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Title: The modified Yule-Walker method for multidimensional infinite-variance periodic autoregressive time series

Abstract:

The time series with periodic behavior, such as the periodic autoregressive moving average (PARMA) model belonging to the class of the periodically correlated processes, are present in various real applications. In the literature, such models were considered in different directions, especially with the Gaussian-distributed noise. However, in most of the applications, the assumption of the finite-variance distribution seems to be too simplified. Thus, one considers many extensions of the classical PARMA model where the non-Gaussian distributions are applied. In particular, the Gaussian distribution can be replaced by the infinite-variance distribution, e.g. by the alpha-stable distribution. We focus on the multidimensional alpha-stable PARMA time series. For such models, we propose a new estimation method based on the Yule-Walker equations. However, since for the infinite-variance case the covariance does not exist, thus it is replaced by another measure, namely the covariation. The proposed generalized Yule-Walker method is the extension of the similar algorithm presented by the authors for a one-dimensional PARMA model with infinite variance. The effectiveness of this approach is verified using the Monte Carlo simulations in different contexts, including the sample size and index of stability of the noise. Finally, the real data analysis is presented.