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Senior Design

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Individual Capstone Assessment

In this project, I contributed a large portion of the overall AI agent design and training. I was able to apply a lot of the previous skills that I mentioned in the last assessment. The most useful skill I mentioned in the previous self-assessment would have to be my experience training machine learning algorithms with PyTorch, it cut down a lot on the total time it took to get the agent up and running. I also was able to apply a lot of the skills I developed in my internships like using the Pandas and Numpy Python libraries to analyze the results of machine learning models and how well they were performing over time. More importantly, I was able to build on these skills, since I hadn’t used reinforcement learning algorithms extensively in the past, this project was a huge help in understanding how they work.

As mentioned above, I was in charge of implementing and training the artificial intelligence agents. I did this using PyTorch to create the deep Q network to control the agents and an openAI gym environment where the agents played against each other to learn. I also learned a lot about how to define the state space for reinforcement learning algorithms, which was a much harder task than I had initially estimated. I had a lot of successes with implementing the network, but as I mentioned before there was a lot of trouble in getting the state vector input for the networks right, since there is so much information available in the state of a Pokemon battle it was hard to balance having the critical pieces in the state without giving the network so much information that it is hard for the agents to learn, Nick helped me a lot with teaching his most. Another obstacle I faced was the limited computing power available to me, as the agents were trained on my home PC, which also contributed to limiting the size of both the network and state vector.

Throughout this project, we were able to create an AI agent that is around the average player’s skill level (at least the average of the people who battled it at the senior design expo) which was one of our initial goals. We also were able to interface it with the Pokemon Showdown website, allowing others to challenge it at any time. I learned a lot about how each role in long-term group projects like this supports each other. Having people like Alex and Nick on the team who are much better at planning and solving less concrete issues like the environment definition made this project possible.

I think the most successful aspect of our group work was how we were able to use the different skills we learned in our backgrounds to complete different parts of the project. I think the biggest shortcoming of our teamwork was my failure to always include everyone in on the changes I was making since a lot of the projects I have worked on were solo, and I haven’t used group work tools often with machine learning before. I think we all put a lot of effort into this project in our tasks, and I think it showed in the end since we were able to accomplish some of our original goals. I think both Alex and Nick deserve special recognition, Alex for keeping us on track (especially for the class side of things), and Nick for his input on how important different aspects of the state were to include as input for the bot. I think we all played essential roles in completing this project and without any of us, the final result would have been significantly worse than what we achieved.