DS-GA 3001.03: Extended Syllabus Lecture 10

Optimization and Computational Linear Algebra for Data Science (Fall 2016)

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- Gradient Descent – Notes "Optimization Methods" of [2].
- Newton's Method – See Page 484 in [1] or page 44 in [4]. You can also take a look at [3]
- Quasi-Newton's Methods: BFGS. Page 136 in [4].
- Quasi-Newton's Methods: L-BFGS (Limited Memory BFGS). Page 177 in [4].
- Homework 10 consists in deriving the Conjugate Gradient Method, it is inspired in the description of the material in [5].

References

[1] S. Boyd and L. Vandenberghe, *Convex Optimization*, Cambridge University Press, 2004.

[2] Carlos Fernandez-Granda, *Lecture Notes of "Optimization-based Data Analysis"*, available at http://www.cims.nyu.edu/~cfgranda/pages/OBDA_spring16/notes.html, 2016.

[3] Carlos Fernandez-Granda, *Lecture Notes of DSGA1002*, available at http://www.cims.nyu.edu/~cfgranda/pages/DSGA1002_fall15/notes.html, 2015.

[4] J. Nocedal and S. Wright, *Numerical Optimization*, Springer 2006.

[5] J. R. Shewchuk, *An Introduction to the Conjugate Gradient Method without the Agonizing Pain*, 1994