Homework 2 (Due 02/15/2022, 8PM EST)

Starter code repos:

https://colab.research.google.com/github/Stable-Baselines-Team/rl-colab-notebooks/blob/sb3/dqn_sb3.ipynb

Resources:

[Reference code] RL Adventure (Double DQN):

https://github.com/higgsfield/RL-Adventure/blob/master/2.double%20dqn.ipynb

[Reference lecture] CS285, Berkeley Lecture 8:

https://rail.eecs.berkeley.edu/deeprlcourse/static/slides/lec-8.pdf

RL Adventure (DQN):

https://github.com/higgsfield/RL-Adventure/blob/master/1.dqn.ipynb

Stable baseline 3 (SB3) Github repo:

https://github.com/DLR-RM/stable-baselines3

To submit HW2, please send the link to the Google Colab notebook

1. **Implement double DQN:**

   Hint: SB3 only implements (valinia) DQN (the one discussed in the class). This task asks you to implement double DQN and compare the performance of DQN with the one of double DQN. double DQN is a minor modification of DQN. The only difference is that double DQN usus two Q networks to calculate the target labels. The reason that double DQN uses two Q networks is to reduce the over estimation of DQN. More details can be found in the slides, CS285, Berkeley Lecture 8, https://rail.eecs.berkeley.edu/deeprlcourse/static/slides/lec-8.pdf

   There are two ways to complete this homework. You can either complete the exercises in the starter code notebook, https://colab.research.google.com/github/Stable-Baselines-Team/rl-colab-notebooks/blob/sb3/dqn_sb3.ipynb, and submit the notebook. The exercises in this notebook will help you implemente double DQN. Or you can directly modify the source code of DQN in SB3. If you decide to directly modify the source code of DQN in SB3 (in particular, modify the bootstrapped target), to submit, please create another Colab notebook and do something like *!pip install git+"your SB3 github URL",* and run the training/testing experiments in this notebook.

The source code of 1-step TD (bootstrapped) target of DQN can be found in the *train* method, *dqn.py (stable_baselines3/dqn/dqn.py).*

[Requirements]:

- Compare double DQN with DQN.

[Software Setup for Development]:

1. git clone the SB3 source code repo (development version) to your local machine (no need to install it on your local machine). https://stable-baselines3.readthedocs.io/en/master/guide/install.html
2. Download the Google Drive Desktop (to sync with your Google Drive). https://www.google.com/drive/download/
3. Sync the cloned SB3 code repo (on your local machine) with the one in your Google Drive using Google Drive Desktop.
4. Connect your cloned SB3 code repo stored in your Google Drive to Google Colab.
5. Install the cloned SB3 code repo in your Google Drive using Google Colab (install it on Colab).

6. Use any editor (e.g. Sublime, PyCharm, etc.) for the code implementation (modify the code in the cloned SB3 on your local machine).
7. Test your implementation and running experiments using Colab.
8. Push your code in the cloned SB3 on your local machine to your repo in your GitHub account.

[Submission]:

(We don't need a link to your Google Drive. We only need the link to your GitHub using the Colab notebook)

1. Create a new Colab notebook.
2. *!pip install git+"your github URL"*
3. Training/testing experiments using the Colab notebook.