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Persistent homology is a method for probing topological properties of point clouds and functions. The method involves tracking the birth and death of topological features as one varies a tuning parameter. Features with short lifetimes are informally considered to be topological noise. I will present some statistical ideas relating to persistent homology; in particular, deriving confidence intervals that allow us to separate topological signal from topological noise. This is joint work with Sivaraman Balakrishnan, Fabrizio Lecci, Alessandro Rinaldo, Aarti Singh, and Larry Wasserman. (Received September 09, 2013)