

CS596 Machine Learning

Spring 2018

Instructor: Xiaobai Liu

Course Overview

This course shall cover a set of basic concepts of machine learning algorithms and theories, and introduce 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.

Enrollment Information

Prerequisites: programming, data structures, minimal exposure to statistics, linear algebra;

Course Materials

The following resources will be distributed to students:

- Lectures and necessary reading materials
- Sample codes (most of them are in Python format);
- Home assignments

Optional Reading:

- Pattern Recognition and Machine Learning, Christopher M. Bishop, Springer-Verlag New York, Inc. Secaucus, NJ, USA ©2006 ISBN:0387310738
- Optional Reading: Machine Learning: a Probabilistic Perspective by Kevin Patrick Murphy
Online available, <http://www.cs.ubc.ca/~murphyk/MLbook/>

Course Structure and Conduct

CS 596 Machine Learning is a lecture-based course. Assignments will primarily use Python.

Course Grading

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

- Homework assignment (80% of grade). There are 8 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 (20% of grade). Every student is encouraged to pair with other students in the same class to complete a project as a team.
- Extra credits available to stimulate in-class interactions and efforts

Tentative Syllabus

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| Week 1 | Introduction |
| Week 2 | Linear Regression |
| Week 3 | Logistic Regression |
| Week 4 | |
| Week 5 | Neural Network |
| Week 6 | |
| Week 7 | Support Vector machine |
| Week 8 | |
| Week 9 | Unsupervised learning |
| Week 10 | |
| Week 11 | Ensemble Methods: bagging and boosting |
| Week 12 | |
| Week 13 | Dimensionality Reduction |
| Week 14 | |
| Week 15 | Final Project |

Office Hours and Contact

Office Hours: 3:20-4:20pm, M/W, GMCS 531.

Important Due Dates

Class Project, May 1, 2018

Other Course Policies

Accommodations: The learning environment should be accessible to all. SDSU provides reasonable accommodations in the following situations:

- **Disability:** If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Disability Services at (619) 594-6473. To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services as soon as possible. Accommodations are not retroactive.
- **Religious and official university activities (e.g., Athletics):** Within the first two weeks of classes, notify your instructor of planned absences for religious or university activities. If scheduling changes occur, immediately notify the instructor.

Academic Honesty: You are free to discuss ideas and strategies for approaching problems with others, but students must complete work on their own. Using other people's work in any form (i.e. the web, other students) will result in disciplinary action. Plagiarism is unacceptable and will not be tolerated. You are responsible for understanding plagiarism; the library has a tutorial (<http://library.sdsu.edu/guides/tutorial.php?id=28>). If you have any questions about plagiarism after taking the tutorial, I will be happy to assist you. My standard course of action is to report students whom I believe have cheated or plagiarized to the Judicial Procedures Office. In addition to the academic penalty (usually an F for the course), Judicial Procedures may decide upon additional sanctions such as expulsion.

Classroom policy: Turn cell-phones to be silent mode before class and refrain from chatting during class as both disturb the students around you. If you find yourself unable to resist chatting, you will be asked once to be quiet. A second time will result in your being asked to leave for the day.

Conflicts/Issues: Should you have any concerns about the course, please see me during my office hours or make an appointment and we will try to resolve the problem together. If you are not satisfied with the resolution after having discussed the issue with me, you may contact department chair Dr. Shangping Ren.