PENALIZED LANGEVIN DYNAMICS WITH VANISHING PENALTY FOR SMOOTH AND LOG-CONCAVE TARGETS

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Abstract: We study the problem of sampling from a probability distribution on Rp defined via a convex and smooth potential function. We first consider a continuous-time diffusion-type process, termed Penalized Langevin dynamics (PLD), the drift of which is the negative gradient of the potential plus a linear penalty that vanishes when time goes to infinity. An upper bound on the Wasserstein-2 distance between the distribution of the PLD at time t and the target is established. This upper bound highlights the influence of the speed of decay of the penalty on the accuracy of approximation. As a consequence, considering the low-temperature limit we infer a new nonasymptotic guarantee of convergence of the penalized gradient flow for the optimization problem.