Wavelet estimation of the dimensionality of curve time series

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Abstract

Functional data analysis is ubiquitous in most areas of sciences and engineering. Several paradigms are proposed to deal with the dimensionality problem which is inherent to this type of data. Sparseness, penalization, thresholding, among other principles, have been used to tackle this issue. We discuss here a solution based on a finite-dimensional functional subspace. We employ wavelet representation of random functions to estimate this finite dimension and successfully model a time series of curves. The proposed method is shown to have nice asymptotic properties. Moreover, the wavelet representation permits the use of several bootstrap procedures, and it results in faster computing algorithms. Besides the theoretical and computational properties, some simulation studies and an application to real data are provided.

Keywords Aggregate data · Bootstrap testing · Finite dimension · Functional data analysis

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