On the fast convergence of random perturbations of the gradient flow

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Abstract

We consider in this talk small random perturbations (of multiplicative noise type) of the gradient flow. We rigorously prove that under mild conditions, when the potential function is a Morse function with additional strong saddle condition, the perturbed gradient flow converges to the neighborhood of local minimizers in $O(\ln \epsilon^{-1})$ time on the average, where $\epsilon > 0$ is the scale of the random perturbation. Under a change of time scale, this indicates that for the diffusion process that approximates the stochastic gradient method, it takes (up to logarithmic factor) only a linear time of inverse step size to evade from all saddle points and hence it implies a fast convergence of its discrete-time counterpart.

The talk will be based on this preprint: arXiv:1706.00837.

The slides are available here.