

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

Optimization in Oslo

A Seminar Series on Continuous Optimization

Date:

Wednesday November 30, 2022 at 14:00 (GMT+1, CET)

Speaker:

Prof. Mathias Staudigl
Maastricht University

Title:

Conditional Gradient methods for generalised self-concordant minimization

Abstract:

Self-concordant minimization problems appeared traditionally as a routine in interior-point methods based on barrier formulations of conic convex optimization problems. Recently, self-concordance has gained revived interest due to its connection with machine learning and computational statistics, where it has been demonstrated that many commonly used statistical loss functions display self-concordant-like structures. In this presentation, we develop computationally efficient first-order methods based on the availability of a linear minimization oracle and demonstrate state-of-the-art complexity results.

The first part of the talk will illustrate how the algorithm functions in an abstract convex optimization setting under generalised self-concordant assumptions. The second part of the talk will present a new homotopy-based conditional gradient method for solving convex optimization problems with a large number of simple conic constraints. Instances of this template naturally appear in semidefinite programming problems arising as convex relaxations of combinatorial optimization problems. Our method is a double-loop algorithm in which the conic constraint is treated via a self-concordant barrier, and the inner loop employs a conditional gradient algorithm to approximate the analytic central path, while the outer loop updates the

accuracy imposed on the temporal solution and the homotopy parameter. Our theoretical iteration complexity is competitive when compared to state-of-the-art SDP solvers; with the decisive advantage of cheap projection-free subroutines. Preliminary numerical experiments are provided for illustrating the practical performance of the method.

Brief Bio:

Mathias Staudigl obtained a Phd in Operations Research in 2011 from the University of Vienna. After a post-doc at the European University Institute (EUI) in Florence (Italy) he was Akademischer Rat at the Institute for Mathematical Economics at Bielefeld University (Germany). Since 2015 he has been at Maastricht University (The Netherlands), where he obtained tenure in 2018 and subsequently was appointed as Associate Professor at the Department of Advanced Computing Sciences (DACS). At DACS he is the leader of the Games & AI research group.