STAT 7620 Elements of Statistical Learning
Spring 2018

Lectures: MWF 11:30AM – 12:25PM in Cockins Hall 240

Instructor: Yoonkyung Lee
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Course Website:
This course has a web site on Carmen. You will find class notes, homework assignments, solutions, references and other course announcements on the website. Please check it on a regular basis.

Text: *The Elements of Statistical Learning – Data Mining, Inference and Prediction*, Hastie, T., Tibshirani, R., and Friedman, J. (2009), 2nd edition, Springer.
The second edition (2009) is available as an eBook via the SpringerLink on the OSU library website. (see the course website on Carmen for access).

Prerequisites: Probability/Math/Statistics - STAT 6301/6302 or higher, or ECE 6001/7001, or equivalent, or permission of instructor. Familiarity with matrix algebra and linear regression analysis, and working knowledge of standard software packages such as R or Matlab.

Course Description: Statistical learning or machine learning methodology explores various ways of estimating functional dependencies between a response variable and possibly a large set of explanatory variables (features), when one is trying to find and understand an unknown, regular component within the realm of noisy, complex data. Modern regression and pattern recognition analyses fall in this framework. This course will provide an overview of supervised learning and discussions of statistical learning algorithms such as Discriminant Analysis, Classification Tree, Support Vector Machines, and Boosting, and illustrate practical uses of the algorithms. In addition, this course will cover cluster analysis and dimension reduction for unsupervised learning.

Tentative Course Schedule:

Week	Topics
1	Overview of Statistical Learning/Machine Learning (Chapter 1)
	Linear Methods for Regression (Chapter 3)
2	Penalized Regression (Chapter 3)
3-4	Linear Methods for Classification (Chapter 4)
5	Support Vector Machines (Chapter 12)
6	Basis Expansion and Regularization (Chapter 5)
7-8	Kernel Smoothing Methods (Chapter 6)
	Tree-Based Methods (Chapter 9)
9	Bagging and Boosting (Chapter 10)
10-11	Model Assessment and Selection (Chapter 7)
12	Cluster Analysis (Chapter 14)
13-14	Dimension Reduction (Chapter 14)
14-15	Project Presentations

Class Attendance Policy: You are expected to attend all lectures.

Grading: Grades will be assigned on the basis of your performance on homework assignments (40%), a group project (50%), and participation (10%).

Homework Assignments: Homework will involve reading, analytical exercises, computational work, and data analyses. Homework assignments and solutions will be posted on the course website. Each homework will be due at the beginning of class on the due date. No late homework will be accepted.

Project: A project will be a key component of the course, which will be completed in groups of about 4 students. Class presentation and a project report are required for each group. Each group will be asked to choose a research article on advanced topics relevant to the course, provide a summary of the main idea, critically evaluate the idea with a simulation study or demonstrate its effectiveness with a novel application to real data.

Tentative Timeline for Project:

Week 10	Select a topic and form a group.
Week 11	Project proposal (1 page) due March 30
Week 13	Preliminary report (up to 5 pages) due April 13
Week 14-15	Class presentations* (April 20-23)
Final Week	Final report (up to 10 pages) due May 1

* The class may meet during the regularly scheduled final hours, 12:00-1:45PM on *Friday, April 27* for project presentations.

Academic Misconduct: Please help us to maintain an academic environment of mutual respect, fair treatment, and personal growth. Although students are encouraged to work together on homework assignments, all students must submit their own written work IN THEIR OWN WORDS. It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct `http://studentlife.osu.edu/csc/`.

Special Accommodations: Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone 614-292-3307, `slds@osu.edu`; `slds.osu.edu`.