Autoregression Depth

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Abstract

We consider an analog of the halfspace (Tukey) depth in time series, in the vein of general methodology for extending depth notions to various statistical models. In autoregression models, the result parallels the regression depth for standard regression models. We study its possible statistical applications, in particular its potential for quantile estimation and maximum autoregression depth estimators, which happen to extend the ad hoc proposal for AR(1) models that already appeared in the literature. We explore, both empirically via simulations and examples and theoretically via asymptotics related to that for general maximum depth estimators, how autoregression depth-based procedures compare with similar median-oriented proposals - for instance L1- and sign-based procedures. A special attention is paid to the robustness properties and the behavior for heavy-tailed distributions.