Final Project, Stat 9340 Spring 2021

You can work in groups of size 1 to n for this project. Of course, I expect more out of a group than an individual.

You will select one of the projects from below. Note, I expect you will find code examples online (there are many for these) and it is fine if you use them (with attribution). However, I also want you to add some (hopefully non-trivial) extension if possible. Note, be particularly mindful of the computational costs in doing these projects!

(1) **Reinforcement Learning:** I would like you to work with examples from: https://gym.openai.com/docs/. If you are working by yourself, you can pick one example, but if you are working in a group you need to pick at least 2, one being from a more complicated environment. I want you to use deep models in your solution if you can. Note, if anyone has some other problem they would rather solve, please let me know. I'm open to that as well.

(2) GAN/VAE: I would like you to consider a GAN or (Variational Autoencoder) VAE on some interesting problem (see a list of GAN applications here (https://machinelearningmastery.com/impressive-applications-of-generative-adversarial-networks/). If you work in a group, I would like to see a comparison between the GAN and VAE. Note, the *DeepLearning with R* book has examples on fitting a GAN and VAE (we will be talking about these methods in a couple of weeks in class). Note, GANs are notoriously hard to train from scratch.

(3) Sequence-to-Sequence Modeling: Implement an LSTM with attention-based approach to perform language translation or some other NLP task. This would be best if you used some source (at least one) that others have not.

(4) Other? E.g., combine things from above, something else… (Confirm with me!)

In each of these, please indicate any advancements that you use that are beyond the basics we talked about in class (e.g., use of a double Q-learning deep algorithm in RL, etc.). Also, uou should make sure you are adding some value here in some way.

Assignment and Timeline:

(1) Topic and Group Participants (if relevant): April 7, 2021 5pm.

(2) Report or Presentation/Code Due: May 13, 2021 Noon

- Note, you can either submit a report of your work or a presentation (hard copy and recorded); you also have to submit working code and appropriate data or links to data; report should detail what you did, why you did it, where you found motivating code, what you did differently, what challenges you faced, and what improvements you would make if you could
- For group projects, you are required to submit a confidential (only I will see it) assessment of the role of each group member (what they did and how hard they worked) in addition to a rating (1 – worst, 5-best). Include a self-assessment.