MTH 9842: Optimization Techniques in Finance

Course Outline

Professor Andrew Lesniewski
Baruch College, CUNY
Fall 2018

Time and location: Mon 6:05 – 9:00 pm, VC 5-175
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Office hours: Mon 4:00 – 6:00 pm, or by appointment

Teaching Assistants:
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Office hours: By appointment

Topics covered by the course include the following techniques:

1. Unconstrained optimization (gradient, Newton and quasi-Newton methods, least square problems)
2. Constrained optimization, KKT conditions, duality
3. Linear programming
4. Convex optimization
5. Large scale optimization, stochastic gradient descent and extensions
6. Discrete and continuous stochastic optimal control
7. Reinforcement learning

Homepage: Baruch MFE private forum site is available to registered students. If you're not registered but would like forum access, please contact the course TAs.

Textbook: There is no textbook. Lecture notes to be posted online, and a list of recommended readings will be provided with each set of notes. Useful general references are:

1. J. Nocedal, S. J. Wright: *Numerical Optimization*, Springer (2006)
2. S. Boyde, L. Vandenberghe: *Convex Optimization*, Cambridge University Press (2004)
3. H. Pham: *Continuous-time Stochastic Control and Optimization with Financial Applications,* Springer (2009)
4. R. S. Sutton, A. G. Barto: Reinforcement Learning, MIT Press (2018)

Assignments: Will be assigned weekly. Some problems will involve some programming in a language of your choice. However, I strongly urge to use the following tools:

(i) python/pandas/numpy/scipy
(ii) or R,

for computing, and

(i) Bloomberg,
(ii) or Yahoo Finance,

for data. Assignments can be printed out and submitted or e-mailed to the TAs.

Grading: Homework: 50%, Final Exam: 50%

Prerequisites: Solid grounding in calculus, probability, linear algebra, programming in Python or R .