CSI5340/ELG5214 Fall 2023 Syllabus
Introduction to Deep Learning and Reinforcement Learning

September 6, 2023

Objective

- For students to learn the foundation, frameworks, and techniques in deep learning and deep reinforcement learning
- For students to develop practical skills and hands-on experience in using deep learning and reinforcement learning to solve practical problems
- For the students be exposed to the recent research and advances in the field.

Calendar Description (subject to revision)

Fundamental of machine learning, models, expressiveness and capacity, fitting and generalization, optimization; multi-layer perceptron, universal approximation theorem, back-propagation; convolutional neural networks, recurrent neural networks, variational auto-encoder, generative adversarial networks; components and techniques in deep learning; reinforcement learning, planning; Markov Decision Process; value functions, Bellman expectation equation, Bellman optimality equation; policy iteration, value iteration, temporal difference methods, Q-learning, SARSA, deep reinforcement learning, applications and advances of deep learning and reinforcement learning

Required Background

- Having completed undergraduate courses in linear algebra, calculus, and probability theory and statistics.
- Fluent with at least one programming language, Python strongly preferred
- No specific graduate prerequisite

Instructor

- Yongyi Mao, SITE 5039, `ymao [at] uottawa [dot] ca`

Text and References

- No Textbook.
- Recommended Reference Books
  - Ian Goodfellow, Yoshua Bengio and Aaron Courville, *Deep Learning*, MIT press, 2016, Electronic version available at `http://www.deeplearningbook.org`
  - Richard S. Sutton (Author), Andrew G. Barto, *Reinforcement Learning: An Introduction*, MIT Press
- Some research papers

Lectures

- Time: Thursday 2:30PM to 5:20PM

Office Hours

- Via Zoom and by email appointments

Grading Scheme

- Homeworks: 60%
  - Except for a few cases, most of the homework problems are programming based.
- Mini-research project (40% + 3% bonus)
  - A list of mini-projects are given in the beginning of the term.
  - Students may form a group to sign up a for project given in the list (on first-come-first-pick basis); the maximum group size is yet to be determined.
  - For grading purpose, each group need to present a project proposal presentation and a final project presentation.
  - More information will be given.

Platforms

- Brightspace is used for submission of assignments/projects, grading and some aspects of course management.
  - Students from Carleton need to contact your administrator to have an uOttawa Brightspace account and access the platform.
- Slack is used for announcements, technical discussions, social networking.
  - Students are invited by email to join the Slack workspace, or can join via the following link: `https://join.slack.com/t/dl23workspace/shared_invite/zt-22pncg69x-n_aGrI5ihxmjgtDPuExE~A`
- Some course materials can be found in this Dropbox folder: `https://www.dropbox.com/sh/3l3wyevq2yiuiha/AADx6e1PZFdUBsHBi2RotJ23a?dl=0`

Figure 1: QR code to join Slack Workspace

Plagiarism and Academic Fraud

- Plagiarism (copying and handing in for credit someone else's work) and other forms of academic fraud are serious academic offences that will not be tolerated.
- The person providing solutions to be copied is also committing an offence as they are an active participant in the plagiarism.
- The person copying and the person copied from will be reprimanded equally according to the regulations set by the University of Ottawa.
- For additional information, visit THIS LINK.