

STAT/BIOST 527
Nonparametric Regression and Classification

Syllabus

Instructor: Ali Shojaie, PhD, Associate Professor of Biostatistics

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Time and Place: MWF 1:30-2:20pm GUG 218

Office hours:

Wednesdays 4-5pm, Thursdays 2:30-3:30pm or by appointment

Class Web Pages: <http://faculty.washington.edu/ashojaie/teaching/nonpar.html>

Course Objectives

This course covers techniques for smoothing and classification including spline models, kernel methods, generalized additive models, and the averaging of multiple models. It also describes measures of predictive performance, along with methods for balancing bias and variance.

Prerequisites: Either STAT 502 and STAT 504 or BIOST 514 and BIOST 515 and familiarity with computing, or permission of the instructor.

Computing Software: The in-class examples and labs will use the R programming language; students are welcome to use any other computing software/language of their choice, but only R will be supported.

Text: There are a number of good textbooks on nonparametric regression and classification, which can be used as reference for the course. We will use material from the following texts (all available online through Springer-link):

1. Elements of Statistical Learning, by Hastie et al (2011)
2. Introduction to Nonparametric Estimation, by Tsybakov (2009)
3. Statistics for High Dimensional Data, by Buhlmann and van de Geer (2011)
4. Bayesian and Frequentist Regression Methods, by Jon Wakefield (2013)
5. All of Nonparametric Statistics, by Wasserman (2006)

Grading: Graded (3 credits)

The grade will be determined based on the following three components:

- Homework (5-7 total): 40%
- Quiz: 20%
- Project: 40%

Important Notes:

1. Class material, including lecture notes, homework assignments, and other course-related information will be posted on the webpage. Printed course material will not be provided by the instructor. Please check the webpage regularly for updated class material.

2. Questions and discussions are welcome, and encouraged throughout the class; keep in mind that if there is something that is not clear to you, it most likely is unclear to others as well.

Tentative Schedule and Topics Covered:

1. Preliminaries
2. Smoothing methods and kernels
3. Basis expansion and projection estimators
4. Penalized estimators
5. Nonparametric classification
6. Tree-based methods
7. Multiple predictors and additive models

Academic Integrity:

Students at the University of Washington (UW) are expected to maintain the highest standards of academic conduct, professional honesty, and personal integrity. The UW School of Public Health (SPH) is committed to upholding standards of academic integrity consistent with the academic and professional communities of which it is a part. Plagiarism, cheating, and other misconduct are serious violations of the University of Washington Student Conduct Code (WAC 478-120). We expect you to know and follow the university's policies on cheating and plagiarism, and the SPH Academic Integrity Policy. Any suspected cases of academic misconduct will be handled according to University of Washington regulations. For more information, see the University of Washington Community Standards and Student Conduct website.

Access and Accommodation:

Your experience in this class is important to me. If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs in this course. If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 206-543-8924 or uwdrs@uw.edu or disability.uw.edu. DRS offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law.

Learning Environment:

To provide a supportive learning environment, I ask your commitment to showing respect to each other and to your instructors both inside and outside of class by avoiding behavior that might be offensive or distracting to others. Students with concerns about the instructor or teaching assistant (TA) should discuss these concerns with the course instructor and/or TA. If the student is not satisfied with the response, s/he may contact the Biostatistics Department Chair at heagerty@uw.edu. If concerns are not satisfactorily resolved, s/he may also contact the Graduate School at G1 Communications Building by phone at (206) 543-5139.

NOTE: The instructor maintains the right to modify/update the syllabus when necessary.