<center>Topics in Computational Statistics</center>

Brief Description

Many modern statistical procedures are numerically complex and require the solution of convex and non-convex optimization problems. Therefore, the construction of algorithms to implement statistical procedures are an important component of statistics methodology and applications. In this course we will learn about some of these statistical procedures and their computing algorithms.

Course Content

1. Preliminary: Variance-bias trade off

2. Convex Optimization

   - Gradients and subgradients
   - Back fitting algorithm
   - Ridge regression
   - Quantile regression

3. Model and variables selection

   - Stepwise regression
   - LASSO, ensembles

4. Maximizing the likelihood (EM algorithm)

5. Bayesian models

   - Brief review of Bayesian inference
   - Markov chain Monte Carlo

6. Gaussian graphical models

7. System control: Kalman filter

1 Prerequisites

Some mathematical skills including linear algebra, multivariate calculus and real analysis. Some statistical skills including familiarity with maximum likelihood inference, model fitting by least squares, statistical inference and prediction.

Evaluation

- Final project with oral presentation. Individual projects if class size permits, otherwise in groups.

2 Calendar

All the lectures are from 4-6pm.

Date	Place
Mon, Oct 1	200B-00.07
Thu, Oct 4	200B-01.05
Mon, Oct 8	200B-01.16
Mon, Oct 15	200E-01.209
Thu, Oct 18	200B-01.05
Mon, Oct 22	200B-01.16
Mon, Oct 29	200B-01.16
Mon, Nov 5	200E-01.209
Mon, Nov 12	200B-00.07
Thu, Nov 15	200B-01.05