CSC 4301 Summer 2022

Project II: Wumpus World Game
Report

Team Members

Fahd El Mamoun <77045>

Hamza Bakhadda <76734>

Jamal Khalil <68417>

Supervised By

Dr. Tajjeeddine Rachidi

Introduction

The Wumpus world is a cave consisting of rooms connected by passageways. Lurking somewhere in the cave is the terrible Wumpus, a beast that eats anyone who enters its room. The Wumpus can be shot by an agent, but the agent has only one arrow and can only shoot him from an adjacent room. Some rooms contain bottomless pits that will trap anyone who wanders into these rooms (except for the Wumpus, which is too big to fall in). A 4x4 grid makes up the environment, the only mitigating feature of this environment is the possibility of finding gold while trying to avoid/shoot the Wumpus.

Variables & Key Predicates

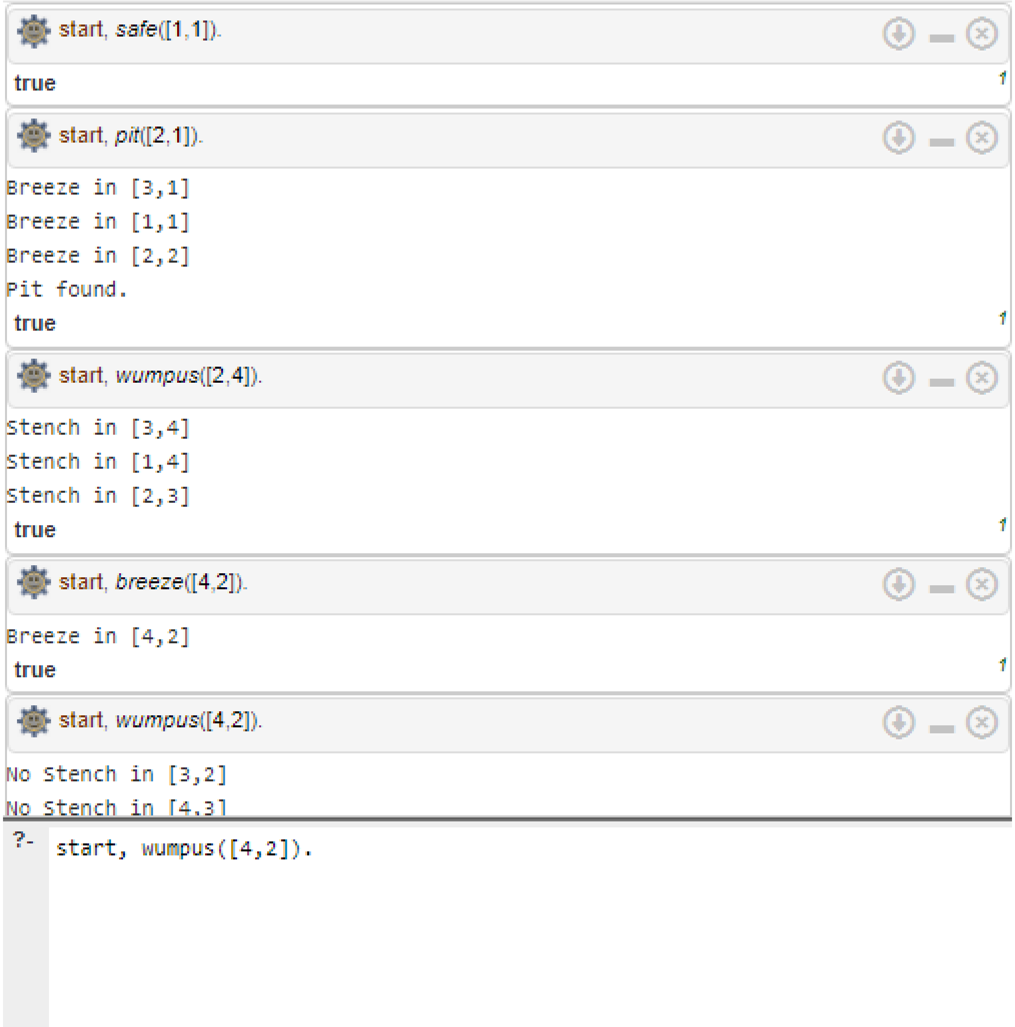
Predicate	**Use**
Dynamic	Introduces variables Breeze, Stench, WumpusLocation, pitLocation, goldLocation, and agentLocation. Limits the world to a 4x4 grid.
Safe([X,Y])	Checks if room with coordinates X and Y is safe or not.
Pit([X,Y])	Checks if room with coordinates X and Y contains a pit or not.
Wumpus([X,Y])	Checks if room with coordinates X and Y contains the Wumpus or not.
Breeze([X,Y])	Checks if there is a breeze in the room with coordinates X and Y.
isAdjacent([X,Y])	Checks if Room A is adjacent to Room B.
Stench([X,Y])	Checks if there is a stench in the room with coordinates X and Y.

