Homework 4 - RL

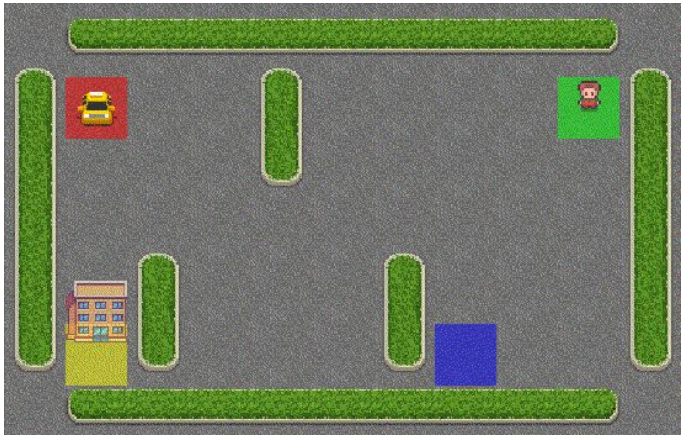
Due Date: 5/13 (Mon) 23:59

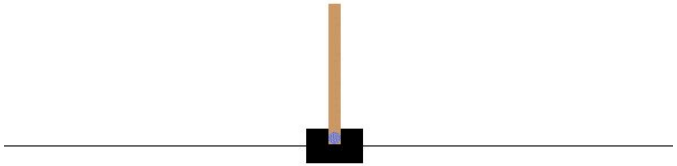
HCIS Lab

Introduction

In this assignment, you will implement basic RL algorithm, Q-learning and its variants in OpenAI Gym environments i.e.,

- Taxi-v3
- CartPole-v0

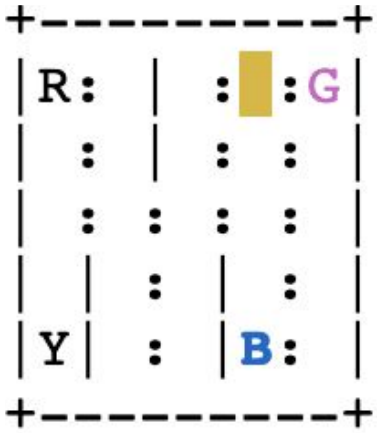


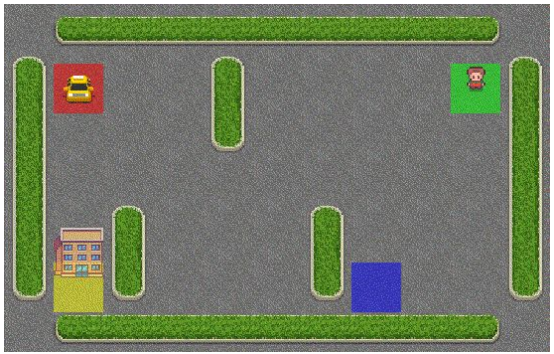


Introduction

Taxi-v3

- In Taxi environment, when the episode starts, the taxi(**Yellow block**) drives to the passenger's location(**B**), picks up the passenger, and drives to the passenger's destination(**G**). Your job is to train RL models to accomplish the task.



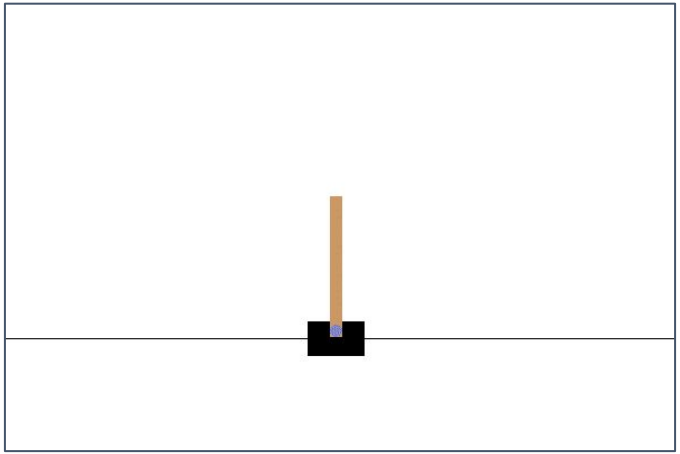


https://www.gymlibrary.dev/environments/toy_text/taxi/

Introduction

CartPole-v0

- In CartPole environment, the goal is to balance the pole by applying forces in the left and right direction on the cart. Again, you need to use RL models to complete the given task.



