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ONE WORLD OPTIMIZATION SEMINAR

September 20th 2021 @ 15:30 CEST (Central European Summer Time)

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Nonsmooth Implicit Differentiation for Optimization

Abstract. We begin by reviewing the implicit function theorem as well as available extensions in nonsmooth analysis. The classical implicit function theorem has two parts; the first deals with uniqueness and regularity of the implicit function while the second provides an implicit differentiation calculus. We focus on the second part, illustrating the fact that nonsmooth implicit differentiation fails with Clarke Jacobians and proposing a solution using Conservative Jacobians. Conservative Jacobians have been introduced recently as tools for nonsmooth calculus, compatible with the compositional rules of differential calculus while preserving minimizing behavior of gradient type algorithms. We describe how these objects can be used to resolve the issues of nonsmooth implicit differentiation and how they extend the domain of validity of the rules of differential calculus in nonsmooth analysis. Applications to be discussed include the treatment of optimization problems arising in bilevel programming, such as hyperparameter tuning in machine learning, or training of implicit neural networks. We conclude with an example of a pathological behavior which could occur when nonsmooth implicit differentiation is used outside its domain of validity.

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.