Distance Preserving Embeddings for Riemannian Manifolds from Samples

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Algorithms for finding low dimensional embeddings of manifold data have gained popularity in the last decade. However, a systematic sample analysis of manifold embedding algorithms largely eludes researchers. Here we present an algorithm that, given access to just a finite size sample, embeds the underlying n-dimensional manifold into $\mathbb{R}^d$ (where $d$ only depends on some key manifold properties such as its intrinsic dimension, volume and curvature) that guarantees to approximately preserve all the underlying interpoint geodesic distances.

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