Syllabus- Spring 2014
Stat 502X Applied Modern Multivariate Statistical Learning

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Class Schedule:
2-3 MWF 1116 Sweeney (No Class M 1/20 and F 3/14)
Mid-Term Exam 7-9PM Thursday March 13
Final Exam 12-2PM Monday May 5

Class Requirements:
Regular Homework 30% of Course Grade
Mid-Term Exam 35% of Course Grade
Final Exam 35% of Course Grade


Some Generalities About Modern Data Analytics
- Intro, Some Relevant Linear Algebra, Transforms/Kernels --- 7 Lectures
  (M1, M2, M3, M4, M48)

Prediction
- Linear Prediction --- 6 Lectures
  (M5, M7, M8, M9, M10)
- Smoothing --- 5 Lectures
  (M11, M13, M14, M15)
- Flexible Non-Linear Parametric Regression --- 3 Lectures
  (M16)
- Trees and Forests --- 4 Lectures
  (M17, M20, M18, M19)
- Ensembles: Regression Boosting, Stacking, Bayes Model Averaging --- 3 Lectures
  (M36, M21, averages and majority votes)
Classification

- Bayes, Linear, and Quadratic Classification --- 3 Lectures (M28, M29, M30)
- Support Vector Machines --- 2.5 Lectures (M31, M32, M33, M34)
- Boosting in Classification--- 2.5 Lectures (M35, M36)
- Prototype and Nearest Neighbor Classification --- 2 Lectures (M37)

Some Unsupervised Statistical Learning Methods

- Association Rules/Market Basket Analysis --- 1 Lecture (M38)
- Clustering --- 3 Lectures (M39, M40, M42)
- Multi-Dimensional Scaling --- .5 Lecture (M41)
- Density Estimation --- .5 Lecture (M45)

Some Recommended Text Material:

*Applied Predictive Modeling*, Kuhn and Johnson, Springer 2013
*An Introduction to Statistical Learning*, James, Witten, Hastie, and Tibshirani, Springer 2013
*The Elements of Statistical Learning*, Hastie, Tibshirani, and Friedman, Springer 2009


**Homework Policy:** You may discuss homework problems with other students and with the course instructors. However, every student must do his or her own programming and other detail work and write up and submit his or her own homework paper. Language and details of these papers may NOT be common across students. Attach all code used to produce problem solutions as appendices to the corresponding homework paper. Homework due dates will be announced and papers are due in Vardeman’s Snedecor Hall mailbox by SPM on the due dates. Assignments or parts of assignments turned in late may not be accepted at all or may be heavily penalized according to the discretion of the instructors.
Class Decorum: Please do not text or surf the Web during class.

Accommodation for Students with Disabilities: Iowa State University complies with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act. If you have a disability and anticipate needing accommodations in this course, please contact Prof. Vardeman before the end of the 2nd week of the semester. Later requests for accommodations may not be honored. Anyone requesting an accommodation will need to obtain a SAAR form with recommendations for accommodations from the Disability Resources Office, located in Room 1076 of the Student Services Building.