Department of Numerical Analysis and Scientific Computing
Simula Research Laboratory
Oslo, Norway

Optimization in Oslo

A Seminar Series on Continuous Optimization

Date:
Wednesday May 3, 2023 at 14:00 (GMT+2, CET, UTC+2)

Speaker:
Prof. Boris Mordukhovich
Wayne State University, USA

Title:
Generalized Newton Methods in Nonsmooth Optimization

Abstract:
This talk presents new locally and globally convergent Newton-type methods to solve unconstrained and constrained problems of nonsmooth optimization by using tools of variational analysis. These methods employ generalized Hessians for a general class of nonsmooth functions, which enjoy comprehensive calculus rule and explicit evaluations. The proposed globally convergent algorithms are of two types. The first one extends the damped Newton method and requires positive-definiteness of the generalized Hessians for its well-posedness and efficient performance, while the other algorithm is of the regularized Levenberg-Marquardt type being well-defined when the generalized Hessians are merely positive-semidefinite. The obtained convergence rates for both methods are at least linear but becomes superlinear under the so-called semismooth* property of subgradient mappings. Problems of convex composite optimization are investigated with and without the strong convexity assumption on the smooth parts of objective functions by implementing the machinery of forward-backward envelopes. Numerical experiments are conducted for a basic class of Lasso problems by providing performance comparisons of the new algorithms with some other first-order and second-order methods that are highly recognized in nonsmooth optimization.

Brief Bio:
Boris Mordukhovich is a Distinguished University Professor at Wayne State University in Michigan, USA. He received his Ph.D. in Applied Mathematics from the Belarus State University in Minsk, Belarus and has received a number of honorary doctoral degrees including the National Sun Yat-sen University, Taiwan

Alicante University, Spain, and several more. Boris is a Fellow of the Society for Industrial and Applied Mathematics (SIAM), the American Mathematical Society (AMS), a Foreign Member of the The National Academy of Sciences of Ukraine, and Corresponding Member of the Accademia Peloritana dei Pericolanti (Italy).

His areas of research span variational analysis and optimization, systems control and operations research, and nonlinear dynamics. Applications of his work include problems in economics, engineering, mechanics, and behavioral sciences. Boris is the author of roughly 500 publications and several well-known books such as the two volume book *Variational Analysis and Generalized Differentiation* from the Springer Grundlehren Series.

For more info see:

www.borismordukhovich.com