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Paul Bendich* (bendich@math.duke.edu), **Jacob Harer** and **John Harer**. *A Persistent Homology Based Geodesic Distance Estimator for Dimension Reduction.*

Given a point cloud sampled from or near a Riemannian manifold embedded in high-dimensional Euclidean space, one often wants to build a metric on the point cloud which approximates the geodesic metric on the manifold M . In this paper, we prove theoretical guarantees for the quality of standard graph geodesic metric constructions. We also present a novel algorithm which uses persistent homology to build such a metric, and provide experimental evidence that it is more accurate than other constructions. Finally, we discuss the improvements our algorithm offers to the non-linear dimension reduction technique IsoMap. (Received September 04, 2012)