The following pages contains the scenario we used to play the game.

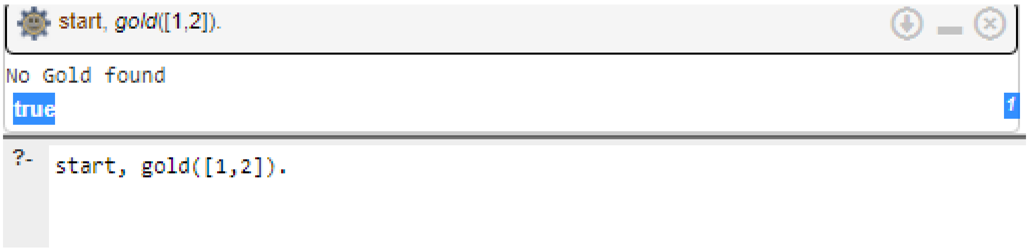
First Scenario

Stench	**Wumpus**	Stench	Breeze
	Stench	**Gold** Breeze	Pit
	Breeze		Breeze
Agent (Start) Breeze	Pit	Breeze	

Snapshots of 1st Scenario



```
start, safe([1,1]).
true

start, pit([2,1]).
Breeze in [3,1]
Breeze in [1,1]
Breeze in [2,2]
Pit found.
true

start, wumpus([2,4]).
Stench in [3,4]
Stench in [1,4]
Stench in [2,3]
true

start, breeze([4,2]).
Breeze in [4,2]
true

start, wumpus([4,2]).
No Stench in [3,2]
No Stench in [4,3]
?- start, wumpus([4,2]).
```

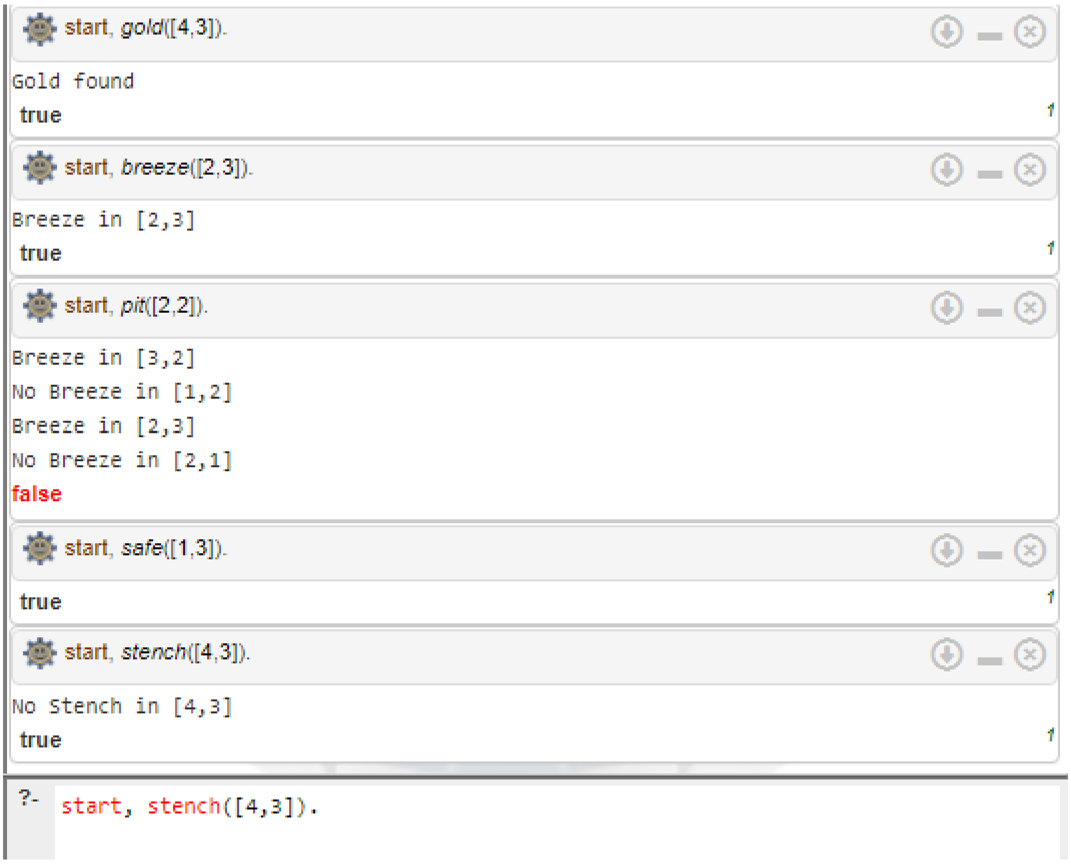


```
start, gold([1,2]).
No Gold found
true
?- start, gold([1,2]).
```

