COMP4660/8420 Introduction to GAN and RL

Part 1. Theory questions

1. What is the main difference between the Generator and the Discriminator in a GAN that produces images?

2. What is the goal of unsupervised pre-training?

3. What is the difference between Q-Learning and Policy Gradients?

Part 2. Practice questions

GAN

For the GAN code you will need to fill in the three lines of missing codes to get it running.

GAN optional advanced

An advanced part is getting it to run on one of the other datasets that are commented out at the top. Both the Generator and Discriminator need to be adjusted to account for the different image sizes.

Reinforcement Learning

For the reinforcement learning part, both algorithms are fully functional as is, but can be tweaked in terms of the hyperparameters to perform better. The programs are the two algorithms introduced in the lecture training on a Python AI gym problem where they need to learn to balance a pole on a moving block by choosing from the moves left and right at each time step.

WARNING: All the programming problems take a bit of time to run to get good results (probably around an hour or two minimum on a basic laptop), but you can see that they are working within around 10-15 minutes in the lab.

To really see optimal results I suggest leaving them to run overnight.
Both the GAN and the RL examples are quite interesting to see the progression of learning. The GAN example produces sample images at each iteration and both reinforcement learning examples produce a graph of episode length. So, if you are interested, you can run the programs overnight.