Linearization of Wasserstein Space and Stability of Optimal Transport Maps

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Abstract

In this talk, we discuss a simple idea to embed the space of probability measures with finite second moment over $\mathbb{R}^d$ into a Hilbert space. It consists in mapping each measure μ to the (quadratic) optimal transport plan between a reference probability density ρ and μ, which we denote $T_\mu \in L^2(\rho, \mathbb{R}^d)$. In this talk, we are interested in better understanding how the embedding $\mu \mapsto T_\mu$ distorts the Wasserstein geometry. We will also present some work in progress towards understanding how $\|T_{\mu_N} - T_\mu\|_2$ concentrates around its mean, where μ_N is the empirical measure. This relies on a new quantitative stability result for optimal transport plans with respect to perturbations in total variation. Joint work with A. Delalande and F. Chazal.