Sampling from the Wasserstein Barycenter

Chiheb DAALOUL, Institut de Mathématiques de Marseille - Marseille
Thibaut LE GOUIC, Institut de Mathématiques de Marseille - Marseille
Jacques LIANDRAT, Institut de Mathématiques de Marseille - Marseille
Magali TOURNUS, Institut de Mathématiques de Marseille - Marseille

We propose an algorithm to sample points distributed according to the Wasserstein barycenter of absolutely continuous probability measures $\mu_1, \ldots, \mu_n$. To the best of our knowledge, this is the first sampling algorithm for this distribution, prior work focusing on estimating the density of the barycenter. The algorithm carries out gradient descent on the Wasserstein space to optimize a penalized version of the multimarginal formulation of the barycenter problem. This procedure thus transports randomly initialized points along trajectories distributing them according to an approximate barycenter. Our analysis focuses on a continuous time formulation and assumes Poincaré and variance inequalities for log-concave $\mu_1, \ldots, \mu_n$. We prove that our method converges exponentially fast to the approximate barycenter and we control the Wasserstein distance to the true barycenter with the penalization.

Contact : chiheb.daaloul@ec-m.fr