

# wumpus game

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In `solution_WumpusNowWithRocks`, we divide the program into a several functions, and we will introduce each function as followings:

In the main function, we initialize the situation as we start at Cell 11, and knowledge base as an empty list,

`unvisited` is the list that record the cell that is not been visited,

`path` is the list that record safe path that the agent has walked through,

`wumpus_possibility` is the list that through inference process, whether a cell could have the possibility of having wumpus,

`wumpus_exist` is the variable that when it equals to one, it means it has wumpus in the map,

`wumpus_location` is the variable that record where wumpus lies,

`get_gold` is the variable that judges whether the agent get the gold,

`return_flag` is the variable that evaluate whether agent should return to the previous cell, if `return_flag` equals to 0, the agent does not need to go back, if `return_flag` equals to 1, the agent need to go back.

The main idea is as follows: an agent lies in a cell and stores the situation of the cell in the knowledge base, and bases on this fact, the agent infers the next cells that are safe and saves them into knowledge base, and tries all safe moves and stores the next cells'situation, and make inference. And once the agent gets the gold, the agent will go back to the initial cell according to the paths which had been stored previously.

functions:

```
def orientation_infer(target_location,now_location)
```

This function use the current location (`now_location`) and next location (`target_location`) and returns the orientation of next location from current location's perspective.

```
def ask_location(situation)
```

This function returns where the agent lies.

```
def infer_next_location(knowledge,around,path,unvisited,return_flag,get_gold)
```

This function infers the next location, whether next location is available, if the next location is available, the function return the next location, else it just pop out the location which previous existed in path and change the variable of `return_flag` into 1.

```
def infer_unvisited(knowledge,around,unvisited)
```

This function judge whether a cell has been visited,if it has not been visited, we create a key in the knowledge dictionary,

```
def ask_around(name)
```

This function find out the next possible moves

```
def establish_kb(situation, knowledge)
```

This function establish knowledge base, it stores the parameters of a cell, and it could be updated according the follow up steps.

```
def infer_wumpus(knowledge, now_location, around, wumpus_exist, wumpus_possibility)
```

This function infers wumpus, according to the knowledge and the situations of surrounding cells, and the wumpus possibility to make a judgement of whether there is a wumpus, if the current cell is clean, then the three surrounding cell will not have wumpus, and if the current cell is nasty, then one of the three surrounding cells will have wumpus.

```
def wumpus_confirm(knowledge, wumpus_possibility)
```

it returns whether a cell contains wumpus, if the element in the wumpus possibility set have two identical elements, it means that this element contains a wumpus.

```
def shoot_wumpus(name, wumpus_location, now_location)
```

This function shoot the wumpus and if the shooting is successful, the variable wumpus\_exist will change to 0

```
def infer_pit(knowledge, now_location, around)
```

This function infer pit, if a cell contains breeze, it means that one of the four surrounding cells has a pit, and add this knowledge to knowledge base. After adding the rock variable, there is a condition when rock number is bigger than 0, then the agent can use the rock to tell whether a cell contains pit. If the result of take\_action(name, Toss) returns quiet, then the cell that has been dropped rock does not contain pit, and if it returns Click, then the cell contains pit.

```
def infer_gold(name, knowledge, now_location)
```

This function infers gold, if a cell contains glitter, then this cell has gold, and change the variable get\_gold to 1.

```
def move_to_next(name, orientation)
```

This function realizes the action of moving to next cell.

Result:

\*\*\*\*\*

Initializing your new Wumpus world!

Your new world is called: Wumpus3346

There is a Wumpus in cell Cell 13.

There is Gold in cell Cell 32.

There is a Pit in cell Cell 31.

There is a Pit in cell Cell 33.

There is a Pit in cell Cell 44.

You are starting in Cell 11, looking to the Right.

You are starting with 0 points, 1 arrow(s).

You have 5 rocks.

You are alive.

