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ONE WORLD OPTIMIZATION SEMINAR

May 11th, 2020 @ 15:00 CEST (Central European Summer Time)

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Scaled Relative Graph

Abstract. Have you ever fallen asleep reading an optimization proof? Most convergence proofs of convex optimization algorithms are written in algebraic equalities and inequalities. Even though they are easy to verify, their core ideas may still be difficult to grasp. The good news is, for nonexpansive operators that constitute popular optimization methods such as forward-backward, alternative projection, Douglas-Rachford, and ADMM, there exist simple 2D graphs that not only capture the core ideas of their convergence proofs but are also a tool to write rigorous proofs and even find best parameters.

In this talk, we analyze contractive and nonexpansive fixed point iterations with a new tool called the scaled relative graph (SRG). The SRG provides a rigorous correspondence between nonlinear operators and subsets of the 2D plane. Under this framework, a geometric argument in the 2D plane becomes a rigorous proof of contractiveness of the corresponding operator. We use the tool to quickly prove some convergence rates, and also show that the averagedness coefficients of the composition of averaged operators by Ogura and Yamada and the three-operator splitting by Davis and Yin are tight.

This is joint work with Ernest Ryu, Robert Hannah, and Xinmeng Huang.

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>.