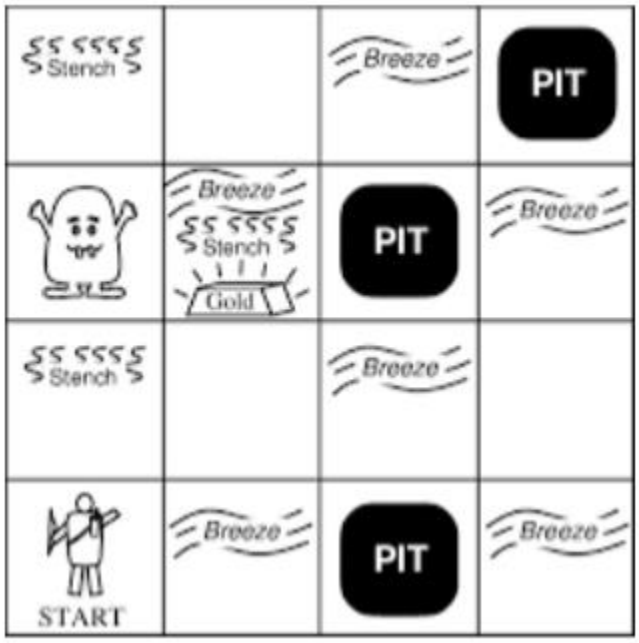
Project #2

In this project you see a logical agent for the Wumpus game.



'to run the game, enter: start(Start, Gold, WumpusRoom, Pits, MapSize, Path, AliveWumpus, Arrow, GrabGold).'),

start(the start location of the agent [X, Y], Gold room [X,Y], Wumpus room [X,Y], list of pits [[X,Y],[X1,Y1],[X2,Y2]...], Map dimentions [M, N], empty list for the path [],Wumpus is alive: 1 or 0, Agent has Arrow: 1 or 0, 0).

Example:

start([1,1], [2,4], [2,3], [[2,2], [3,2], [4,1], [4,4], [2,1]], [4,4], [], 1, 1, 0).

Project Report:

This project aims to create a logical agent that will perceive its environment and make the best actions to reach its goal. The goal here is to kill the Wumpus and grab the gold.

In this implementation, the agent will check all paths to get to the gold and grab it. While looking for the gold, it will try to kill the Wumpus if found, and skip the pits.

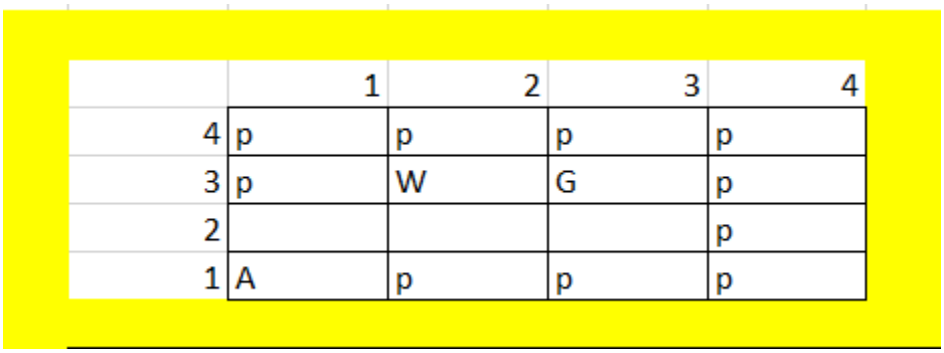
This can be done through backtracking which is a concept in Prolog that allows for further traversing even if we reached the goal. In other words, the agent will be looking for gold by traversing all rooms

that are safe, and then it will look for the Wumpus and kill it. Thus, the search goal here is the gold mainly.

All the game rules are respected in this implementation.

The map is a 2D matrix.

Experiment 1:



	1	2	3	4
4	p	p	p	p
3	p	W	G	p
2				p
1	A	p	p	p

Here we have in our map we have the pits' locations list is [[1, 2], [1, 3], [1, 4], [2, 4], [3,1], [3,4], [4, 1], [4, 2], [4, 3], [4, 4]].

The breeze and stench are automatically generated and are taken into consideration.

The gold is in room [3, 3]

The agent is in room [1, 1].

The Wumpus room is [3, 2].

The map dimensions are 4 by 4.

start(Start, Gold, WumpusRoom, Pits, MapSize, Path, AliveWumpus, Arrow, GrabGold).'),

start([1,1], [3, 3], [3,2], [[1, 2], [1, 3], [1, 4], [2, 4], [3,1], [3,4], [4, 1], [4, 2], [4, 3], [4, 4]], [4,4], [], 1, 1, 0).

