BIOST/STAT 572
Advanced Applied Linear Models: Prediction and Smoothing

University of Washington
Spring 2007

Instructor: Sebastien Haneuse, PhD

Location: Health Sciences Building (HSB) BB-1404

Times: M 1:30 - 2:20pm
WF 1:30 - 2:50pm

Contact information:
Office hours: F 3:00 - 4:00pm, or by appointment.
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Course webpage: http://courses.washington.edu/b572/

Course description:
In this course we will cover modern methods for prediction and smoothing. The specific goals of this class are:

i. Provide a solid grasp of the theoretical/statistical foundations of modern regression and classification methods.

ii. Present a coherent survey of the methodology, focusing on non-parameteric methods.

iii. Allow students to gain experience and intuition by working on regression/classification problems with both real and simulated data.

Course learning objectives:
Upon completion of the course, the student should be able to:

i. Understand the statistical issues that arise in prediction/smoothing problems.

ii. Understand the theoretical underpinnings of, and be able to fit/implement, a broad range of nonparametric methods for prediction and smoothing problems.

iii. Critically read, review and develop an appreciation for the literature on nonparametric prediction/smoothing methods.

Prerequisites:
Statistics at the level of STAT 512/513 and BIOST/STAT 570/571, or their equivalent, or the instructor’s permission. Familiarity with the statistical programming languages R (or S-plus) is highly recommended.
Tentative course outline:

- Introduction to prediction problems
- Linear methods for regression and classification
- Bias-variance trade-off in model development
- Penalty-based methods
- Local methods
- Generalized additive models
- Tree-based methods
- Boosting

Evaluation:
A short problem set will be assigned approximately every other week. Each student will also be required to complete a short research project, present their findings to the class and write up their work in the form of a short research article. Examples of potential research projects include:

- The comprehensive analysis of a specific dataset.
- A simulation study comparing several methods presented in class.
- A review of a recently published article.
- The development of a novel method or extension of an existing method into a new research area.

Textbooks and readings:


Additional readings will also be assigned.

Academic accomodations:
To request academic accomodations due to disability, please contact Disabled Student Services, 448 Schmitz, (206) 543-8924 (V/TTY). If you have a letter from Disabled Student Services indicating that you have a disability that requires academic accomodations, please present the letter to me so that we can discuss the accomodations you might need in this class.