

Daily Log

Wednesday September 4

Before I started working on the project directly, I took a few minutes to consider the hardware necessary to create a functional drone in the real world. Prototype self driving cars have a menagerie of sensors and cameras, but I am limited to how many I can use as current quad copters are incapable of carrying much more than themselves. I finally settled on having one camera that points downward with an angle of depression of 45 degrees as well as a lidar sensor. This way the drone can look ahead and down to find the target and the lidar sensor can detect obstacles right around the drone itself. I installed pytorch and gazebo. I followed the tutorial for implementing a DQN using pytorch.

Friday September 6

For the first part of class I was deciding which deep learning models I should use for my project, but then I began to research about creating my own model. I talked to Mr. White about whether I should switch projects and got the green light for doing so. After briefly outlining the theoretical features and benefits of my model, I began researching related existing models that I can tweak.

Timeline

Date	Goal	Met
Today minus 1 weeks	Finalize my project idea and learn the procedures of senior research	I did learn the procedures but didn't finalize my project idea (I ended up changing it)
Today	Set up my laptop with all the pre-requisite software for working on this project	Yes, I was able to install and use gazebo and pytorch
Today plus 1 week	Find more existing research on my topic	
Today plus 2 weeks	Start implementing the closest models that I find	

Reflection

In narrative style, talk about your work this week. Successes, failures, changes to timeline, goals. This should also include concrete data, e.g. snippets of code, screenshots, output, analysis, graphs, etc.

It was not in my timeline to switch projects, but I think this is a good decision overall and am glad it happened now rather than later. Designing my own model by tweaking and/or combining existing models has been an interest of mine. I can appreciate the hard work and dedication, as well as the ingenuity of scientists and engineers to continually integrate new concepts and technologies to improve existing models. On Friday I gathered a list of papers to read about until next class. Although I didn't have much time over the weekend I was able to get the gist of each. As I explained on Friday, I want to make a hierarchical deep learning task that can dynamically expand and utilize external memory.

To start with I read two papers on hierarchical reinforcement learning. One focused on using intrinsic motivation and the other focused on using advantage weighted maximization. These are two methods to learn hierarchical policies meaning policies that determine which and when to use a certain sub policy that it created. I found a paper which researched dynamically expandable networks. These networks were trained to add more layers as needed to learn new tasks and to retain accuracy on old tasks. Deepmind published a paper on dynamic neural computers which use a neural network to control read/erase/write heads on a memory matrix. Although it was successful, I didn't envision using memory this way; rather, I envisioned using it to store the weights of sub policies that are not currently being used. These aren't two conflicting methods so I can try both and see how the performance on various tasks changes.