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Abstract

Generalized Dynamic Principal Components

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Brillinger defined dynamic principal components (DPC) for time series based on a reconstruction criterion. He gave a very elegant theoretical solution and proposed an estimator which is consistent under stationarity. Here we propose a new enterally empirical approach to DPC. The main differences with the existing methods -mainly Brillinger procedure- are (i) the DPC we propose need not be a linear combination of the observations and (ii) it can be based on a variety of loss functions including robust ones. Unlike Brillinger, we do not establish any consistency results; however, contrary to Brillinger's, which has a very strong stationarity flavor, our concept aims at a better adaptation to possible nonstationary features of the series. We also present a robust version of our procedure that allows to estimate the DPC when the series have outlier contamination. We give iterative algorithms to compute the proposed procedures that can be used with a large number of variables. Our non robust and robust procedures are illustrated with real data sets.