Result of experiment 1:

```
?- start([1,1], [3, 3], [3,2], [ [1, 2], [1, 3], [1, 4], [2, 4], [3,1], [3,4], [4, 1], [4, 2], [4, 3], [4, 4]]
, [4,4], [], 1, 1, 0).
|    Gold found and grabed following this path: [[1,1],[2,1],[2,2],[3,2],[3,3]]

Gold found and grabed following this path: [[1,1],[2,1],[2,2],[2,3],[3,3]]

Wumpus is dead at [3,2]
The Wumpus was killed from room[2,2]
Taking this path: [[1,1],[2,1],[2,2]]

true
```

In this experiment, the agent found two paths that leads to the gold. And he could kill the Wumpus from room [2,2].

Thus, there is the first path that leads to gold without killing the Wumpus, and the other that allows to kill the Wumpus and then us its room as a path to the gold.

Experiment 2:

	1	2	3	4
4	p	p	p	G
3	p	W	p	p
2				p
1	A	p	p	p

Here we have in our map we have the pits' locations list is [[1, 2], [1, 3], [1, 4], [2, 4], [3,1], [3, 3], [3,4], [4, 1], [4, 2], [4, 3]].

The breeze and stench are automatically generated and are taken into consideration.

The gold is in room [4, 4]

The agent is in room [1, 1].

The Wumpus room is [3, 2].

The map dimensions are 4 by 4.

start(Start, Gold, WumpusRoom, Pits, MapSize, Path, AliveWumpus, Arrow, GrabGold).'),

start([1,1], [4, 4], [3,2], is [[1, 2], [1, 3], [1, 4], [2, 4], [3,1], [3, 3], [3,4], [4, 1], [4, 2], [4, 3]], [4,4], [], 1, 1, 0).

Result:

```
?- start([1,1], [4, 4], [3,2],[ [1, 2], [1, 3], [1, 4], [2, 4], [3,1], [3, 3], [3,4], [4, 1], [4, 2], [4, 3]], [4,4], [], 1, 1, 0).
Wumpus is dead at [3,2]
The Wumpus was killed from room[2,2]
Taking this path: [[1,1],[2,1],[2,2]]
```

Gold cannot be grabbed since it is surrounded by pits. However, the agent could kill the Wumpus.

Experiment 3:

p	p	p		G
		p		
p	W			p
			p	p
	p			

Here we have in our map we have the pits' locations list is [[1, 2], [2,4],[3,1], [3, 3], [4,3], [5, 1], [5, 2], [5, 3], [5, 1]].

The breeze and stench are automatically generated and are taken into consideration.

The gold is in room [5, 5]

The agent is in room [1, 1].

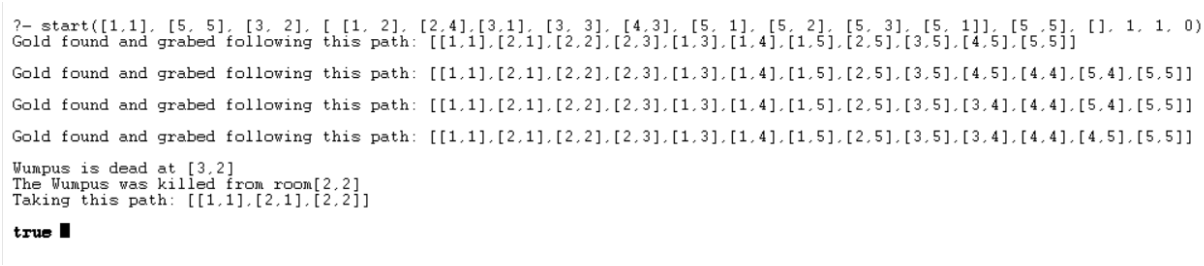
The Wumpus room is [3, 2].

The map dimensions are 5 by 5.

start(Start, Gold, WumpusRoom, Pits, MapSize, Path, AliveWumpus, Arrow, GrabGold).'),

start([1,1], [5, 5], [3, 2], [[1, 2], [2,4],[3,1], [3, 3], [4,3], [5, 1], [5, 2], [5, 3], [5, 1]], [5 ,5], [], 1, 1, 0).

Results of experiment 3:



The agent could find different paths leading to the gold.

Conclusion:

This agent can find gold and kill the Wumpus by brut-forcing and backtracking. While traversing all the possible options to the goal, the score and time could not be accumulated, and caused warnings and runtime errors. Thus, I deleted that part of score and time.