A Newton-type method for strict saddle functions

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Nonconvex optimization problems arise in many fields of computational mathematics and data science. Recent advances in this area have focused on instances where nonconvexity has a benign effect, in the sense that traditional optimization algorithms exhibit good theoretical and practical performance on such problems. On the other hand, exploiting a particular nonconvex structure to improve algorithmic design is a more challenging endeavor.

In this talk, we describe a Newton-type framework for solving nonconvex optimization problems that exhibit a particular structure characterized by a strict saddle property. Our approach benefits from the local convergence properties of Newton's method, and is endowed with global convergence rates that improve over those known for generic nonconvex instances. In addition, our algorithm and its analysis can account for the presence of manifold constraints, which we illustrate on a selection of strict saddle functions.

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