https://www.gymlibrary.dev/environments/classic_control/cart_pole/

Setup

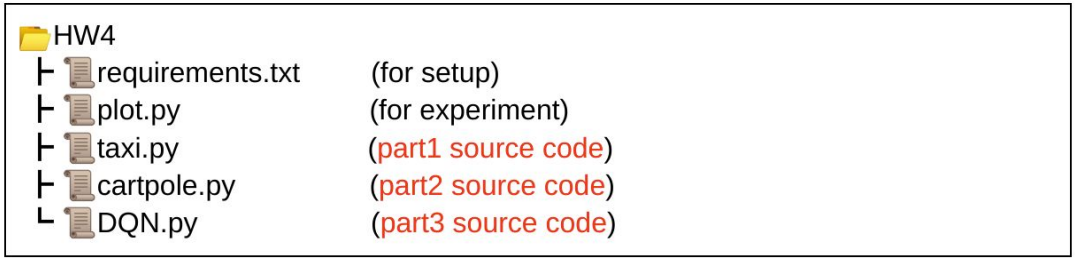
We recommend you to use python **3.7** and all the packages you need are listed in the requirements.txt. Please run the following command to install the packages:

```
pip install -r requirements.txt
```

Implementation (50%)

The sections you need to implement are specified with # Begin your code and # End your code. Please read all the comments to comprehend the source code before implementation. **Do not modify** the rest of the code.

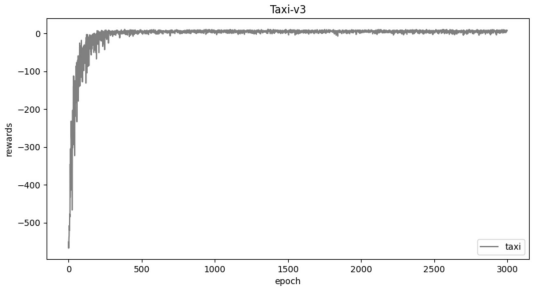
- Part 1: Q learning in Taxi-v3 (10%)
- Part 2: Q learning in CartPole-v0 (15%)
- Part 3: DQN in CartPole-v0 (25%)

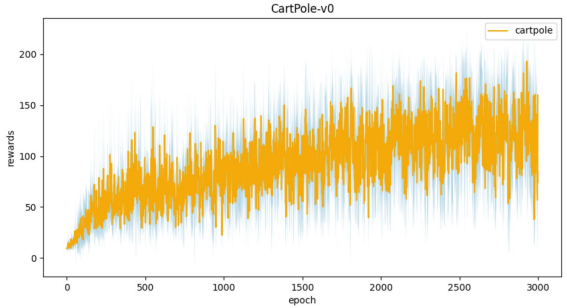


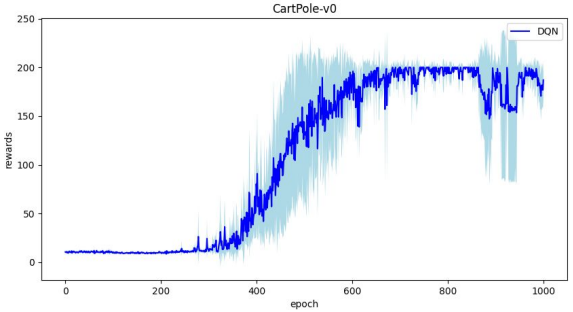
Experiment

```
python plot.py [-h] [--taxi] [--cartpole] [--DQN] [--compare]
```

You can use plot.py to plot the learning curves, this will help you verify if you train the model correctly.







Report (50%)

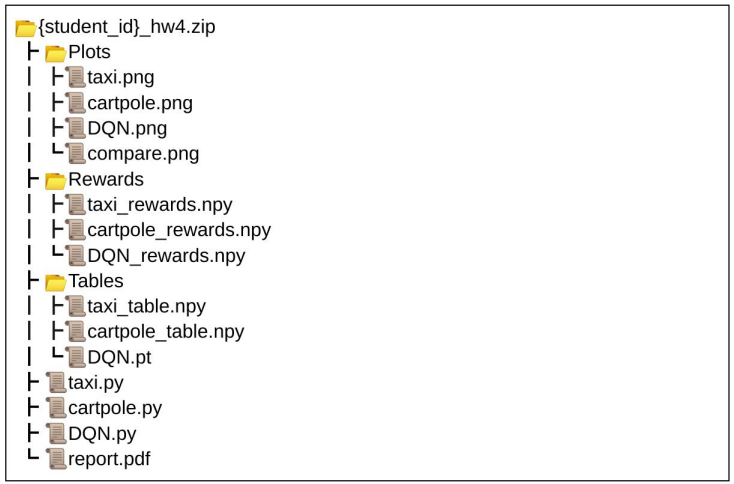
- You should write your report following the report template
- The report should be written in **English**.
- Please save the report as a **.pdf** file. (font size: 12)
- Answer the questions in the report template **in detail**.

Submission

Due Date: 2024/5/13 23:59

Please compress your source code, results and report (.pdf) into `STUDENTID_hw4.zip`.

The file structure should look like:



Please zip the contents, instead of the _hw4 folder, so there should NOT be a folder named {student_id}_hw4 in the zip file.

Wrong submission format leads to -10 point.

Late Submission Policy

-20 points per late day (rounds up the day to the next whole number).

Please check out the spec for more details!