27th IFIP TC7 Conference 2015 on System Modelling and Optimization

Compressed Sensing and Medical Applications

A globalized semismooth Newton method for a class of nonsmooth optimization problems

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Abstract: In this talk, we propose a globalized semismooth Newton method for solving optimization problems involving smooth nonconvex and nonsmooth convex terms in the objective function. A prox-type fixed point equation representing the stationarity conditions forms the basis of the approach. In many important situations, including e.g. ℓ_1 -regularized and group-sparse problems, the corresponding proximity operator can be shown to be semismooth and the semismooth Newton method is applicable. The approach we investigate uses semismooth Newton steps for the fixed point equation to enhance an underlying basic globally convergent descent method, such as a proximal gradient scheme. The acceptance of the semismooth Newton steps is controlled by a filter. We present both global and local convergence results and conclude with numerical examples demonstrating the efficiency of the proposed method.