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Topological data analysis (TDA), while abstract, allows characterization of time-series data obtained from nonlinear dynamical systems. Though it is surprising that abstract measures of structure like the Betti numbers could be useful in the analysis of real-world data, TDA lets us compare different systems and even do membership testing or change-point detection. However, TDA of time-series data is computationally expensive and involves a number of free parameters. This complexity can be obviated by coarse-graining, using a construct called the witness complex. The parametric dependence of this process gives rise to the concept of persistent homology: how shape changes with the scale of the analysis. Its results allow us to distinguish time-series data from different systems—e.g., the same note played on different musical instruments. (Received September 01, 2019)