

1142-51-49

Tom Needham* (needham.71@osu.edu) and **Facundo Mémoli**. *Distance Distributions for Curves and Metric Measure Spaces*. Preliminary report.

Given a finite set of points in a Euclidean space, one can consider the histogram of mutual distances between pairs of points as a summary of the geometry of the point cloud. In 2012, Brinkman and Olver extended this idea to define the distance distribution of a plane curve; this is an isometry-invariant function which is more robust to noise than the classical curvature invariant. They conjectured that the distance distribution completely determines a curve up to rigid motions. In this talk, we will demonstrate a counterexample to this conjecture and we show how distance distributions arise in a much more general context: as lower bounds for a metric on the space of all compact metric measure spaces. Using ideas from optimal transport and topological data analysis, we show that distance distributions do have good local injectivity properties for simple classes of metric measure spaces. (Received August 23, 2018)