Your Tasks

Before you begin the graded tasks, feel free to take some time reviewing all the new code and output of DqnLabTest1+2, which follow "the movie" format we have seen in previous labs. As you do this, feel free to insert print statements anywhere you think might clarify things for you.

1. ***(TURN THIS IN, 5 points)*** *First, read the assignment specification and* ***estimate how long you think it will take you*** *and write it down.*
2. *Task 1: Understand DQN training:*
    A. Run DqnLabTest3 to observe how our basic framework trains up a neural network.
    B. **(TURN THIS IN, 5 points)** What do you see in this learning curve? In particular, what do you think is causing it to not improve consistently over time?
3. *Task 2: DQNs and greed*
    A. Run DqnLabTest4 to observe three training sessions varying the probability of selecting a greedy action.
    B. **(TURN THIS IN, 13 points)** What do you see in the learning curves for each training?
4. *Task 3: DQNs and learning rate*
    A. Run DqnLabTest5 to observe three training sessions varying the initial learning rate of the ADAM optimizer.
    B. **(TURN THIS IN, 13 points)** What do you see in the learning curves for each training?
5. *Task 4: DQNs and network depth*
    A. Run DqnLabTest7 (note that we skipped 6, feel free to check that test out, but it is not required) to observe three training sessions varying the **depth** of the network while keeping the neuron count fixed.
    B. **(TURN THIS IN, 13 points)** What do you see in the learning curves for each training?
6. *Task 5: DQNs and network width*
    A. Run DqnLabTest8 to observe three training sessions varying the **width** of the network.
    B. **(TURN THIS IN, 13 points)** Prepare learning curves for these training sessions. What do you see in them?
7. *Task 6: DQNs and regularization*
    A. Run DqnLabTest9 to observe three training sessions varying the amount of regularization we apply to the network.
    B. **(TURN THIS IN, 13 points)** Prepare learning curves for these training sessions. What do you see in them?
8. Task 7: Make the best DQN you can!

    A. **(TURN THIS IN, 15 points)** Examine DqnLabTest10. Using the framework there, create the best DQN you can to solve that specified MDP (feel free to change the source in the DQNAgent itself too). Provide any modified source, a learning curve for your agent, and a reflection about approaches you tried as you settled on a particular network configuration and why you settled on what you did.
9. Task 8: Compare DQN with table-based Q-learning.
    A. **(TURN THIS IN, 15 points)** Refer back to your answers from lab 3. Compare and contrast your answers to this lab with the analogous questions there (I.e., learning rate and greed).
10. **(TURN THIS IN, 5 points)** Upon completing the lab, determine how long you actually spent on the lab, and report that timeframe in addition to your estimate beforehand.

Submit

A file that is readable (pdf, docx, etc) containing your charts, explanations, and neural network creation function(s).