CMPT 726 - G100 Machine Learning

Calendar Objective/Description:
Machine Learning

Instructor's Objectives:
Machine learning is the study of computer algorithms that improve automatically through experience, which play an increasingly important role in artificial intelligence, computer science and beyond. The goal of this course is to introduce students to machine learning, starting from the foundations and gradually building up to modern techniques. Students in the course will learn about the theoretical underpinnings, modern applications and software tools for applying deep learning. This course is intended to be an introductory course for students interested in conducting research in machine learning or applying machine learning, and should prepare students for more advanced courses, such as CMPT 727 and CMPT 728. No previous knowledge of machine learning is assumed, but students are expected to have solid background in calculus, linear algebra, probability and programming using Python.

Prerequisites:
see go.sfu.ca

Topics:
- (Generalized) linear models: linear regression, ridge regression, logistic regression
- Non-linear models: kernel ridge regression, SVMs, neural networks, k-nearest neighbours
- Regression, binary classification, multinomial classification
- Optimization: gradient descent, stochastic gradient descent
- Unsupervised learning: principal components analysis, auto-encoders, clustering

Grading:
The course grade will be based on homework assignments and exam.

Reference Books:
The Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani, and Jerome Friedman, Springer-Verlag, 2009, 9780387848570
Pattern Recognition and Machine Learning, Christopher M. Bishop, Springer, 2006, 9780387310732

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).