Second Scenario

Stench	**Wumpus**	Stench Breeze	
	Stench Pit Breeze	Pit Breeze	Breeze **Gold**
	Stench Breeze	Breeze	Breeze
Agent (Start) Breeze	Pit	Breeze	Pit

Snapshots of 2nd Scenario

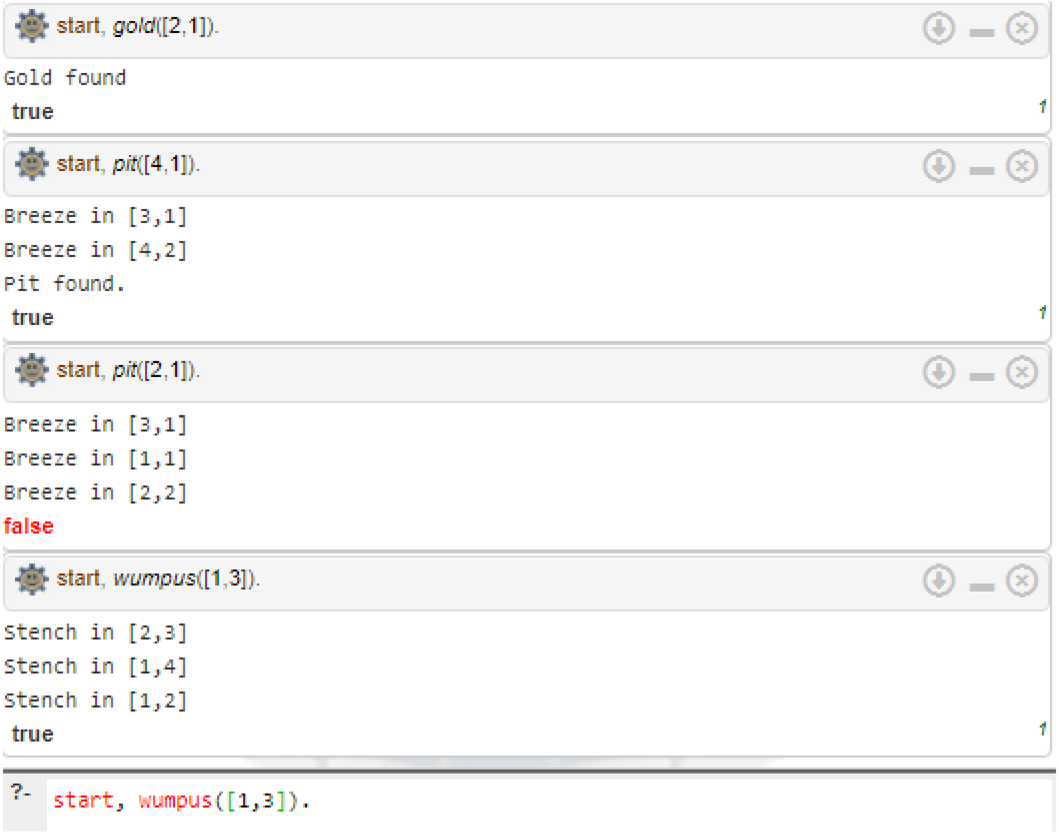


```
start, gold([4,3]).
Gold found
true

start, breeze([2,3]).
Breeze in [2,3]
true

start, pit([2,2]).
Breeze in [3,2]
No Breeze in [1,2]
Breeze in [2,3]
No Breeze in [2,1]
false

start, safe([1,3]).
true

start, stench([4,3]).
No Stench in [4,3]
true

?- start, stench([4,3]).
```

