Summary

This course reviews recent advances in convex optimization and statistical analysis in the wake of Big Data. We provide an overview of the emerging convex formulations and their guarantees, describe scalable solution techniques, and illustrate the role of parallel and distributed computation.

Content

The course consists of the following topics
- Lecture 1: Introduction to convex optimization and iterative methods.
- Lecture 5: Unconstrained smooth minimization II: Gradient and accelerated gradient methods.
- Lecture 7: Stochastic gradient methods.
- Lecture 13: Constrained Convex optimization III.

Learning Prerequisites

Required courses

Previous coursework in calculus, linear algebra, and probability is required. Familiarity with optimization is useful.

Learning Outcomes

By the end of the course, the student must be able to:

- Choose an appropriate convex formulation for a data analytics problem at hand
- Estimate the underlying data size requirements for the correctness of its solution
• Implement an appropriate convex optimization algorithm based on the available computational platform
• Decide on a meaningful level of optimization accuracy for stopping the algorithm
• Characterize the time required for their algorithm to obtain a numerical solution with the chosen accuracy