\*\*\*\*\*

Turing to face Up

Perception = (clean, calm, bare, no\_bump, quiet, Cell 11, Up, living, 0)

\*\*\*\*\*

Turing to face Up

Perception = (clean, calm, bare, no\_bump, quiet, Cell 11, Up, living, 0)

\*\*\*\*\*

Taking a step

Moving to Cell 12

There is a nasty smell in here

Perception = (nasty, calm, bare, no\_bump, quiet, Cell 12, Up, living, 0)

\*\*\*\*\*

Turing to face Down

There is a nasty smell in here

Perception = (nasty, calm, bare, no\_bump, quiet, Cell 12, Down, living, 0)

\*\*\*\*\*

Taking a step

Moving to Cell 11

Perception = (clean, calm, bare, no\_bump, quiet, Cell 11, Down, living, 0)

\*\*\*\*\*

Turing to face Right

Perception = (clean, calm, bare, no\_bump, quiet, Cell 11, Right, living, 0)

\*\*\*\*\*

Taking a step

Moving to Cell 21

There is a breeze running through this room

Perception = (clean, breeze, bare, no\_bump, quiet, Cell 21, Right, living, 0)

\*\*\*\*\*

Turing to face Right

There is a breeze running through this room

Perception = (clean, breeze, bare, no\_bump, quiet, Cell 21, Right, living, 0)

\*\*\*\*\*

Tossing a rock. You have 4 left.

\*\*\*\*\*

Turing to face Up

There is a breeze running through this room

Perception = (clean, breeze, bare, no\_bump, quiet, Cell 21, Up, living, 0)

\*\*\*\*\*

Taking a step

Moving to Cell 22

Perception = (clean, calm, bare, no\_bump, quiet, Cell 22, Up, living, 0)

\*\*\*\*\*

Turing to face Up

Perception = (clean, calm, bare, no\_bump, quiet, Cell 22, Up, living, 0)

\*\*\*\*\*

Taking a step

Moving to Cell 23

There is a breeze running through this room

There is a nasty smell in here

Perception = (nasty, breeze, bare, no\_bump, quiet, Cell 23, Up, living, 0)

\*\*\*\*\*

Turing to face Up

There is a breeze running through this room

There is a nasty smell in here

Perception = (nasty, breeze, bare, no\_bump, quiet, Cell 23, Up, living, 0)

\*\*\*\*\*

Tossing a rock. You have 3 left.

\*\*\*\*\*

Turing to face Right

There is a breeze running through this room

There is a nasty smell in here

Perception = (nasty, breeze, bare, no\_bump, quiet, Cell 23, Right, living, 0)

\*\*\*\*\*

Tossing a rock. You have 2 left.

\*\*\*\*\*

Turing to face Left

There is a breeze running through this room

There is a nasty smell in here

Perception = (nasty, breeze, bare, no\_bump, quiet, Cell 23, Left, living, 0)

\*\*\*\*\*

Trying to shoot the Wumpus

You killed the Wumpus!

You get 100 more points!

There is a breeze running through this room

Perception = (clean, breeze, bare, no\_bump, quiet, Cell 23, Left, living, 100)

\*\*\*\*\*

Turing to face Up

There is a breeze running through this room

Perception = (clean, breeze, bare, no\_bump, quiet, Cell 23, Up, living, 100)

\*\*\*\*\*

Taking a step

Moving to Cell 24

Perception = (clean, calm, bare, no\_bump, quiet, Cell 24, Up, living, 100)

\*\*\*\*\*

Turing to face Right

Perception = (clean, calm, bare, no\_bump, quiet, Cell 24, Right, living, 100)

\*\*\*\*\*

Taking a step

Moving to Cell 34

There is a breeze running through this room

Perception = (clean, breeze, bare, no\_bump, quiet, Cell 34, Right, living, 100)

\*\*\*\*\*

Turing to face Right

There is a breeze running through this room

Perception = (clean, breeze, bare, no\_bump, quiet, Cell 34, Right, living, 100)

\*\*\*\*\*

Tossing a rock. You have 1 left.

