STAA 577: Spring 2018

Syllabus

Week One – Introduction and Data Wrangling

- Introduction (3/19/2018)
  - Parametric vs non-parametric methods
  - Supervised vs unsupervised learning
  - Regression vs classification
  - Bias-variance tradeoff
  - Lab00 and Lab01 (on your own)
- Classification – Logistic regression, logistic elastic net
- Data wrangling in R (3/21/2018)
- No class (3/23/2018)

Week Two – Resampling methods

- Classification - Linear and quadratic discriminant analysis, K nearest neighbors (3/26/2018)
- Laboratory (3/28/2018)
- Cross validation, Bootstrap including laboratory (3/30/2018) [75 minutes]

Week Three -- Linear model selection and regularization

- Subset selection
- Shrinkage methods (Ridge regression, Lasso, Elastic net)
- Laboratory (4/6/2018) [75 minutes]

Week Four – Beyond linearity

- Polynomial regression
- Smoothing splines
- Generalized additive models
- Laboratory (4/13/2018)

Week Five – Tree based methods

- Regression trees
- Classification trees
- Boosting, random forests and bagging
- Laboratory (4/20/2018)

Week Six – Support Vector Machines

- Hyperplanes
- Maximal margin classifiers
- Classification with Support Vector Machines
- Laboratory (4/27/2018)

Week Seven – Unsupervised learning

- The Singular Value Decomposition
- Dimension reduction methods
- Principal Component Analysis
- Laboratory (5/4/2018)

Week Eight – Unsupervised learning

- Clustering methods – K-means, Hierarchical clustering (5/7/2018)
- Classical nonlinear optimization theory [optional] (5/9/2018)
- No class (5/11/2018)