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.

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