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*Multivariate Topological Data Analysis*

Assume that a finite set of points is randomly sampled from a subspace of a metric space. Recent advances in computational topology have provided several approaches to recovering the geometric and topological properties of the underlying space. In this talk we take a nonparametric statistical approach to this problem. We assume that the data is randomly sampled from an unknown probability distribution. We define two filtered complexes with which we can calculate the persistent homology of a probability distribution. Using nonparametric statistical density estimators, we show that we can recover the persistent homology of the underlying distribution.