Syllabus

Course Description

Machine learning is at the core of the emerging "Data Science", a new science area that promises to improve our understanding of the world by analysis of large-scale data in the coming years. The objective of this class is to provide rigorous training in conceptual, theoretical and experimental machine learning. The lectures will cover learning methods for regression, classification, clustering, dimensionality reduction and combining multiple learners. The models in the categories of Bayesian methods, perceptrons/neural networks, parametric/non-parametric methods, kernel machines, and graphical models will be introduced. Various examples and applications will also be discussed with details. The specific goals for students include

- To learn fundamental concepts in machine learning.
- To acquire hands-on experiences with implementation of machine learning algorithms.
- To understand how to derive the mathematical formulation of the fundamental machine learning models.
- To learn how to formulate and solve application questions with appropriate machine learning methods.

Course Design

This course will be primarily lecture-based with in-class discussion of broader topics. The breakdown of the class grade is as follows:

- Homework assignments (66.7%): There will be around six hands-on homework assignments. Each requires substantial work in programming and math derivation. The programming assignments must be done in Matlab. Each homework will be due at 11:59 PM CDT. For late submissions, each student is allowed to submit a maximum of two out of the five assignments late with a maximum delay of three days for each late submission. Any submissions that do not follow this policy will not be graded and will receive zero credit, this will be strictly enforced. If there are questions, contact the instructor and TA.
- Final exam (33.3%): 2-hour in-class closed-book exam.

Textbooks

Introduction to Machine Learning (Third Edition), Ethem Alpaydin, MIT Press, ISBN: 9780262028189

Pattern Recognition and Machine Learning, Christopher Bishop, Springer, ISBN: 978-0-387-31073-2 (Secondary)

Prerequisite

Programming with Matlab, and prior knowledge in basic statistics, probabilities and linear algebra.

Time and Location

Tuesday/Thursday, 11:15am-12:30pm, Keller 3-111

Academic Integrity Policy

Students are encouraged to discuss the homework assignments with each other, but each student must complete and submit his/her own work. Any student cheating on a homework assignment will receive an F as a class grade and the incident will be reported to the University office. Group work will be encouraged on the course project. More information on academic misconduct is available at Note on Academic Conduct for New Students and The Office for Student Academic Integrity.

Last modified: Monday, September 5, 2016, 8:46 PM