Module 4: Critical Thinking

Brady Chin

Colorado State University Global

CSC515-1: Principles of Machine Learning

Dr. Dong Nguyen

April 13th, 2025

Option #2: Build a PyTorch Demo

The demonstration that I chose was the actor-critic CartPole problem. This is an example of reinforced learning using PyTorch, among other libraries.

PyTorch Installation

I initially ran into a problem with installing PyTorch as I used the command "pip install pytorch". After reading the error messages, it said that the proper command was "pip install torch". After I ran that, it said PyTorch was already installed. No other issues arose.

Chosen Example

The example I chose was the actor-critic CartPole problem. This problem has a cart is the goal is to balance a pole upright for as long as possible using reinforcement learning. The timer stops when the pole has been dropped (Surma, G., 2018, September 26).

There were two scripts provided. One was a more simple version of the problem but it too longer to train and execute. The other one was more complicated but ran faster. Both scripts were able to execute with no problems and gave similar results.

The output for both scripts would display the most recent reward and the average reward. This would be displayed every 10 episodes. Once it was solved it would display the record and the last episode time steps.

Model

This example uses the actor-critic model. The actor is a neural network that takes actions and outputs a probability distribution. The critic then estimates the expected return from that state.

This model is often used in robotics and game applications. In robotics, this model allows for real-time control. On the other hand, this CartPole program was an example of the actor-critic model being used in a game environment.

Techniques for My Portfolio Project

Since my chatbot project will use supervised learning, such as NLP datasets and transformers, there will not be an immediate use for most techniques used in this reinforcement learning example. However, reinforcement learning techniques can be applied later in the development to optimize my model by giving it immediate feedback and live interaction.

Dataset

Since this was a reinforcement learning example, it did not use a dataset. Instead, it learned through interactions with the environment (Murel, J., 2024, March 25). Therefore, it will not be possible to improve on the model. However, we still can improve the learning experience by reshaping the reward system or start with easier versions of the task.

Conclusion

This example was helpful to see PyTorch in action and a great introduction to reinforcement learning differs fundamentally from supervised and unsupervised learning. The CartPole is a good example of a model that learns from rewards and experiences rather than labels.

References

Murel, J., (2024, March 25), *What is Reinforcement Learning.* IBM.

    https://www.ibm.com/think/topics/reinforcement-learning

PyTroch Tutorials, (2024), *Welcome to PyTorch Tutorials.* PyTorch.

    https://pytorch.org/tutorials/

Surma, G., (2018, September 26), *Cartpole - Introduction to Reinforcement Learning (DQN*

    Deep Q-Learning). Medium.

    https://gsurma.medium.com/cartpole-introduction-to-reinforcement-learning-
ed0eb5b58288