CMPUT 466/566 (Fall 2021)
Syllabus and Open-Access Information

Instructor: Lili Mou

Course Format: The course will be delivered remotely. UofA members (for credit or auditing) enjoy a private Google Meet lecture room, QA sessions with the instructor and TAs, as well as other social events.

For non-UofA members, you may still access the live course lectures in a **broadcasting room**

https://ualberta-ca.zoom.us/j/98065991261

Lecture time: 12:30 PM -- 1:50 PM, Tuesday and Thursday, 1-Sep-2021 ~ 7-Dec-2021 (Edmonton time)

The audience of the broadcasting room will be muted but text chat is allowed (although not monitored). The instructor may answer selected questions from the broadcasting room on an occasional basis.

COURSE CONTENT

Course Description:

Machine learning teaches a machine to learn from previous experience and makes a prediction for (possibly new) data. This course covers standard materials of a "Machine Learning" course, such as linear regression, linear classification, as well as non-linear models. In the process, we will have a systematic discussion on training criteria, inference criteria, bias-variance tradeoff, etc. The goal of the course is to build a solid foundation of machine learning, so there would be intensive math derivations in lectures, assignments, and exams.

Official textbook: None. But the instructor will provide lecture notes.

References: link

Tentative topic list:

Linear regression

- Mean square error (as heuristics)
- Closed-form solution
- Gradient descent
- Maximum likelihood estimation
- Maximum a posteriori training
- Bias-variance tradeoff
- Train-validation-test framework
- Bayesian learning
- Generalized linear models

Linear classification

- Discriminative model: Logistic regression
- Multi-class softmax
- Maximum a posteriori inference
- Generative model: Naïve Bayes

- Discriminant: Linear SVM

Nonlinear models

- Kernels methods: Non-linear SVMs
- Neural networks

Below is only relevant to students who take the course for credit:

GRADE EVALUATION

Assessment	**466 undergraduate students**	**566 graduate students**
Weakly written assignments	15	10
Coding assignments (2--3)	10	10
Mini-project	10	15
Mid-term exam (Oct 15, lecture time)	30	30
Final exam	35	35
Attendance Bonus	Up to 10	Up to 10

Explanation:

- **Written assignments** will be graded in a binary fashion. Students expect to get full marks if they make a series attempt before the deadline. However, the student should be very serious about written assignments for their own sake because they may be much reflected in mid-term and final exams.

- **Coding assignments** involve implementations of basic machine learning models, such as linear regression and logistic regression. Details will be posted when the assignment is available.

- **Mini-project:** A student is expected to apply a few machine learning models to a certain task and make experimental comparison. 10 marks for accomplishing this basic task, and another 5 marks for non-triviality. For undergrads, the 5 non-triviality marks are bonus. Details will be posted in a separate doc.

  No collaboration is allowed for a basic mini-project (or any assignment). For a non-trivial project, collaboration may be allowed up to 3 students. In this case, the students have to form a group themselves and apply to the instructor before Sep 18, 2020. Each of the team member MUST have substantial previous machine learning background. The approval will be based on students' previous experience and the proposal.

- **Mid-term exam** and **final exam** are supposed to be close-book, close-computer. The instructor will make all efforts to ensure academic integrity by remote proctoring. Currently, we are considering two options:
  - Using Smart Exam Monitor (SEM) provided by UofA
  - Using zoom or Google meet

  In either case, the software is free of charge to students, and the companies offering these tools are either approved by UofA or generally trusted. By enrolling the course for credit, the student agrees to turn on webcam, microphone, and share computer screen during the exams.

The mid-term exam is optional. When the letter grade is computed,

mid-term marks =max{mid-term percentage, final percentage} * 30

- **Attendance Bonus:** Despite the non-triviality bonus, a student (either undergrad or grad) gets a bonus mark if, for a mathematical/scientific error, the student is the first to point it out during live lectures. This excludes typos, grammatical errors, and brevity, and is capped by 10 marks. Suggestions for lecture notes and pre-recorded videos are welcome, but no bonus mark will be issued.

  A student should send an email to Steven (weikai@ualberta.ca) and cc the instructor (lmou@ualberta.ca) for bonus points. If the student does not cc the instructor, then no bonus will be issued. The bonus request must be sent on the same day of the lecture where the bonus mark is earned, because the instructor may not remember the details of past lectures.

Late Policy:

Late submissions (written/coding assignments and mini-project) are not accepted for the student's own reason. For a force majeure event (e.g., medical issues, religious events), late assignments will be accepted until the weekend after the final exam (Dec 20, 2020). For written assignments, reference solutions will be posted after the due date, and in this case, students need to propose their own problems and provide solutions for late submissions.

Mid-term exam is optional, because the mid-term will be lifted up to the mark percentage of the final.