

Langevin-based algorithms: semi-convexity and discontinuous gradients

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Langevin-based algorithms, derived from a certain class of stochastic differential equations, have emerged as powerful tools for both sampling in high-dimensional spaces and optimization in non-convex landscapes. Over the years, these methods have shown remarkable success in addressing the challenges posed by complex, high-dimensional distributions and the inherent difficulties of non-convex optimization problems. Their ability to efficiently explore complex, multi-modal distributions and escape local minima makes them particularly suited for a wide range of applications, from machine learning to physical simulations. This talk reviews recent progress and compares it with popular optimizers widely adopted in industry, such as ADAM, AMSGrad, AdaBound, and AdaBelief. It also presents recent convergence results for semi-convex potentials with discontinuous gradients.