COMP 5900: Data Representation Learning

TITLE: Data Representation Learning

LECTURES: Tuesday 2:35pm-5:25pm, Mackenzie Building 3174

INSTRUCTOR: Yuhong Guo, yuhong.guo(at)carleton.ca
OFFICE: HP5167, School of Computer Science; **OFFICE HOURS:** Tuesday 12:50pm-2:20pm

COURSE PAGE: http://people.scs.carleton.ca/~yuhongguo/courses/2017Winter/COMP5900.html

PREREQUISITES

Basic level of familiarity with probability and statistics, linear algebra; programming capacity.

TEXTBOOKS & TEACHING MATERIALS

- Deep Learning (Adaptive Computation and Machine Learning series), by Ian Goodfellow, Yoshua Bengio, Aaron Courville
- Introduction to Information Retrieval, by Manning, Raghavan, and Schütze.
- Other unpublished lecture notes and published scientific research papers.

DESCRIPTION

Data representations are fundamental to machine learning and data mining. Expressing complex data objects, such as documents or images, as feature representations that capture salient, robust and stable properties, can reveal important structure in a data collection, as well as in individual data items. Feature representations do not only facilitate understanding, they enable subsequent learning. Automatically discovering useful representations from data has been a long-standing goal of machine learning research. This course will cover fundamental concepts and algorithms for automated representation learning, including dimensionality reduction algorithms, matrix factorization and deep learning algorithms.

CONTENT

Textual document representation, image representation, dimensionality reduction, sparse coding, nonnegative matrix factorization, restricted Boltzmann machines, autoencoders, convolutional neural networks, recurrent neural networks.

GRADING

- Midterm Exam: 20% Paper Presentation: 20%
- Final Exam: 20% Course Project: 40%

POLICIES and RULES

- Attendance to all lectures and presentations is required, except in special situations with emergencies (with legitimate reason and proof) or with prior agreement.
- Late submission of assignments and project will NOT be accepted.
- All the Carleton's standard rules on Equity, Students with special needs, Plagiarism, Academic Integrity etc. hold for this course. All these matters will be handled by appropriate authorities. You should look into the relevant university publications. If you have questions regarding any of this, you can ask the School of Computer Sciences Administrative Staff.