

EPSTEIN INSTITUTE SEMINAR ▪ ISE 651

Second-Order Methods for Stochastic and Nonsmooth Optimization

ABSTRACT – We discuss the challenges and opportunities in designing second-order methods for solving stochastic and nonsmooth optimization problems. While the classical motivation for using second-order methods, namely, fast local convergence guarantees, may remain out of reach in many stochastic and nonsmooth settings, we argue that there remain worthwhile benefits of second-order techniques, such as significantly reduced efforts required for parameter tuning. For much of the talk, we focus on BFGS-type updating schemes for quasi-Newton methods, arguing the benefits of its "self-correcting properties", which can be understood from both geometric and algebraic viewpoints. We also briefly discuss simpler scaling techniques based on second-order derivative estimates that lead to practical benefits in circumstances in which quasi- and inexact Newton methods are too expensive.



Dr. Frank E. Curtis

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SPEAKER BIO – Dr. Frank E. Curtis is an Associate Professor in the Department of Industrial and Systems Engineering at Lehigh University, where he has been employed since 2009. He received his bachelor's degree from the College of William and Mary in 2003 with a double major in Mathematics and Computer Science, received his master's degree in 2004 and Ph.D. in 2007 from the Department of Industrial Engineering and Management Science at Northwestern University, and spent two years as a Postdoctoral Researcher in the Courant Institute of Mathematical Sciences at New York University from 2007 until 2009. His research focuses on the design, analysis, and implementation of numerical methods for solving large-scale nonlinear optimization problems, the results of which have appeared in journals such as *Mathematical Programming* and the *SIAM Journal on Optimization*. He received an Early Career Award from the Advanced Scientific Computing Research program of the U.S. Department of Energy, and has received funding from various programs of the U.S. National Science Foundation. He served as the Vice Chair for Nonlinear Programming for the INFORMS Optimization Society from 2010 until 2012, and is very active in professional societies and groups related to mathematical optimization, including INFORMS, the Mathematics Optimization Society, and the SIAM Activity Group on Optimization.

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3:30PM – 4:50PM

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