CMPT 727 - G100 Statistical Machine Learning

Instructor(s): Maxwell Libbrecht

Calendar Objective/Description:
Statistical Machine Learning

Instructor's Objectives:
Why we're offering this course: Machine learning now plays a central role in hundreds of fields. All learning methods have common underpinnings based on probability and statistics, but these are not widely understood. This course aims to give students a probabilistic foundation for machine learning and an understanding of probabilistic machine learning methods.

After you complete this course, you will be able to:
* Understand concepts such as: prior, posterior, likelihood, overfitting, bias-variance tradeoff, likelihood, regularization.
* Choose between probabilistic machine learning methods, understand what aspects of a data set influence machine learning performance, and foresee which will perform best.

Who should take this course? This course is intended for graduate students with an interest in machine learning or big data. You should take this course if:
* You intend to use or develop machine learning in your research or work.
* You are interested in fields where probabilistic machine learning is important including: vision, natural language processing/understanding, medical imaging, robotics, smart cities.
* You want to understand statistical behavior of machine learning methods at a deep level.

Prerequisites: No official prerequisites. However, the course assumes basic knowledge of machine learning (e.g. CMPT 726), probability (e.g. STAT 270) and linear algebra (e.g. MATH 240). The course is open to advanced undergraduates with permission.

Topics:
- Probabilistic graphical models
- Discrete and continuous distributions
- Maximum likelihood estimation
- EM algorithm
- Bayesian probability

Grading:
Grading will be based on written and coding assignments and participation in group problem solving sessions.

**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).