Finite-Difference-Based Methods for Noisy Black-Box Optimization

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Abstract

This talk addresses nonconvex derivative-free optimization problems where only function evaluations and where potentially noisy are available. We propose finite-difference-based methods for minimizing differentiable (not necessarily convex) functions with globally Lipschitz continuous gradients. In the noiseless setting, we prove convergence of the gradient sequence to zero and provide global convergence rates of iterates under the Kurdyka–Łojasiewicz property. In the noisy setting, without requiring knowledge of noise levels, the algorithms reach near-stationary points, with explicit bounds on iterations and function evaluations. Numerical experiments demonstrate robustness and efficiency compared with other finite-difference schemes and state-of-the-art derivative-free solvers, while also integrating acceleration techniques from smooth optimization.