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:
Coralia Cartis is Professor of Numerical Optimization at the Mathematical Institute, University of Oxford and a Fellow of Balliol College and The Alan Turing Institute for Data Science. She received a BSc degree in mathematics from Babesh-Bolyai University, Cluj-Napoca, Romania, and a PhD degree in mathematics from the University of Cambridge, under the supervision of Prof Michael J.D. Powell. Prior to her current post, she worked as a research scientist at Rutherford Appleton Laboratory and as a postdoctoral researcher at Oxford University, and was a tenured assistant professor in the School of Mathematics, University of Edinburgh. Her research interests include the

development and analysis of nonlinear optimization algorithms and diverse applications of optimization from climate modeling to signal processing and machine learning. She serves on the editorial boards of leading optimization and numerical analysis journals and was awarded some prizes for her research.