

Course Outline
ECE271A – Statistical Learning I
Department of Electrical and Computer Engineering
University of California, San Diego

Nuno Vasconcelos

Fall 2007

Your responsibilities in this class fall into three main categories:

1. Class participation and homework 20%
2. Mid-term 30%
3. Final 40%
4. Cheetah Day 10%

You are allowed to collaborate on homework as long as you write your solutions independently and acknowledge the collaboration in the problems where it was used. Homework will be handed-out on Thursdays and is due one week after the hand-out date. It will have a problem solving component and a component of computer problems. I assume that students have access to Matlab. Let me know if that is a problem. The computer problems will consist of the application of a number of techniques to a given problem (Cheetah). On the last day of classes we will get together for Cheetah Day, where everyone will present the big picture conclusions.

Instructor

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Office hours: Fridays 9:30-11:00AM

TA TBA

Exam dates:

- Mid-term - TBA
- Final - finals week

Text: We will follow closely

- Richard O. Duda, Peter E. Hart and David G. Stork *Pattern Classification*. New York, NY: John Wiley&Sons, 2001.

Supplementary hand-outs will be distributed when appropriate. There are various other books of interest. These are not required but can be used for alternative explanations of the material.

1. T. Hastie, R. Tibshirani, J. H. Friedman, *The Elements of Statistical Learning*. Springer Verlag, 2001.
2. Luc Devroye, Laszlo Györfi, Gabor Lugosi, *A Probabilistic Theory of Pattern Recognition*. Springer Verlag, 1998.

3. Andrew Gelman, Donald B. Rubin, Hal S. Stern, *Bayesian Data Analysis, Second Edition*, CRC Press; 2nd edition, 2003.
4. Tom Mitchell, *Machine Learning*, McGraw-Hill, 1997.
5. Christopher Bishop, *Neural Networks for Pattern Recognition*. Oxford University Press, 1996.
6. Vladimir Vapnik, *The Nature of Statistical Learning Theory*. Springer Verlag, 1999.

There is a web page for the course,

<http://www.svcl.ucsd.edu/courses/ece271A-F07/ece271A-F07.htm>

(also accessible from <http://www.svcl.ucsd.edu/~nuno>)

LECTURE SUBJECT	Number of classes
Introduction	1
Bayesian decision theory	2
The Gaussian classifier	1
Maximum likelihood estimation	1
Bias and variance	2
Bayesian parameter estimation	2
Conjugate and non-informative priors	1
Dimensionality and dimensionality reduction	2
The nearest neighbor classifier	1
Kernel-based density estimation	1
Mixture models and EM	3
Applications	1