Machine Learning: Assignment #6
Fall 2020

Due: January 13th, 23:59:59 CST (UTC +8).

1. A Walk Through Reinforcement Learning

In this problem, you will implement some reinforcement learning algorithms, including Q-learning with table and Q-learning with approximators. You will also get touch with some popular RL techniques and tricks.

Here we use the gym benchmark to do experiments. It provides some handful environments to play with the agents/algorithms you design.

Skeleton code *run.ipynb* are provided for your convenience. Please see the documentation and comments in the notebook for more details. Also, please report critical results in this report. **It should be made that we can judge your assignment without referring to your code (though we may check your code).**

(a) **Q-Learning with Table**

Please implement the Q-Learning algorithm with a look-up table.

(i) First play with the *FreezeLake* environment and write code according to the hints/documentation in the notebook.

(ii) Now play with the *N-Chain* environment and answer the corresponding questions.

(b) **Q-Learning with Approximator (Optional, Homework Bonus)**

Please implement the Q-Learning algorithm with an approximator with the *CartPole* environmant.

(i) Implement an linear approximator.

(ii) Implement a neural network approximator.

(iii) Implement the *experience replay*.

(iv) Implement the *double Q-learning*.

(c) *Do not forget to answer the inline questions of* run.ipynb *in the PDF report.*

(d) This is the last assignment for this course. Thank you for participating our course and completing our assignments. Hope you have fun in this course. If have any comments to help improve the course, please contact TA or write in the report.

Please submit your homework report to at http://courses.zju.edu.cn:8060/course/18843 in pdf format, with all your code in a zip archive.