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Pseudo-Riemannian geometry embeds information geometry in optimal transport

Optimal transport and information geometry both study geometric structures on spaces of probability distributions. Optimal transport characterizes the cost-minimizing movement from one distribution to another, while information geometry originates from coordinate-invariant properties of statistical inference. Their connections and applications in statistics and machine learning have started to gain more attention. We show that the pseudo-Riemannian framework of Kim and McCann, a geometric perspective on the fundamental Ma-Trudinger-Wang (MTW) condition in the regularity theory of optimal transport maps, encodes the dualistic structure of statistical manifold which is a generalization of Riemannian geometry. Some examples are given to illustrate the framework. This is joint work with Jiaowen Yang (Facebook).