Modern Nonparametric Methods

STA 293 Sec 1 SYLLABUS AND COURSE POLICIES Spring, 2005

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Lectures: WF 10:05-11:20AM Old Chem 025


Prerequisites

I assume you know: Linear algebra and statistical principles at the level of Casella and Berger (2002) or Wasserman (2004). You should be comfortable with the topics: distribution functions, convergence in probability, convergence in distribution, almost sure convergence, likelihood functions, confidence intervals, the delta method, bias, mean square error. Students uncertain about preparation are encouraged to contact the instructor.

Course description

Teaches modern, computationally-based methods for exploring and drawing inferences from data. The course covers resampling methods, nonparametric density estimation, nonparametric regression and classification. Specifically covers: bootstrap, Kernel methods, splines, local regression, orthogonal series estimators, Minimax theory, Wavelets, VC Theory, support vector machines.

Computing

The assignments will involve some computing. It will be useful to learn one of the following programming languages: R (recommended), S-Plus, or MATLAB.

Homework

There will be biweekly assignments. Data and necessary computing codes will be provided.

Class outline

This course will cover modern nonparametric statistical methods. Here is an outline of the topics.

1. Introduction
2. Statistical Functionals
3. Resampling Methods
4. Smoothing
5. Nonparametric Regression
6. Density Estimation
7. Minimax Theory
8. Orthogonal Function Methods
9. Adaptive Methods
10. Classification
11. Other Topics

References

- Wahba, G. (1990) Spline Models for Observational Data, SIAM