ECE 472 Robotic and Computer Vision

Prof. K. Dana

Project 2: Deep Reinforcement Learning

1. Write a Jupyter notebook in Google Co-lab to implement the Pytorch tutorial cart-pole:

   (https://pytorch.org/tutorials/intermediate/reinforcement_q_learning.html).

   For each key line of code, please give a brief description of the RL algorithm that is implemented (e.g. 2-3 sentences).

2. Give an overview of the DQN algorithm in written forms (1-3 paragraphs). Include definitions of key terms and how they relate to the cart-pole problem (state, action, environment, reward.)

3. Choose performance metrics for your implementation and plot these as a function of the amount of training for your agent. Compare these plots for a random agent, and an agent trained for a small amount of time and a large amount of time. (Choose training times to show significant differences in the plots).

4. Explore open-AI gym to find three other problems that can be solved with RL. Compose a list of three other environments. Describe the state, action, environment and reward for each of these three environments.

   Note: Displaying the cart-pole is somewhat tricky in google colab. There is a tutorial here that explains how it can be done:

   https://www.anyscale.com/blog/an-introduction-to-reinforcement-learning-with-openai-gym-rllib-and-google