Machine Learning Assignment 5 Q-learning

108062135 呂佳恩

BASIC REPORT

Implementation:

Following the TA's template, we try to implement the q-table algorithm. With Q learning, there is a function that the model makes the decision based on. The model chooses the action with the highest reward, which is done by the argmax function.

The agent interacts with the environment again and again to learn. The agent starts by making random choices, and updates the model through the interaction with the environment. The state-action pair Q value is then stored in the Q-table, which could be searched and updated.

Difficulties:

I feel like the hard part was to fully understand what each line means and what the template was trying to achieve through each line of code. However, the TAs were very kind and included a lot of comments which helped make the process much easier than expected.

Summary:

The model I built didn't need much tuning to pass through the test, but would need some fine tuning if we were going to compete against each other on the high score.

I feel like through the process of tracing and implementing this piece of code, I really have a better understanding of how the Q-learning and Q-table is built and updated.

ADVANCED REPORT

Implementation:

The implementation of the DQN is similar to the Q-learning, we just have to fill in the spaces.

With Q-learning, since we were using a table to record our moves and rewards, since the table has a size limit, it might not be suitable for tasks with huge amounts of actions and states. DQN replaces the Q-table with a neural network.

The benefit of this is that neural networks can shift shapes according to different situations and can abstract traits automatically.

There are three stages in the implementation:

1. Build the network
2. Build the Deep Q-Network
3. Train the model

Difficulties:

The DQN required some tuning and the training time was significantly longer than the Q-learning part which made me question my result if it was a dead body code.

Summary:

For the DQN, I had to tune the model a little bit to get it to perform according to what I expected, however, it was relatively easy when compared to previous home works.