Wavelet Estimation of Functional Coefficient Regression Models

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Abstract

The area of nonlinear time series models has experienced a great development since the 1980s. Although there is a wide range of parametric nonlinear time series models, in general we do not know if the postulated model is the most appropriated for a specific data set. This situation highlights the importance of nonparametric models. An interesting nonparametric model to fit nonlinear time series is the well-known functional coefficient regression model. Nonparametric estimations by, e.g., local linear regression and splines, are developed in the literature. In this work we study the estimation of such a model using wavelets. It is a proposal that takes into account both, classical and warped wavelets. We present the rates of convergence of the proposed estimators and carry out simulation studies to evaluate automatic procedures (among AIC, AICc and BIC) for selecting the coarsest and finest levels to be used during the estimation process. Moreover, we illustrate the methodology with an application to a real data set, where we also calculate multi-step-ahead forecasts and compare the results with other methods known in the literature.

Keywords: Daubechies-Lagarias algorithm; varying coefficient models; functional autoregressive models; father wavelets; warped wavelets