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Nonlinear Optimization Modeling using JuMP and JuliaOpt

Abstract:

The JuliaOpt organization hosts open-source optimization software in the Julia programming language. JuliaOpt boasts a growing community of early adopters in academia and industry, many of whom are interested in Julia for its unique combination of performance and ease of use for scientific computing. In this talk, we provide an overview of three JuliaOpt packages: (1) JuMP, an algebraic modeling language with unique functionality for automatic differentiation in nonlinear optimization, (2) MathProgBase, an abstraction layer which makes it easy to develop both solvers and modeling interfaces, and (3) Convex.jl, an algebraic modeling language following the disciplined convex programming philosophy of CVX. Finally, we introduce Pajarito, a new solver for mixed-integer convex programming, demonstrating how we take full advantage of the JuliaOpt infrastructure to achieve state-of-the-art performance with minimal development effort.

Biography:

Miles Lubin is a Ph.D. candidate in the Operations Research Center at MIT advised by Juan Pablo Vielma. He received his B.S. in Applied Mathematics and M.S. in Statistics from the University of Chicago in 2011. He is a Department of Energy Computational Science Graduate Fellow and collaborates with Los Alamos and Argonne National Laboratories on methodologies for large-scale optimization drawing from motivating applications in renewable energy. He is an author of JuMP and a founding member of the JuliaOpt organization.

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