

EE551000 System Theory

HW4: Solving cartpole using RL

Due: Jun 12, 2019 23:59

Goal and Todo

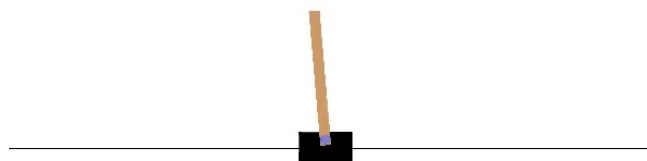
The goal of this test is to solve a classic control problem by implementing multiple reinforcement learning methods learned in this class. In this test, you have to implement the algorithms all by your own.

Step-by-step

- Environment
 - We'll use Cartpole-v1 (OpenAI Gym library) as our environment. To use this environment, you should install it on your machine. Run the command (You'll need Python 3.5+):

```
pip install gym
```
 - You can also build it from source...

```
git clone https://github.com/openai/gym  
cd gym  
pip install -e .
```
- After you install, try `sample.py` in `hw4/`. This sample shows you how to interact with OpenAI Gym environments.
- The observation space (state space) is:
 - Cart position (max: 4.8, min: -4.8)
 - Cart velocity (max: Inf, min: -Inf)
 - Pole Angle (max: 24 deg, min: -24 deg)
 - Pole velocity at tip (max: Inf, min: -Inf)
- The action space is:
 - Push cart to left (0)
 - Push cart to right (1)
- Taking each step would earn reward +1.



- For more detail, you can visit <https://gym.openai.com/docs/>.

What to implement?

- Tabular Q-learning method. (how to transform continuous state to discrete state ?)
- Policy Gradient method.
- Actor-Critic method.
- **NOTE:** You are allowed to use any Python framework (e.g. Tensorflow, Pytorch) to implement your algorithms.

Report

- **Title, name, student ID**
- **Implementation**
 - ✓ Briefly describe your implementation.
- **Experiments and Analysis**
 - ✓ Compare all methods regarding to performance.
 - ✓ Analyze anything you'd like to.

Reminder

- Please upload your code and report.pdf to iLMS before 6/12 (Wed) 23:59. **No late submission allowed.**
- DO NOT zip your code into a single file.
- Please do not copy&paste the code from your classmates.