Your Tasks

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: Inspect DQN critical states on the toy MDP:*
    A. Run CriticalLabTest1 to observe output from this agent's training and critical state identification.
    B. **[TURN THIS IN, 5 points]** Find a "critical" state, according to the agent. Do you agree that it is critical? Why or why not?
    C. **[TURN THIS IN, 5 points]** Find a "non-critical" state, according to the agent. Do you agree that it is non-critical? Why or why not?
    D. **[TURN THIS IN, 5 points]** Are the two criticality metrics meaningfully different on this MDP? Why or why not?
3. *Task 2: Make Q-learning agent capable of computing critical states (starting with the toy MDP)*
    A. CriticalLabTest2 will not run until you have written two functions. Do so now, using the implementations found in the DQN agent as a reference.
    B. **[TURN THIS IN, your code, 5 points]** Write determine_criticalities_huang() for the Q-learning agent. It should return a list of tuples (state, criticality) for each state of the MDP. The criticality computation found in Huang et al. uses max-average.
    C. **[TURN THIS IN, your code, 5 points)** Write determine_criticalities_amir() for the Q-learning agent. It should also return a list of tuples (state, criticality) for each state of the MDP. The criticality computation found in Amir+Amir (HIGHLIGHTS paper, 2018) uses max-min.
    D. **[TURN THIS IN, 5 points]** Are the two criticality metrics meaningfully different on this MDP? Why or why not?
    E. **[TURN THIS IN, 5 points]** Compare the output with that from Task 1. Do the two agents produce meaningfully different critical states? Why or why not?
4. *Task 3: DQN criticality on the parking MDP*
    A. Run CriticalLabTest3 to observe a training session on a parking MDP.
    B. **[TURN THIS IN, 5 points]** Are the two criticality metrics meaningfully different on this MDP? Why or why not?
5. *Task 4: Q-learning criticality on the parking MDP*
    A. Run CriticalLabTest4 to observe a training session on a parking MDP *(You will need to copy over the printCriticalities function from the DQN agent to the QLearning agent, apologies)*.
    B. **[TURN THIS IN, 5 points]** Are the two criticality metrics meaningfully different on this MDP? Why or why not?

    C. **[TURN THIS IN, 10 points]** Compare the output with that from task 3. Do the two agents produce meaningfully different critical states? Why or why not?
6. *Task 5: Criticality for both agents on a random MDP*
    A. Run CriticalLabTest5 to observe two training sessions for the DQN and Q-learning agents on a random MDP.
    B. **[TURN THIS IN, 5 points]** Are the two criticality metrics meaningfully different on this MDP? Why or why not?
    C. **[TURN THIS IN, 10 points]** Do the two agents produce meaningfully different critical states? Why or why not?
7. *Task 6: Testing with criticality*
    A. Run CriticalLabTest6 to load pickle files containing DQN agent parameters and see their state criticalities. If you cannot get output from loading the pickle files, here is mine Download If you cannot get output from loading the pickle files, here is mine.
    B. **[TURN THIS IN, 10 points]** Your job is to determine which of the agents are: undertrained (there are 2x, undertrained and more undertrained), trained (there is 1x), and mutated (there are 3x, high, medium, and low). Mutation is based on this paperLinks to an external site.. Indicate which color you think is which type of agent using the state criticalities. Provide justification for each label you assign to each color
    C. **[TURN THIS IN, 10 points]** If you create any figures/summaries/etc to answer the previous task, please turn those in as well.
8. **(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 writing, criticality functions, and any charts you made for task 6.