

### Group Members:

Jonathn Chang, Shan Jiang, Oscar O'Brien, Queena Deng

### Our Project:

We aim to build a Deep Q Learning agent in PyTorch to learn some classic games. We will be using the Gymnasium library (<https://github.com/Farama-Foundation/Gymnasium>). The project will involve an introductory study of RL applied to a video game environment (understanding of the basic RL problem: environment, reward, agent, policy), and perhaps extend to RL for other games outside the library.

Compare performance with a regular Q Learning agent.

### Data:

Classic control game engines from the Gymnasium package in python. We want to start with the Mountain Car game. A 2D car is placed at the bottom of a valley and can control forward and backward acceleration. The goal of the car is to get to the top of the hill.

### Modification Ideas:

- hyperparameter tuning (i.e. LR, etc...)
- Model size/layers
- Update formula adjustments
- Comparison with continuous control version of the game
- Change game rules to make it harder for the car
- Trying other games?

### References (where we're planning to start):

[https://pytorch.org/tutorials/intermediate/reinforcement\\_q\\_learning.html](https://pytorch.org/tutorials/intermediate/reinforcement_q_learning.html)

[https://pytorch.org/tutorials/intermediate/mario\\_rl\\_tutorial.html](https://pytorch.org/tutorials/intermediate/mario_rl_tutorial.html)

<https://towardsdatascience.com/reinforcement-learning-concept-on-cart-pole-with-dqn-799105ca670>

<https://towardsdatascience.com/reinforcement-learning-with-openai-d445c2c687d2>