



CS 229
Machine Learning
Handout: Course Information

Meeting Times and Locations

Lectures Mondays and Wednesdays, 9:30 AM - 10:50 AM
 NVIDIA Auditorium (in the Huang Engineering Center)

Teaching Staff

Professor
Dan Boneh
Office: Gates 475

Professor
Andrew Ng
Office: Gates 112

Course Coordinator
Swati Dube
Office: Gates 108

Teaching Assistants

Anand Avati	Sanyam Mehra	Jian Huang	Ramtin Keramati
Ziang Xie	Reginald Long	Zahra Koochak	Guillaume Genthial
Lucio Dery	Chenyue Meng	Yoann Le Calonnec	Yu Wu
Vikranth Dwaracherla	Barak Oshri	Haihong Li	Chang Yue
Suraj Radhakrishna Heereguppe	Ishan Patil	Mengwei Liu	Akash Mahajan
Jeremy Irvin	Shuhui Qu	Xingyu Liu	Maxime Voisin
Qijia Jiang			

Syllabus and Course Schedule

Introduction (1 class)

- Basic concepts.

Supervised learning (5 classes)

- Supervised learning setup. LMS.
- Logistic regression. Perceptron. Exponential family.
- Generative learning algorithms. Gaussian discriminant analysis. Naive Bayes.
- Support vector machines.
- Model selection and feature selection.
- Ensemble methods: Bagging, boosting.
- Evaluating and debugging learning algorithms.
- Practical advice on how to use learning algorithms.

Learning theory (2 classes)

- Bias/variance tradeoff.

Unsupervised learning. (5 classes)

- Clustering. K-means.
- EM. Mixture of Gaussians.
- Factor analysis.
- PCA (Principal components analysis).
- ICA (Independent components analysis).

Reinforcement Learning And Control. (4 classes)

- MDPs. Bellman equations.
- Value iteration and policy iteration.
- Linear quadratic regulation (LQR). LQG.
- Q-learning. Value function approximation.
- Policy search. Reinforce. POMDPs.

Deep Learning (3 classes)

- NN architecture.
- Forward/Back propagation.
- Vectorization.
- Adversarial.

Dates for Assignments

- Assignment 1: Out 10/04. Due 10/18.
- Assignment 2: Out 10/18. Due 11/01.
- Assignment 3: Out 11/01. Due 11/15.
- Assignment 4: Out 11/15. Due 12/06.
- Midterm: 11/08, 6-9pm.
- Term project: Proposals due 10/20 (by 11:59PM). Milestone due 11/17 (5pm). Poster presentations on 12/12 (8.30am-11.30am); final writeup due on 12/15 (11:59pm, no late days).

Contact Information

If you have a homework, technical or general administrative question about CS229, for you to get the fastest possible response, please post it on our Piazza forum. To contact the CS229 teaching staff directly, you can also email us at cs229-qa@cs.stanford.edu.

Prerequisites

Students are expected to have the following background:

- Knowledge of basic computer science principles and skills, at a level sufficient to write a reasonably non-trivial computer program.
- Familiarity with the basic probability theory. (CS 109 or STATS 116 is sufficient but not necessary)
- Familiarity with the basic linear algebra (any one of MATH 51, MATH 104, MATH 113, or CS 205A would be much more than necessary)

Online Resources

- Home page: <http://cs229.stanford.edu/>
- Current quarter's class videos: Available from SCPD
- Piazza forum <http://piazza.com/stanford/fall2017/cs229>
- Assignments will be submitted through Gradescope. Sign up for the course using entry code **9ZRWVZ**.
- Staff mailing list: cs229-qa@cs.stanford.edu (to contact the teaching staff directly)

NOTE: If sending email about a homework, please state in the subject line which assignment and which question the email refers to (e.g., Subject: HW3 Q1). Please send one question per email. If you have a technical or homework or general administrative question that is not confidential or personal, we encourage you to post it on the Piazza forum instead, as that will get you a faster response.

Homeworks and Grading

There will be four written **homeworks**, one **midterm**, and one major open-ended **term project**. The homeworks will contain written questions and questions that require some Matlab programming. In the term project, you will investigate some interesting aspect of machine learning or apply machine learning to a problem that interests you.

We try very hard to make questions unambiguous, but some ambiguities may remain. Ask if confused or state your assumptions explicitly. Reasonable assumptions will be accepted in case of ambiguous questions.

Honor code: We strongly encourage students to form study groups. Students may discuss and work on homework problems in groups. However, each student must write down the solutions independently, and without referring to written notes from the joint session. In other words, each student must understand the solution well enough in order to reconstruct it by him/herself. In addition, each student should write on the problem set the set of people with whom s/he collaborated.

Further, since we occasionally reuse problem set questions from previous years, we expect students not to copy, refer to, or look at the solutions in preparing their answers. **It is an honor code violation to**

intentionally refer to a previous year's solutions. This applies both to the official solutions and to solutions that you or someone else may have written up in a previous year.

Late Assignments: Each student will have a total of **seven (7) free late (calendar) days** to use for homeworks, project proposals and project milestones. Once these late days are exhausted, any assignments turned in late will be penalized 20% per late day. However, **no assignment will be accepted more than three days after its due date**, and late days cannot be used for the final project writeup. Each 24 hours or part thereof that a homework is late uses up one full late day.

Assignment Submission: Assignments will be submitted through Gradescope. Please check the course website for further instructions.

The term project may be done in teams of up to three persons. The midterm is open-book/open-notes, and will cover the material of the first part of the course. It will take place on Wednesday, November 8, 6-9 pm (location TBD).

Sections

To review material from the prerequisites or to supplement the lecture material, there will occasionally be extra discussion sections held on Friday. An announcement will be made whenever one of these sections is held. Attendance at these sections is optional.

Communication with the Teaching Staff

If you have a question that is not confidential or personal, we encourage you to post it on our forum on Piazza. To contact the teaching staff directly, we strongly encourage you to come to office hours. If that is not possible, you can also email us at the course staff list, cs229-qa@cs.stanford.edu (consisting of the TAs and the professors). By having questions sent to all of us, you will get answers much more quickly. Of course, confidential or personal questions can still be sent directly to Professor Ng, Professor Boneh or Swati Dube.

For grading questions, please talk to us after class or during office hours.

Answers to commonly asked questions and clarifications to the homeworks will be posted on the FAQ.