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ONE WORLD OPTIMIZATION SEMINAR

April 27th, 2020 @ 15:00 CEST (Central European Summer Time)

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(KAUST)

On Second Order Methods and Randomness

Abstract. We present two new remarkably simple stochastic second-order methods for minimizing the average of a very large number of sufficiently smooth and strongly convex functions. The first is a stochastic variant of Newton's method (SN), and the second is a stochastic variant of cubically regularized Newton's method (SCN). We establish local linear-quadratic convergence results. Unlike existing stochastic variants of second order methods, which require the evaluation of a large number of gradients and/or Hessians in each iteration to guarantee convergence, our methods do not have this shortcoming. For instance, the simplest variants of our methods in each iteration need to compute the gradient and Hessian of a single randomly selected function only. In contrast to most existing stochastic Newton and quasi-Newton methods, our approach guarantees local convergence faster than with first-order oracle and adapts to the problem's curvature. Interestingly, our method is not unbiased, so our theory provides new intuition for designing new stochastic methods.

The talk is based on joint work with Dmitry Kovalev and Konstantin Mishchenko that can be found at <https://arxiv.org/abs/1912.01597>.

The link of the zoom-room of the meeting and the corresponding password will be announced the day before the talk on the mailing list of the seminar, to which one can subscribe on <https://owos.univie.ac.at>.