however the agent can only do it from a nearby room and has only one arrow. There are some rooms that have bottomless pits that will capture anyone who enters them (the Wumpus is too big to fall in the pits). The environment is a 4x4 grid, and the only thing that makes it bearable is the chance of discovering gold while attempting to dodge or eliminate the Wumpus.

II. *Explanation of predicates:*

-dynamic : introduces the variables agent Loc, Breeze, Stench, Wumpus Loc, pit Loc, and gold Loc. And it restricts the universe to a grid of 4x4.

-isAdjacent_to([X,Y]) : determines whether Room A is close to Room B.

-breeze([X,Y]) : uses the coordinates X and Y to determine whether there is a breeze in the space.

-pit([X,Y]) : determines whether the space at coordinates X and Y contains a pit or not.

-stench([X,Y]) : checks the X and Y coordinates to see whether there is a smell in the space.

-wumpus([X,Y]) : determines whether or not the Wumpus is present in the room at coordinates X and Y.

-safe([X,Y]) : determines whether the room at coordinates X and Y is secure.

-grabGold() : determines whether or not the gold was taken.

-gold([X,Y]) : determines whether gold is present in the space between X and Y.

-shootWumpus([X,Y]) : declares whether the agent was killed or not after firing the agent's arrow in the room at coordinates X and Y.

III. *3-Different Configurations:*

1. Configuration 1:

	Gold		
Breeze			Stench
Pit	Breeze	Stench	Wumpus
Breeze and Agent(start)			Stench

⇨ <u>Screenshot of the configuration 1 :</u>

start, *safe*([1,1])

true ₁

start,*breeze*([2,2])

Breeze is in [2,2]
true ₁

start,*pit*([2,1])

Breeze is in [3,1]
Breeze is in [1,1]
Breeze is in [2,2]
false

start,*stench*([2,1])

There is no Stench in [2,1]
true ₁

start,*stench*([2,4])

There is no Stench in [2,4]
true ₁

start,*wumpus*([4,2])

There is no Stench in [3,2]
There is no Stench in [4,3]
There is no Stench in [4,1]
false

start,*gold*([3,3])

