SCHOOL OF INDUSTRIAL ENGINEERING
SEMINAR

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Inexact Newton Methods for Nonlinear Constrained Optimization

Abstract

Inexact Newton methods play a fundamental role in the solution of large-scale unconstrained optimization problems and nonlinear equations. The key advantage of these approaches is that they can be made to emulate the properties of Newton's method while allowing flexibility in the computational cost per iteration. Due to the multi-objective nature of *constrained* optimization problems, however, that require an algorithm to find both a feasible and optimal point, it has not been known how to successfully apply an inexact Newton method within a globally convergent framework.

In this talk, we present a new methodology for applying inexactness to the most fundamental iteration in constrained optimization: a line-search primal-dual Newton algorithm. We illustrate that the choice of merit function is crucial for ensuring global convergence, and discuss novel techniques for handling non-convexity, ill-conditioning, and the presence of inequality constraints in such an environment. Preliminary numerical results are presented for PDE-constrained optimization problems.

Biography

I'm originally from the United States (New York state). I studied Mathematics and Computer Science at the College of William and Mary and graduated in 2003. After my undergraduate, I went to get my PhD in the Department of Industrial Engineering and Management Sciences at Northwestern University. My thesis advisor was Professor Jorge Nocedal and I received my degree in 2007. Since then, I have been a Postdoctoral Researcher at the Courant Institute of Mathematical Sciences at New York University

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