Journal Report 2
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Daily Log

Monday September 9

I was absent from school on Monday. What I did up until Wednesday is on last weeks journal.

Wednesday September 11

I was reading on various hierarchical reinforcement learning papers to find the state of the art model for learning sub-policies and how to use them to maximize external reward. I read about the concept of empowerment. Put simply, empowerment is a measure of agency in a given environment and the agents awareness of this agency. Formalizing this as an equation to optimize is challenging to understand. There is some information theory involved like using an information bottleneck. If trying to map an item from domain X to domain Y, it is helpfull to find the least expensive representation of X such that Y is still predictable from X. An example is transcribing speech. Sound is a complex waveform while words in the form of text are much simpler to comprehend. There is a game being played where you want to minimize the representation size while also limiting distortion. Rate distortion theory describes this.

Friday September 13

For the first half of class, I read more about empowerment to understand the math behind it and how to use it to find decision states. Decision states are useful delimiters for when to activate/deactiveate subpolicies. ex: I will walk along this hallway until the end. Once reaching the end, I will then turn right. At the intersection of the hallway is the decision state where 'walking' is deactivated and 'turning right' is activated. In the second half, I brushed up my knowledge on core tensorflow constructs such as variables, placeholders, tensors/ndarrays, tf layers,etc.

Timeline

Date	Goal	Met
Today minus 2 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 minus 1 weeks	Set up my laptop with all the prerequisite software for working on this project	Yes, I was able to install and use gazebo and pytorch
Today	Find a good Hierarchical Reinforcement learning paper to implement	Yes I found one that looks promising, but new ones come out so fast that I may find a better one later
Today plus 1 week	Implement a simple ConvNet in tensorflow on the mnist dataset along with generating the tensor graph to view the accuracy over time	
Today plus 2 weeks	Implement a simple LSTM that will attempt to learn and replicate Shakespeare like text	

Reflection

I just put the tangible ones like implementing certain models in tensorflow. I will be continuing to research on the side, but I think it is a given at this point. Once i research enough about a certain topic I will include it in the goals.

I planned on using pytorch because I heard it was fast, but I ran into issues when using it that I couldn't fix. Apparently I'm missing a DLL, but I don't know which one because there isn't any list I can cross examine to see which one I'm missing. I tried reinstalling, but it still didn't find the missing one. I concluded that although pytorch may be slightly faster, the support for it is lacking. I also have used tensorflow already so it is easier to use.

Despite me not being a grad student, I think the information from the papers I am reading isn't too hard to understand (yet). The hardest part is digesting the equations because there is so much notation to learn about. I have to learn a bit about probability theory as I go because concepts like maximum likelihood, log likelihood, expectations, etc show up often in these formulas. Knowing multi-var is also helpful. I happened to learn many of the concepts because I was working on an E M project that involved it.