Gold is not found
true ₁

2. <u>Configuration 2:</u>

	Breeze	Pit	Breeze
Gold		Breeze	
Stench	Agent (start)		
Wumpus	Stench		

⇨ Screenshot of the configuration 2 :

```
start, safe([2,2])
true
```

```
start, breeze([3,4])
There is no Breeze in [3,4]
true
```

```
start, pit([4,3])
Breeze is in [3,3]
Breeze is in [4,4]
Breeze is in [4,2]
Pit is found.
true
```

```
start, stench([1,1])
There is no Stench in [1,1]
true
```

```
start, stench([2,1])
There is no Stench in [2,1]
true
```

```
start, wumpus([4,1])
There is no Stench in [3,1]
There is no Stench in [4,2]
false
```
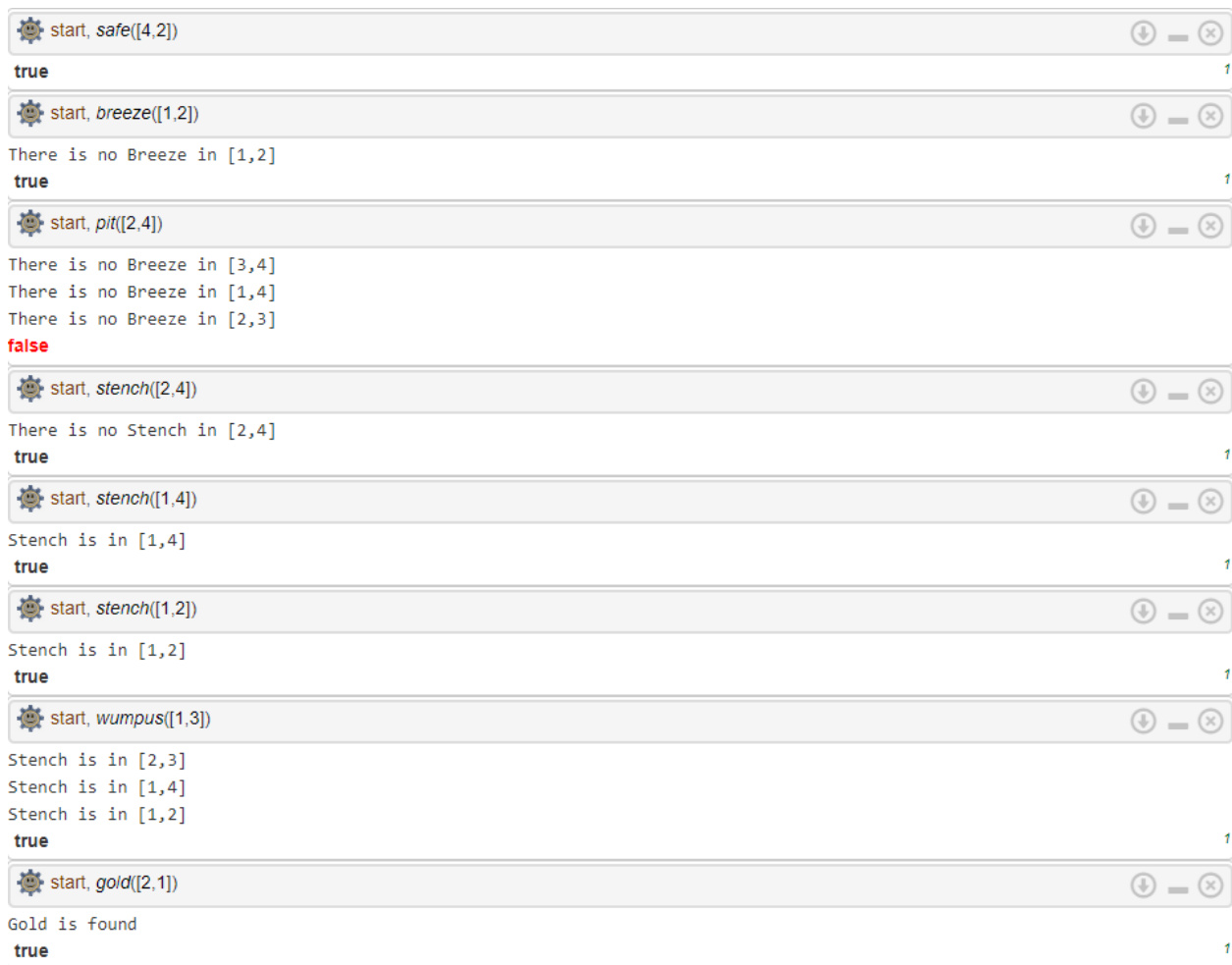
```
start, gold([4,1])
Gold is not found
true
```

3. Configuration 3:

Breeze	Agent (start)		
Pit	Breeze		
Breeze		Stench	
	Stench and Gold	Wumpus	Stench

⇨ Screenshot of the configuration 3 :

```
🔆 start, safe([4,2])                                                    ⊕ ⊖ ⊗
true                                                                        1

🔆 start, breeze([1,2])                                                  ⊕ ⊖ ⊗
There is no Breeze in [1,2]
true                                                                        1

🔆 start, pit([2,4])                                                     ⊕ ⊖ ⊗
There is no Breeze in [3,4]
There is no Breeze in [1,4]
There is no Breeze in [2,3]
false

🔆 start, stench([2,4])                                                  ⊕ ⊖ ⊗
There is no Stench in [2,4]
true                                                                        1

🔆 start, stench([1,4])                                                  ⊕ ⊖ ⊗
Stench is in [1,4]
true                                                                        1

🔆 start, stench([1,2])                                                  ⊕ ⊖ ⊗
Stench is in [1,2]
true                                                                        1

🔆 start, wumpus([1,3])                                                  ⊕ ⊖ ⊗
Stench is in [2,3]
Stench is in [1,4]
Stench is in [1,2]
true                                                                        1

🔆 start, gold([2,1])                                                    ⊕ ⊖ ⊗
Gold is found
true                                                                        1
```

IV.   *Limitations :*

Only two out of the three experiments I conducted succeed. For instance, I lost the game as a result of a poor decision. This suggests that I must take steps before achieving the goal. Heuristics could be added to the agent to make it much more efficient by allowing it to check for other components like pits for example.

Sincerity dictates that my principal problem was probably a result of my lack of Prolog programming knowledge. Developing an intelligent agent that would rely on rational decisions to do the optimal actions rather than human decisions could be made possible with more practical experiences.