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Nonparametric Nonstationary Regression

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Abstract

This article studies nonparametric estimation of a regression model for d _ 2 potentially nonstationary regressors. It provides the first nonparametric procedure for a wide and important range of practical problems, for which there has been no applicable nonparametric estimation technique before. Additive regression allows to circumvent the usual nonparametric curse of dimensionality and the additionally present, nonstationary curse of dimensionality while still pertaining high modeling flexibility. Estimation of an additive conditional mean function can be conducted under weak conditions: It is sufficient that the response Y and all univariate X_j and pairs of bivariate marginal components X_{jk} of the vector of all covariates X are (potentially nonstationary) _–Harris recurrent processes. The full dimensional vector of regressors X itself, however, is not required to be Harris recurrent. This is particularly important since e.g. random walks are Harris recurrent only up to dimension two. Under different types of independence assumptions, asymptotic distributions are derived for the general case of a (potentially nonstationary) _–Harris recurrent noise term " but also for the special case of " being stationary mixing. The later case deserves special attention since the model might be regarded as an additive type of cointegration model. In contrast to existing more general approaches, the number of cointegrated regressors is not restricted. Finite sample properties are discussed in a simulation study.

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