CS 511 AI 2 - Project 1

Simple Reflex Agent

Unique Name: Purple

Problem Statement: *A simple Reflex Agent for the Wumpus World Simulator. It is to operate in the simulator assuming the agent's initial position is lower left corner facing right (west), for the duration of 50 time steps, and that the environment is non-deterministic (the forward motion succeeds 80% of the time, and agent slips right or left with probability 10% each). Submit a file or zip directory named nickname.zip with your own unique nickname. Your submission will be tested in 50,000 randomly generated wumpus environments for the average obtained score.*

Simple reflex agents act only based on the current percept, ignoring the rest of the percept history. The agent function is based on the condition-action rule: if condition then action. This agent function only succeeds when the environment is fully observable.

The goal of this assignment is for the agent to maximize the total score while moving around the randomly generated world. As the Agent is a 'simple reflex agent', it doesn't keep track of the unseen world and it will just react to reflex. The input is the percept which represents the state. Then the rules based on that percept is run and the action is returned.

Implementation

The initial position/location of the agent is decided by the WorldApplication class. First, we set the (Boolean randomAgentLoc) to 'false' and then set the new location in the function generateRandomWumpusWorld located in the same class. The number of trials, maximum number of steps and world size is also set by the WorldApplication.java class function.

The function 'Agent' decides all parameters, except action taken during a turn, for the Agent during, including non-deterministic moves (the forward motion succeeds 80% of the time, and agent slips right or left with probability 10% each). The probability is controlled by a random number generator deciding on one of the following moves:

```
switch (rand.nextInt(10)) {

  case 0: moveDir = 'F'; break;
  case 1: moveDir = 'F'; break;
  case 2: moveDir = 'F'; break;
  case 3: moveDir = 'F'; break;
  case 4: moveDir = 'F'; break;
  case 5: moveDir = 'F'; break;
  case 6: moveDir = 'F'; break;
  case 7: moveDir = 'F'; break;
  case 8: moveDir = 'L'; break;
  case 9: moveDir = 'R'; break;
}
```

The function that decides the action of the agent for each turn is 'AgentFunction'.
The action table consists of the following,

```
actionTable[0] = Action.NO_OP;
actionTable[1] = Action.GO_FORWARD;
actionTable[2] = Action.GO_FORWARD;
actionTable[3] = Action.GO_FORWARD;
actionTable[4] = Action.TURN_LEFT;
actionTable[5] = Action.TURN_RIGHT;
actionTable[6] = Action.GRAB;
actionTable[7] = Action.SHOOT;
```

A random number generator randomly picks actions to execute based on the action table.

The process itself is based on an 'if… else if…' conditional statement.

The initial condition is to check if the if the location has glitter. If ‘true’, then the agent grabs it.

Next, check if there is any bump, glitter, breeze, stench or scream. If not, then move ‘forward’.

If there is a bump, then turn to the right or left. Currently, it is set to left. (Action Item 5)

If there is stench, then that means that the wumpus is near.
Hence, there are two possibilities for the next ‘action’. The agent can either ‘shoot’ or take ‘no action’. A random value is generated to decide which course to take. Shooting will happen only 5% of the time.

If there is scream and there is no breeze, then that means that there is no one on the way and the agent can move forward.

Else, if none of the above conditions are ‘true’, then there is ‘no action’ taken condition (in order to cover any default actions or loopholes in the ‘if…else if’ conditional logic).

Sample Outputs

Given that the problem statement says to assume that:

- The environment is non-deterministic
- The location has been pre-set to the lower left corner (rather than random)
- Duration of time steps is 50

Number of times the trials were run: 5
No. of trials: 10000

Total Score: 1644712
Average Score: 164.4712

Total Score: 1706419
Average Score: 170.6419

Total Score: 1721519
Average Score: 172.1519

Total Score: 1670719
Average Score: 167.0719

Total Score: 1646841
Average Score: 164.6841

To Run:

javac WorldApplication.java to compile
java WorldApplication -n false -t 10000

Or

If you are using eclipse,
Modify the run configurations with arguments as -n false -t 10000

Or
If you are using IntelliJ,
Modify the run configurations with arguments as -n false -t 10000 OR reset variables in WorldApplication.Java