CSC412/2506 Winter 2019 — Course information
Probabilistic Learning and Reasoning

Course web site: http://www.cs.toronto.edu/~jessebett/CSC412/

Overview

The language of probability allows us to coherently and automatically account for uncertainty. This course will teach you how to build, fit, and do inference in probabilistic models. These models let us generate novel images and text, find meaningful latent representations of data, take advantage of large unlabeled datasets, and even let us do analogical reasoning automatically. This course will teach the basic building blocks of these models and the computational tools needed to use them.

Schedule

Lectures: Tuesdays 3:10–5:00pm, in Sidney Smith Hall, room 2117. (SS 2117)
Tutorials: Thursdays 1:10–2:00pm in Sidney Smith Hall, room 2117. (SS 2117)

Topics and material for each lecture and tutorial will be found on the course web page.

Piazza Discussion Board

https://piazza.com/utoronto.ca/winter2019/csc412/home

Teaching Team

Instructor
Jesse Bettencourt
e-mail: csc412prof@cs.toronto.edu* **CSC412 in subject**
Office hours: Wednesdays 11:30–12:30 in Bahen (BA) 2283

Teaching Assistants:
e-mail: csc412tas@cs.toronto.edu* **CSC412 in subject**
TBA

*Please consider posting questions to Piazza before contacting teaching team directly.
Do NOT send us email about the class directly to our personal accounts. We will not answer.

Marking Scheme

- Assignment 1: 15% (TBA)
- Assignment 2: 15% (TBA)
- Assignment 3: 20% (TBA)
- Midterm: 20% (Tentatively Feb. 14)
- Final: 30%

Assignments are due by **23:59** on the due date.

Late penalty for assignments: 15% will be deducted from assignments each day after the due date (rounding up). Assignments wont be accepted after 48 hours after the due date.

Communication for Special Circumstances: If you find yourself in a situation that requires you to submit your assignment after the deadline you should inform me via email prior to the due date as soon as possible. Be preemptive. Emails explaining late assignments near or after the deadline will not be considered generously.

Collaboration policy: After attempting the problems on an individual basis, you may discuss and work together on thehomework assignments with up to two classmates. However, you must write your own code and write up your own solutions individually and explicitly name any collaborators at the top of the homework.

Programming Assignments: A typical assignment will require you to write (or modify) and use some Python code that implements a simple version of a learning procedure that has recently been covered in the course. You will have to submit a brief report (roughly one page plus figures) that describes the results you obtained.

Marking concerns: Any requests to have marked work re-evaluated must be made in writing within one week of the date the work was returned. The request must contain a justification for consideration.

Graduate students will be evaluated at the graduate level according to the University Assessment and Grading Practices Policy. Graduate students in CSC2506 may have some additional questions to do on assignments (these questions will not be required for undergraduates).

Course Outline

This course covers some of the theory and methodology of statistical aspects of machine learning. The preliminary set of topics to be covered include:

- Linear methods for regression + classification
- Bayesian linear regression
- Probabilistic Generative and Discriminative models
- Regularization methods
- Stochastic Optimization and Neural Networks
- Graphical model notation and exact inference
- Mixture Models, Bayesian Networks
- Model Comparison and marginal likelihood
- Stochastic Variational Inference
- Time series and recurrent models
- Gaussian processes
- Variational Autoencoders

Readings

There is no required textbook for the class. A few small readings may be assigned if the need arises, these will be posted on the course website. Specific chapter readings may be assigned primarily from:

- David MacKay (2003) *Information Theory, Inference, and Learning Algorithms* http://www.inference.phy.cam.ac.uk/mackay/itila/
- Kevin Murphy (2012) *Machine Learning: A Probabilistic Perspective*

Additional help

Need extra help with the coursework? Here are some options:

- For continued class discussion and questions outside of class, try posting on the piazza. The instructor and TAs will be monitoring them. However, this forum is primarily for you to discuss the topics amongst yourselves. You should not expect an answer from the teaching team for every question. In particular, we may intentionally not answer questions we believe would be beneficial for students to answer for each other. The best way to learn is to explain!
- You can visit the instructor during their office hour.
- E-mail should only be used for emergencies or personal matters.

How to communicate with your instructor

Questions about course material such as:

- How do I do question 3.7 in the textbook?
- What is standard deviation?
- When is the midterm?

should be posted on the piazza discussion forum.

For private communication, such as I missed the test because I was ill, e-mail your instructor. Use your utoronto.ca e-mail account to ensure that your message doesn't automatically go to a Junk folder and include your full name and student number.

Academic integrity

You are responsible for knowing the content of the University of Toronto's Code of Behaviour on Academic Matters. If you have any questions about what is or is not permitted in this course, please do not hesitate to contact your instructor.

Accessibility needs

The University of Toronto is committed to accessibility. If you require accommodations for a disability, or have any accessibility concerns about the course, the classroom, or course materials, please contact Accessibility Services as soon as possible: accessibility.services@utoronto.ca or http://accessibility.utoronto.ca.