Seminar/Talk

Isometries of Wasserstein spaces

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Host: Laszlo Erdös / Dániel Virosztek

Due to its nice theoretical properties and an astonishing number of applications via optimal transport problems, probably the most intensively studied metric nowadays is the p-Wasserstein metric. Given a complete and separable metric space X and a real number p belonging to [1,∞), one defines the p-Wassersteinspace W_p(X) as the collection of Borel probability measures with finite p-th moment, endowed with a distance which is calculated by means of transport plans. The main aim of our research project is to reveal the structure of the isometry group Isom(W_p(X)). Although Isom(X) embeds naturally into Isom(W_p(X)) by push-forward, and this embedding turned out to be surjective in many cases (see e.g. [1]), these two groups are not isomorphic in general. Kloeckner computed in [2] the isometry group of the quadratic Wasserstein space over the real line. It turned out that this group is extremely rich: it contains a flow of wild behaving isometries that distort the shape of measures. Following this line of investigation, we computed Isom(W_p(R)) and Isom(W_p([0,1]) for all p in [1,∞). In this talk, I will survey first some of the earlier results in the subject, and then I will present the key results of our recent manuscript [3]. Joint work with György Pál Gehér (University of Reading) and Dániel Virosztek (IST Austria).[1] J. Bertrand and B. Kloeckner, A geometric study of Wasserstein spaces: isometric rigidity in negative curvature, International Mathematics Research Notices, 2016 (5), 1368-1386.[2] B. Kloeckner, A geometric study of Wasserstein spaces: Euclidean spaces, Annali della Scuola Normale Superiore di Pisa - Classe di Scienze, Serie 5, Tome 9 (2010) no. 2, 297-323.[3] Gy. P. Gehér, T. Titkos, D. Virosztek, Isometric study of Wasserstein spaces – the real line, accepted for publication in Trans. Amer. Math. Soc. Available at https://research-explorer.app.ist.ac.at/record/7389

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