Senior Design (492) Biweekly Report 6

Team Name: sdmay21-proj033
Team Members: Karter Krueger, Joshua Kalyanapu, Matthew Phipps, Rithvik Menon, Ryan Howe, Thamir Al Harthy, and Zachary Mass
Report Period: 3/30/2021 - 4/12/2021

Weekly Summary

This week had a large emphasis on completing the implementation of the GNN (Graph Neural Network) in the SB3 (StableBaselines3) library. This was the main focus so that we can move on to comparing a classic CNN policy and network with the custom GNN in training tests. Implementation of the GNN with the SB3 library has been a complex process in development that should be completed this week. The secondary focus of the week was on getting the Docker image setup and working with the GPU.

Past Week Accomplishments

This week the group members working on the model managed to make a lot of headway with getting the StableBaselines 3 implementation of the Self Attention Model done. Implementing the GNN Self Attention Model into the SB3 took alot of work, but it finally complete to a baseline working state. Furthermore Karter also tested the StableBaselines 3 DQN with a CNN policy and noticed we might be having issues with the current reward function that causes the drone to exploit the reward and spin in circles; so this will be added to the list of future issues to be dealt with.

Pending Issues

- Nvidia Docker 2 not working on any local machines. AnyDesk Machine should be able to be used with Nvidia Docker 2.
- For some reason when we increase the batch size for our models sampling past a size of 1, our input matrix to the forward pass function has the same dimension of whatever size we inputted for the batching. This will require a further deep dive into learning more about batching and how to implement it.
- The reward function is too easy to exploit and sit in one place to collect rewards. This needs to be revised to incentivize moving around.

Individual Contributions

Name	Individual Contributions	Hours This Week	Hours Cumulative (Started tracking in report 4)
Zach Mass	Continued squashing bugs and troubleshooting the docker setup	6	25
Rithvik Menon	Continued working on troubleshooting and getting docker working with the codebase	6	24
Thamir Al-Harthy	Observed the drone behavior. Understood drone's behavior graph generation.	4	15
Matthew Phipps	Researched more about D3QNs as well as worked on implementing the SB3	8	30
Karter Krueger	Worked extensively on implementing the GNN as a custom policy to work with the StableBaselines3 library. This required researching the deeper details of the SB3 library and how the DQN policy works along with how the GNN layer should work in order to fully implement it to a working state.	14	37
Joshua Kalyanapu	Started working on a live-updating graphing tool that will help us visually see how training improves. Attempted to get CI/CD running on the AnyDesk computer.	10	15
Ryan Howe	Continued working on getting Docker working with codebase	8	26

Summary of Weekly Adviser Meeting

- Our advisor is very happy with the progress that has been made with the implementation of the GNN into the SB3 library as we can now start to compare the CNN with GNN in SB3 DQN format.
- We talked about the new goals with the reward function revisions and how to go about batching inside the GNN code.

Plans for Upcoming Reporting Period

- Continue working on Docker. Expecting to be done once everything needed is on the AnyDesk machine.
- Figure out issues with batching forward passing to the GNN
- Find out a solution to the reward function issue incentivizing unwanted behavior
- Finish the live-updating graphing tool
- Finish getting CI/CD running on the AnyDesk server

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