

Computational Optimization ORI 397

AIM 1: To practice implementing advanced optimization algorithms.

AIM 2: To become comfortable designing computationally efficient programs for optimization.

Students completing the course should have significantly increased abilities to tackle complex computational optimization problems and the tasks that surround them in a real-world environment—whether that is your thesis research, or a future employer's application. For example, you'll be able to recognize bottle necks, debug, and organize your code in such a way to allow for re-use and future extension in addition to executing complex optimization tasks.

To achieve these two goals, the class will be structured as follows:

- 1) To start, we will do some simple exercises to learn the basic tasks required for computational optimization. These include reading and processing data, programmatically plotting, sparse matrix operations, interfacing directly with optimization solvers, parallel computations, etc.
- 2) The main section of class will involve a learning about and implementing series of cool, advanced optimization algorithms. The algorithms may change from semester to semester, where some possibilities are: The Ellipsoid Method, Approximate Dynamic Programming, Constraint Sampling, Branch-Cut-Price, Network Simplex, Barrier Algorithm for Convex Optimization, Simultaneous Row and Column Generation, and others.

Prerequisites:

1. An Introduction to Programming class. At a minimum should be familiar with loops, conditionals, basic data structures, organizing code into functions, and big-Oh notation. Knowing object oriented programming would make you highly prepared.
2. Optimization or Algorithms classes. At a minimum, you should have taken at least one of Linear Programming, Algorithms, or Networks class. You are highly prepared if you have taken one or two of the following classes as well: Convex, Dynamic, Integer, and Mixed Integer Programming; Markov Decision Processes; Stochastic Optimization; Advanced Mathematical Programming.

Sign up for Computational Optimization today! (limited spots available! :). Be ready to work hard along with me, and we should have a very useful and enjoyable class.

See you next semester!

Ned Dimitrov