edX

p3_rl_introduction
Project 3: Reinforcement Learning
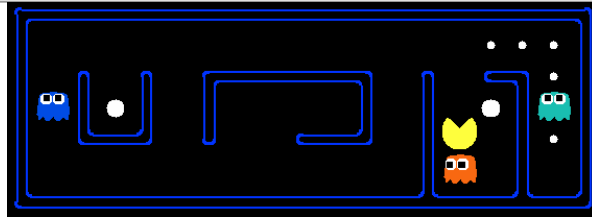
Pacman seeks reward.
Should he eat or should he run?
When in doubt, Q-learn.

Introduction

In this project, you will implement value iteration and Q-learning. You will test your agents first on Gridworld (from class), then apply them to a simulated robot controller (Crawler) and Pacman.

As in previous projects, this project includes an autograder for you to grade your solutions on your machine. This can be run on all questions with the command:

```
python autograder.py
```

It can be run for one particular question, such as q2, by:

```
python autograder.py -q q2
```

It can be run for one particular test by commands of the form:

```
python autograder.py -t test_cases/q2/1-bridge-grid
```

See the autograder tutorial in Project 0 for more information about using the autograder.

The code for this project contains the following files, which are available in a <u>zip archive</u>:

Files you'll edit:	
<u>valueIterationAg ents.py</u>	A value iteration agent for solving known MDPs.
<u>qlearningAgents. py</u>	Q-learning agents for Gridworld, Crawler and Pacman.
<u>analysis.py</u>	A file to put your answers to questions given in the project.
Files you should read but NOT edit:	
<u>mdp.py</u>	Defines methods on general MDPs.
<u>learningAgents.p y</u>	Defines the base classes `ValueEstimationAgent` and `QLearningAgent`, which your agents will extend.
<u>util.py</u>	Utilities, including `util.Counter`, which is particularly useful for Q-learners.
<u>gridworld.py</u>	The Gridworld implementation.
<u>featureExtractor s.py</u>	Classes for extracting features on (state,action) pairs. Used for the approximate Q-learning agent (in qlearningAgents.py).
Files you can ignore:	
<u>environment.py</u>	Abstract class for general reinforcement learning environments. Used by <u>gridworld.py</u>.
<u>graphicsGridworl dDisplay.py</u>	Gridworld graphical display.
<u>graphicsUtils.py</u>	Graphics utilities.
<u>textGridworldDis play.py</u>	Plug-in for the Gridworld text interface.
<u>crawler.py</u>	The crawler code and test harness. You will run this but not edit it.

graphicsCrawlerDisplay.py	GUI for the crawler robot.
autograder.py	Project autograder
testParser.py	Parses autograder test and solution files
testClasses.py	General autograding test classes
test_cases/	Directory containing the test cases for each question
reinforcementTestClasses.py	Project 3 specific autograding test classes

Files to Edit and Submit: You will fill in portions of valueIterationAgents.py, qlearningAgents.py, and analysis.py during the assignment. You should submit these files with your code and comments. Please *do not* change the other files in this distribution or submit any of our original files other than these files.

Evaluation: Your code will be autograded for technical correctness. Please *do not* change the names of any provided functions or classes within the code, or you will wreak havoc on the autograder. However, the correctness of your implementation -- not the autograder's judgements -- will be the final judge of your score. If necessary, we will review and grade assignments individually to ensure that you receive due credit for your work.

Academic Dishonesty: We will be checking your code against other submissions in the class for logical redundancy. If you copy someone else's code and submit it with minor changes, we will know. These cheat detectors are quite hard to fool, so please don't try. We trust you all to submit your own work only; *please* don't let us down. If you do, we will pursue the strongest consequences available to us.

Getting Help: You are not alone! If you find yourself stuck on something, contact the course staff for help. Office hours, section, and the discussion forum are there for your support; please use them. If you can't make our office hours, let us know and we will schedule more. We want these projects to be rewarding and instructional, not frustrating and demoralizing. But, we don't know when or how to help unless you ask.

Discussion: Please be careful not to post spoilers.