Identifying the Finite Dimensionality of Curve Time Series

The curve time series framework provides a convenient vehicle to accommodate some nonstationary features into a stationary setup. We propose a new method to identify the dimensionality of curve time series based on the dynamical dependence across different curves. The practical implementation of our method boils down to an eigenanalysis of a finite-dimensional matrix. Furthermore, the determination of the dimensionality is equivalent to the identification of the non-zero eigenvalues of the matrix. Asymptotic properties of the proposed method are investigated. The proposed methodology is illustrated with both simulated and real data sets.