CMPT 728 - G100 Deep Learning

Instructor(s): Oliver Schulte

Calendar Objective/Description:
Deep Learning

Instructor's Objectives:
Machine learning has become the main framework for building programs that perform intelligent tasks. In fields such as computer vision and natural language processing, many recent successes have been achieved using neural nets with several layers, known as deep neural nets. This course is an introduction to deep neural nets, techniques for training them from data, and significant applications. While general machine learning is not a prerequisite, the course will be difficult for students without sufficient preparation. The main learning outcomes are 1) sufficient practical experience with deep learning to apply current techniques to real-life problems 2) sufficient theoretical understand of deep neural nets to analyze and improve their performance.

Prerequisites:
see go.sfu.ca

Topics:
- Comparison of neural networks with learning approaches (linear classifiers, kernel methods)
- Training feedforward neural nets (backpropagation)
- Advanced training topics, including: dropout, batch normalization, step size adaption
- Common architectures and their applications: convolutional neural networks, recurrent neural network
- Embeddings (skip-gram models, graph neural networks)
- Generative models: generative adversarial models, variational auto-encoders
- Adversarial attacks against neural networks
- Time permitting: interpreting neural networks
- Time permitting: deep reinforcement learning

Grading:
Grading will be based on written assignments (3-5), homework exercises (3-5), quizzes, and a take-home final. The main component of the assignments will be applying neural networks to datasets. Grading breakdown: * Assignments 35% * Exercises 10% * Quizzes 15% * Final Exam 40%. Students must attain at least 50% on the final exam to obtain a clear pass (C- or better).

Required Books:
Introduction to Deep Learning, Eugene Charniak, MIT Press, 2018, 9780262039512

Reference Books:

Academic Honesty Statement::
Academic honesty plays a key role in our efforts to maintain a high standard of academic excellence and integrity. Students are advised that ALL acts of intellectual dishonesty will be handled in accordance with the SFU Academic Honesty and Student Conduct Policies (http://www.sfu.ca/policies/gazette/student.html).