CPSC 536C: Algorithms for Convex Optimization
Syllabus

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Course Description

In this course we will cover the main algorithms for convex optimization that are provably efficient. Our focus will be on the theoretical foundations of these optimization algorithms, with full proofs of convergence as well as matching lower bounds (where they exist). We will also discuss some applications to machine learning, statistics, discrete optimization, etc.

General

- Lectures: MW 11am-12:30pm
- Location: DMP 201
- Website: `https://a5ramach.github.io/cpsc536C_Fall_2026/index.html`
- Preliminary notes should be posted before class, full notes after lecture
- Students will each give 1 lecture on their topic of interest
- Students will scribe notes for 1 lecture

Prerequisites

Linear algebra, multi-variate calculus, basic complexity theory (big-O notation).

Grading

- Homework: $\sim$30%
- Presentation/Scribe: $\sim$30%
- Final Project: $\sim$40%

Tentative Schedule/ Topics

Part I: Convex Analysis

- Introduction
- Convex sets and functions
- Duality and GLS Oracle model

Part II: Algorithms

- Cutting Plane Methods
- First-Order Methods
- Interior Point Methods

Part III: Applications

- Linear Programs, Max Flow
- Student Presentations