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Honors Advanced Topics Block C

# LM 7 Write Up

The initial goal in this learning module was to teach an AI to play the game of checkers against a human using tensor flow. After doing some research they saw that using a minimax algorithm would be easier and started to research that further. The first step was then to get a usable checkers game that our algorithm or AI, they weren't sure which yet, could read from. Finding a usable checkers game that happened to use python was actually very difficult as the few that were found were not functional. This drove them to have to code our own version of checkers. At this point Mr. Detrick expressed that they should try to use tensor flow instead of minimax as minimax was really just a complicated programming problem. Jonathan then researched the real rules of checkers in order to be able to code it in the first place. He learned the nuances of double jump and mandatory jumps and kinging. Jonathan and Jackson both installed VS Code as the python tutorials they were watching seemed to always use it and they thought it would make using outside libraries easier. They then learned about the python package manager pip and other python specific aspects like virtual environments. They even found a VS Code extension called Live Share that could allow them to collaborate on the coding, this worked initially but broke in the end splitting the group up. The individual tasks were for Jonathan to code the checkers game and use tensor flow and for Jackson to learn about machine learning and algorithms. Jonathan then researched how to create a game that could be used easily by tensorflow and found the Open AI gym. He started work on creating his own custom checkers game. Coding this checkers game was very difficult and a human control version is still not

implemented. Jackson then tried to follow a tic tac toe tutorial to try and produce something quickly but there wasn't enough time in the end. Once checkers was done Jonathan worked through a Youtube tutorial on training an AI to play a different game from Open AI Gym and tried to apply it to his checkers game. This was difficult to do as Jonathan did not fully understand what the code meant as the part in the tutorial series that included open AI Gym was near the end and he had to skip over the introductory information. Jonathan tried to run the machine learning algorithm, making changes trying to get it to work, but it would always get stuck at a score of 1.7 and never move forward. This is where the learning module ended and he had to admit defeat to checkers. In the end Jonathan learned how to code in python and use its package manager, the general ideas of neural networks and machine learning, and how to code a game using Open AI Gym. Jackson learned about different types of algorithms that might've been easier to implement than tensorflow and the more specific parts about machine learning and neural networks. If this was tried again they should research the theory of the problem they are trying to solve as in this situation it would have been very helpful. They also could have ditched the checkers idea and used a built in game on Open AI Gym. They hope to eventually have the checkers AI play the game correctly after the end of the learning module but a lot more research still needs to be done. Once the basics of machine learning are grasped there seems to be infinite possibilities for new projects that have much wider scopes.

Resources:

Playing CartPole with the Actor-Critic Method | TensorFlow Core

OpenAI Gym

Intro - Training a neural network to play a game with TensorFlow and Open AI - YouTube

Training Data - Training a neural network to play a game with TensorFlow and Open AI p.2 - YouTube

Training Model - Training a neural network to play a game with TensorFlow and Open AI p.3 - YouTube

Testing Network - Training a neural network to play a game with TensorFlow and Open AI p.4 - YouTube

How to Finally Install TensorFlow 2 GPU on Windows 10 in 2021 | Towards Data Science

Custom Environments in OpenAI's Gym | Towards Data Science

Python Programming Tutorials

Installation — Stable Baselines 2.10.2 documentation