Third Scenario

Stench			Breeze
Wumpus	Stench	Breeze	Pit
Pit Stench	Breeze		Breeze
Agent (Start) Breeze	**Gold**	Breeze	Pit

Snapshots of 3rd Scenario



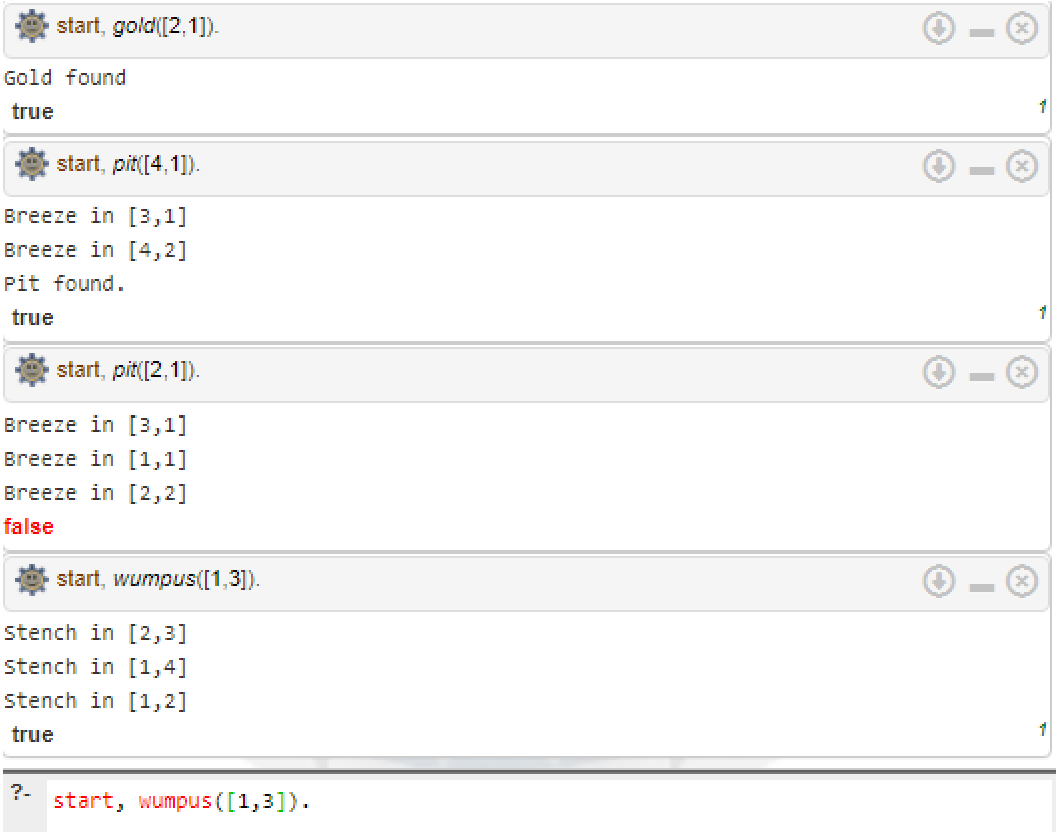
```
start, gold([2,1]).
Gold found
true
```

```
start, pit([4,1]).
Breeze in [3,1]
Breeze in [4,2]
Pit found.
true
```

```
start, pit([2,1]).
Breeze in [3,1]
Breeze in [1,1]
Breeze in [2,2]
false
```

```
start, wumpus([1,3]).
Stench in [2,3]
Stench in [1,4]
Stench in [1,2]
true
```

```
?- start, wumpus([1,3]).
```



```
start, gold([2,1]).
Gold found
true
```

```
start, pit([4,1]).
Breeze in [3,1]
Breeze in [4,2]
Pit found.
true
```

```
start, pit([2,1]).
Breeze in [3,1]
Breeze in [1,1]
Breeze in [2,2]
false
```

```
start, wumpus([1,3]).
Stench in [2,3]
Stench in [1,4]
Stench in [1,2]
true
```

```
?- start, wumpus([1,3]).
```

Limitations & Eventual Future Remedies

We tried three experiments, out of which we only won two times. For instance, we made the wrong decision which led us to losing the game. This implies that we have to try all possible actions before reaching the goal. The **solution** to this would be to add heuristics to the game which would make the agent way more efficient as it could check for other elements such pits.

Honestly, the main limitation that we had is probably related to our lack of programming experience with Prolog. Getting more hand on experience could allow us to build an intelligent agent that would rely on rational decisions to take the best actions instead of relying on human decisions.