CS 229
Machine Learning
Course Materials

Handouts and Problem Sets

- Handout #1: Course Information
- Handout #2: Course Schedule
- Homework #0: Problem Set 0 | Solutions
- Homework #1: Problem Set 1 | Solutions
- Homework #2: Problem Set 2 | Solutions
- Practice Midterms: Practice Midterm 1 | Practice Midterm 2 | Practice Midterm 1 Solutions | Practice Midterm 2 Solutions
- Homework #3: Problem Set 3 | Solutions
- Homework #4: Problem Set 4 | mix.dat | bellsej.m | q6.zip | Solutions

Lecture Notes

- Lecture notes 1 (ps) (pdf) Supervised Learning, Discriminative Algorithms
- Lecture notes 2 (ps) (pdf) Generative Algorithms
- Lecture notes 3 (ps) (pdf) Support Vector Machines
- Lecture notes 4 (ps) (pdf) Learning Theory
- Lecture notes 5 (ps) (pdf) Regularization and Model Selection
- Lecture notes 6 (ps) (pdf) Online Learning and the Perceptron Algorithm. (optional reading)
- Lecture notes 7a (ps) (pdf) Unsupervised Learning, k-means clustering.
- Lecture notes 7b (ps) (pdf) Mixture of Gaussians
- Lecture notes 8 (ps) (pdf) The EM Algorithm
- Lecture notes 9 (ps) (pdf) Factor Analysis
- Lecture notes 10 (ps) (pdf) Principal Components Analysis
- Lecture notes 11 (ps) (pdf) Independent Components Analysis
- Lecture notes 12 (ps) (pdf) Reinforcement Learning and Control

Supplemental Notes

- Supplemental notes 1 (pdf) Binary classification with +/-1 labels.
- Supplemental notes 2 (pdf) Boosting algorithms and weak learning.
  - Matlab code to generate plots (.m) Functional after implementing stump_booster.m in PS2.
- Supplemental notes 3 (pdf) The representer theorem.
- Supplemental notes 4 (pdf) Hoeffding's inequality.

Section Notes

- Section notes 1 (pdf) Linear Algebra Review and Reference
- Section notes 2 (pdf) Probability Theory Review
- Section notes 3 (pdf) Files for the Matlab tutorial: sigmoid.m, logistic_grad_ascent.m, matlab_session.m
- Section notes 4 (ps) (pdf) Convex Optimization Overview, Part I
- Section notes 5 (ps) (pdf) Convex Optimization Overview, Part II
- Section notes 6 (ps) (pdf) Hidden Markov Models
- Section notes 7 (pdf) The Multivariate Gaussian Distribution
- Section notes 8 (pdf) More on Gaussian Distribution
- Section notes 9 (pdf) Gaussian Processes

Other resources

Advice on applying machine learning: Slides from Andrew's lecture on getting machine learning algorithms to work in practice can be found here.

Previous projects: A list of last year's final projects can be found here.

Matlab resources: Here are a couple of Matlab tutorials that you might find helpful: http://www.math.ucsd.edu/~bdriver/21d-s99/matlab-primer.html and http://www.math.mtu.edu/~msgocken/intro/node1.html. For emacs users only: If you plan to run Matlab in emacs, here are matlab.el, and a helpful .emac's file.

Octave resources: For a free alternative to Matlab, check out GNU Octave. The official documentation is available here. Some useful tutorials on Octave include http://en.wikibooks.org/wiki/Octave_Programming_Tutorial and http://www-mdp.eng.cam.ac.uk/web/CD/engapps/octave/octavetut.pdf .

Data: Here is the UCI Machine learning repository, which contains a large collection of standard datasets for testing learning algorithms. If you want to see examples of recent work in machine learning, start by taking a look at the conferences NIPS (all old NIPS papers are online) and ICML. Some other related conferences include UAI, AAAI, IJCAI.

Viewing PostScript and PDF files: Depending on the computer you are using, you may be able to download a PostScript viewer or PDF viewer for it if you don't already have one.

Comments to cs229-qa@cs.stanford.edu Home Page