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

Optimization in Oslo

A Seminar Series on Continuous Optimization

Date:
Wednesday November 2, 2022 at 14:00 (GMT+2, CEST)

Speaker:
Prof. Coralia Cartis
University of Oxford

Title:
Sparse random embeddings and their applications to optimization

Abstract:
We present subspace embedding properties for hashing/count-sketch matrices that are optimal in the projection dimension of the sketch. A diverse set of results are presented that address the case when the input matrix has sufficiently low coherence; how this coherence changes with the number of column nonzeros (allowing a scaling of the coherence bound), or is reduced through suitable transformations (when considering hashed- instead of subsampled- coherence reducing transformations such as randomised Hadamard). We then discuss the application of these and other sketching results to optimization algorithms: improving on the efficiency of Blendenpik for linear-least squares; and on the efficiency and complexity of random subspace methods for nonconvex optimization.

Brief Bio:
Prof. Cartis obtained her PhD in Mathematics from the University of Cambridge in 2005 and received a Leslie Fox Prize in Numerical Analysis 2005 (second place). She is currently a Professor for Numerical Optimization at the Mathematical Institute of the University of Oxford and a Tutorial Fellow in Mathematics at Balliol College. She has a broad array of interests within mathematical optimization ranging from complexity theory of optimization problems and algorithms, interconnections between dynamical systems and continuous optimization, stochastic optimization, and applications in compressed sensing and inverse problems in climate modelling.