CS596-Machine Learning

Prerequisite

Satisfaction of the Entry-Level Mathematics requirement; advanced coding and debugging techniques; basic understanding of linear algebra.

Catalog Description

This course shall cover a set of advanced concepts of machine learning algorithms and theories, and introduce the best practices for implementing robust intelligent systems. The topics involve both supervised methods (e.g. support vector machine, neural network etc.) and unsupervised methods (e.g. clustering, dimensionality reduction, etc.), and their applications in classification, regression, data analysis, and visualization.

The learning outcomes of this class include the following aspects.
i) Students will be able to obtain an understanding of the basic machine learning concepts and techniques;
ii) Students will be able to implement most of the widely used machine learning methods, and solve real learning problems with moderate challenges;
iii) Students will be able to design a robust machine learning system, perform efficiency and complexity analysis, and improve system performance by diagnosing system bottlenecks.

Programming Language

Python

Topics

Introduction	1 week
Case Studies: Python machine Learning	1 week
Machine Learning theories	1 week
Gradient Descent Methods and Regression Models	1week
Neural networks: Theories, Practices, and Advanced Topics	2 weeks
Convolutional Neural Network and Its applications in Computer Vision	1 week
Model Evaluations and Testing	1 week
Support Vector Machine: Non-linear, Kernel Tricks and Optimization	2 weeks

Unsupervised learning methods	1 week
Ensemble methods: bagging and boosting	2 weeks
Dimensionality reduction and Subspace Learning	2 weeks

Grading Guidelines: This class uses coarse grading, based on students' mastery of the concepts, algorithms, theories and practice skills. The grading comprises of the following aspects:

- Homework assignment (50% of grade). There are 5 homework assignments. Each assignment mixes up with problem set, programming and topic discussions; assignment will be due in one week; late submission is only possible when the students contact the instructor at least two days before the submission is due. If a late submission is accepted, there will be reduction in score as a late penalty.
- Final Project (25% of grade). Every student is encouraged to pair with other students in the same class to complete a project.
- Final Exam (25% of grade).
- Extra credits (5% of grade) available to stimulate in-class interactions and extra efforts in homework assignments and projects.

Important Dates

Final Exam: 2:00pm-3:15pm, Tuesday, December 10, 2019

Class Project Due: 11:59pm, December 18, 2019