CS 165B: Introduction to Machine Learning

Syllabus

https://github.com/UCSB-Shiyu-Teaching/CS165B

General Information

General course information can be found on GauchoSpace. Please check GauchoSpace regularly for announcements, assigned homework, and any other relevant information.

Course Objective and Tentative Topics

This is an introductory class in the field of machine learning. By the end of the course, students will 1) understand the foundation, major techniques, applications, and challenges of machine learning; 2) be able to apply basic machine learning algorithms for solving real-world problems. Tentatively, we will cover the following topics:

- Introduction to machine learning
- Review: linear algebra
- Perceptron
- Linear regression
- Review: probability
- Logistic regression
- Naive Bayes classifier
- Decision tree and random forests
- Support vector machines and kernel methods
- Unsupervised learning and k-means clustering
- Dimension reduction and principal component analysis
- Neural networks and deep learning

Recommended Background

This class is math orientated, which requires you to understand some basics in linear algebra, probability theory, and numerical optimization. This class also requires you to complete machine problems (MPs) using Python and to write your homework using LaTex. Please start the HW0 (self-assessment) as soon as possible. It will help you to check if you have enough background knowledge for this class.

Grading Policy

Grades will be based on written and programming assignments (60%), and two exams (40%).

Homework All homework must be done independently. Most homework contains both written and programming components. Therefore, most homework submissions should include a report and some PYTHON code. The report needs to be typed using LATEX. Handwritten homework will not be graded. Unless otherwise instructed, all assignments must be submitted by 11:59 pm on the due date. There is no late homework that will be graded. We drop the lowest homework score.

Exam One mid-term and one final exam will be tested. The format of the exams will be discussed in class.

Academic Integrity

The university, the department, and this instructor all take the issue of academic integrity very seriously. A university requires an atmosphere of mutual trust and respect. While collaboration is an integral part of many scholarly activities, it is not always appropriate in a course, and it is never appropriate unless due credit is given to all participants in the collaboration. This goes for both ideas and programming or other work. Here are some examples:

- Allowed: discussion of lecture and textbook materials.
- Allowed: discussion of how to approach assignments, what techniques to consider, what textbook or lecture material is relevant.
- Not allowed: sharing ideas in the form of code, pseudocode, or solutions.
- Not allowed: turning in someone else's work as your own, even with that person's permission.
- Not allowed: allowing someone else to turn in your work as his or her own.
- Not allowed: turning in work without proper acknowledgment of the sources of the content (including ideas) contained within the work.

Summary: Academic integrity is absolutely required - dishonesty (cheating, plagiarism, *etc.*) benefits no one and hurts everyone. If you are not sure whether or not something is appropriate, please ask the instructor or TA.

Acknowledgement

The preparation of this course has benefited from the previous instructors (Dr. Xifeng Yang and Dr. William Wang), the CSE404 (taught by Dr. Jiayu Zhou) at Michigan State University, and other online materials.