Knowledge Representation - W1 Lab: Intelligent Agents

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I. Introduction

This weeks lab is based on the lecture on Intelligent Agents [1].

A. Prep-work

Git clone the AIMA python data repository from [2]. Download the Anaconda distribution as you will need Jupyter Notebook and Spyder [3]. Thereafter complete the following Jupyter notebooks:

- intro.ipynb
- agents.ipynb

Note: Your solution should be generated in Spyder as a .py file importing code as required from the AIMA repo (See the file provided for an example of importing it form a sub-directory). I will not accept .ipynb submissions and your code should import what it needs from a parent directory (no libraries to be submitted along with solutions).

B. Table Driven Vacuum Agent

Instantiate a Table driven vacuum agent and the trivial vacuum environment.

1) Define a function runEnvironment that takes in the agent, environment and the number of runs.
2) Each run should output the following Run: <num>: Env. status: (0, 0): <status>, (1, 0): <status> Agent Performance: <num> where num and status are pulled from the respective environment.
3) Use your function to evaluate and compare running the table driven agent in 2,4 and 8 runs.
4) What is the optimal status and sequence of actions in the context of the agents performance?
5) What is the least optimal status and sequence of actions in the context of the agents performance?

C. The Farmer's Dilemma

A farmer has to get a fox, a chicken, and a sack of feed across a river. He has a boat, and it can only carry him and one other thing:

- If the fox and the chicken are left together, the fox will eat the chicken.
- If the chicken and the feed are left together, the chicken will eat the feed.

How does the farmer do it?

Problem Solution: The farmer and the chicken cross the river, (the fox and feed are safe together), he leaves the chicken on the other side and goes back across. The farmer then takes the fox across the river, and since he can't leave the fox and chicken together, he brings the chicken back. Again, since the chicken and feed can't be left together, he leaves the chicken and he takes the feed across and leaves it with the fox. He then returns to pick up the chicken and heads across the river one last time.

1) Note we assume the farmer starts in location A along with the chicken, feed and fox.
2) Specify a state diagram the realise the above solution (text, table - your choice).
3) Derive the list of percepts that would be experienced by a farmer agent to include location, chicken, feed and fox.
4) Define the appropriate actions needed for solving the problem.
5) Generate the percept sequence necessary map the appropriate actions for the problem to be solved.
6) Implement a TableDrivenAgentProgram (agents.py approx. line 124) that will solve this problem - note may require customisation of a TableDrivenAgentProgram and associated environment.

II. Submission

Submit your solution by the due date as a single ".py" file using the following naming convention.

"W<Week_num>_Lab_<Surname>_<First name>_<Student Number>.py"

e.g.

"W1_Lab_OReilly_Ruairi_R123456.py"

References

[1] S. Russell and P. Norvig, "Ai a modern approach," Learning, 2005.
[2] aima-python, 2020 (accessed September 22nd, 2020), https://github.com/aimacode/aima-python.
[3] ANACONDA, 2020 (accessed September 22nd, 2020), https://www.anaconda.com/products/individual.