

STAT 718 Spring 2021 Class Schedule

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Preliminaries

- 1/11/21: syllabus, course overview, review of probability and statistics
- 1/13/21: review of linear algebra
- 1/15/21: model validation methods for machine learning
- 1/18/21: **Martin Luther King Jr. Day (no class)**

Linear Regression

- 1/20/21: ordinary least squares regression
- 1/22/21: bias-variance tradeoff
- 1/25/21: ridge regression
- 1/27/21: LASSO regression
- 1/29/21: geometry of the LASSO and general coordinate descent algorithm
- 2/1/21: computing the LASSO solution with coordinate descent
- 2/3/21: adaptive LASSO and elastic net
- 2/5/21: nonconvex (folded concave) penalties for linear regression

Classification and Generalized Linear Models

- 2/8/21: logistic regression, Fisher scoring algorithm
- 2/10/21: regularized logistic regression
- 2/12/21: coordinate descent for regularized logistic regression
- 2/15/21: **President's Day (no class)**
- 2/17/21: generalized linear models (GLMs)
- 2/19/21: regularized GLMs
- 2/22/21: multi-class classification and regularized variants

Optimization Algorithms for Big Data

- 2/24/21: properties of convex sets and convex functions
- 2/26/21: gradient descent algorithm
- 3/1/21: accelerated gradient descent
- 3/3/21: decision tree learning and gradient boosting

- **3/5/21**: proximal gradient descent
- **3/8/21**: stochastic gradient descent (SGD) and mini-batch SGD
- **3/10/21**: methods for accelerating stochastic gradient descent
- **3/12/21**: **wellness day (no class)**
- **3/15/21**: constrained optimization and Karush-Kuhn-Tucker (KKT) conditions
- **3/17/21**: duality in constrained optimization
- **3/19/21**: alternating direction method of multipliers (ADMM)
- **3/22/21**: generalized lasso and fused lasso

Topics in Unsupervised Learning and Graphical Models

- **3/24/21**: overview of unsupervised learning and singular value decomposition (SVD)
- **3/26/21**: matrix completion and recommender systems
- **3/29/21**: matrix completion and recommender systems
- **3/31/21**: principal component analysis (PCA)
- **4/2/21**: robust PCA
- **4/5/21**: sparse PCA
- **4/7/21**: graphical models
- **4/9/21**: graph selection with the graphical lasso

Grouped Regression and Nonparametric Additive Models

- **4/12/21**: group regularization for linear regression
- **4/14/21**: basis expansions and additive models
- **4/16/21**: sparse additive models, main takeaways from the class

Student Project Presentations

- **4/19/21**: group project presentations
 - parallelized coordinate descent algorithms
 - sparse discriminant analysis
- **4/21/21**: group project presentations
 - sparse clustering
 - topic modeling
- **4/23/21**: group project presentations
 - joint estimation of multiple graphical models
 - regularized Cox's proportional hazards models
- **4/26/21**: **Class cancelled**