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*Regularized Nonsmooth Newton Algorithms for Best Approximation, with Applications*

We consider nonsmooth algorithms for the best approximation problem from polyhedral sets. This classical problem has many varied approaches and many applications. In particular, we study a regularized semismooth method where the Jacobian is singular, and compare the computational performance to that of classical projection methods, e.g., the recently studied HLWB projection method.

We observe empirically that the regularized semismooth method significantly outperforms the HLWB approach. However, the HLWB has a convergence guarantee while the semismooth method does not due to singularity of the generalized Jacobian.

We provide several applications including solving large scale linear programs, triangles from branch and bound methods, and generalized constrained linear least squares. We include scaling methods that improve the efficiency and robustness.

work with Yair Censor, Walaa Moursi, Tyler Weames