\*\*\*\*\*

Turing to face Left

There is a breeze running through this room

Perception = (clean, breeze, bare, no\_bump, quiet, Cell 34, Left, living, 100)

\*\*\*\*\*

Taking a step

Moving to Cell 24

Perception = (clean, calm, bare, no\_bump, quiet, Cell 24, Left, living, 100)

\*\*\*\*\*

Turing to face Left

Perception = (clean, calm, bare, no\_bump, quiet, Cell 24, Left, living, 100)

\*\*\*\*\*

Taking a step

Moving to Cell 14

Perception = (clean, calm, bare, no\_bump, quiet, Cell 14, Left, living, 100)

\*\*\*\*\*

Turing to face Down

Perception = (clean, calm, bare, no\_bump, quiet, Cell 14, Down, living, 100)

\*\*\*\*\*

Taking a step

Moving to Cell 13

Perception = (clean, calm, bare, no\_bump, quiet, Cell 13, Down, living, 100)

\*\*\*\*\*

Turing to face Up

Perception = (clean, calm, bare, no\_bump, quiet, Cell 13, Up, living, 100)

\*\*\*\*\*

Taking a step

Moving to Cell 14

Perception = (clean, calm, bare, no\_bump, quiet, Cell 14, Up, living, 100)

\*\*\*\*\*

Turing to face Right

Perception = (clean, calm, bare, no\_bump, quiet, Cell 14, Right, living, 100)

\*\*\*\*\*

Taking a step

Moving to Cell 24

Perception = (clean, calm, bare, no\_bump, quiet, Cell 24, Right, living, 100)

\*\*\*\*\*

Turing to face Down

Perception = (clean, calm, bare, no\_bump, quiet, Cell 24, Down, living, 100)

\*\*\*\*\*

Taking a step

Moving to Cell 23

There is a breeze running through this room

Perception = (clean, breeze, bare, no\_bump, quiet, Cell 23, Down, living, 100)

\*\*\*\*\*

Turing to face Down

There is a breeze running through this room

Perception = (clean, breeze, bare, no\_bump, quiet, Cell 23, Down, living, 100)

\*\*\*\*\*

Taking a step

Moving to Cell 22

Perception = (clean, calm, bare, no\_bump, quiet, Cell 22, Down, living, 100)

\*\*\*\*\*

Turing to face Right

Perception = (clean, calm, bare, no\_bump, quiet, Cell 22, Right, living, 100)

\*\*\*\*\*

Taking a step

Moving to Cell 32

There is a lovely glitter in the room

There is a breeze running through this room

Perception = (clean, breeze, glitter, no\_bump, quiet, Cell 32, Right, living, 100)

\*\*\*\*\*

Turing to face Right

There is a lovely glitter in the room

There is a breeze running through this room

Perception = (clean, breeze, glitter, no\_bump, quiet, Cell 32, Right, living, 100)

\*\*\*\*\*

Tossing a rock. You have 0 left.

\*\*\*\*\*

Trying to pick up gold

You've picked up some gold!

You get 1000 more points!

There is a lovely glitter in the room

There is a breeze running through this room

Perception = (clean, breeze, bare, no\_bump, quiet, Cell 32, Right, living, 100)

\*\*\*\*\*

Turing to face Left

There is a breeze running through this room

Perception = (clean, breeze, bare, no\_bump, quiet, Cell 32, Left, living, 1100)

\*\*\*\*\*

Taking a step

Moving to Cell 22

Perception = (clean, calm, bare, no\_bump, quiet, Cell 22, Left, living, 1100)

\*\*\*\*\*

Turing to face Down

Perception = (clean, calm, bare, no\_bump, quiet, Cell 22, Down, living, 1100)

\*\*\*\*\*



Taking a step

Moving to Cell 21

There is a breeze running through this room

Perception = (clean, breeze, bare, no\_bump, quiet, Cell 21, Down, living, 1100)

\*\*\*\*\*

Turing to face Left

There is a breeze running through this room

Perception = (clean, breeze, bare, no\_bump, quiet, Cell 21, Left, living, 1100)

\*\*\*\*\*

Taking a step

Moving to Cell 11

Perception = (clean, calm, bare, no\_bump, quiet, Cell 11, Left, living, 1100)

\*\*\*\*\*

Perception = (clean, calm, bare, no\_bump, quiet, Cell 11, Left, won, 1100)