



## Model-Free Bootstrap for Markov processes

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Consider time series data  $X_1, \dots, X_n$  that arise as a (partial) sample path of a stationary Markov process of order  $p \geq 1$ . Under this general context, there are (at least) two resampling mechanisms available in the literature, namely: (a) bootstrap based on kernel estimates of the transition density of the Markov processes of Rajarshi (*Annals Inst. Statist. Math.*, 1990), and the Local Bootstrap for Markov processes of Paparoditis and Politis (*J. Statist. Plan. Infer.*, 2002). In this paper, we introduce a third option, the Model-Free Bootstrap for Markov Processes; this is a novel approach stemming from the Model-Free Prediction Principle of Politis (*Test*, 2013). The three approaches are compared as they apply to the problem of constructing confidence bands for the conditional expectation function  $g(y) = E(X_{n+1}|Y_n = y)$  for some  $y \in \mathbf{R}^p$  where we define  $Y_t = (X_t, X_{t-1}, \dots, X_{t-p+1})'$ .

**Keywords:** Confidence intervals, Local Bootstrap, Model-Free Prediction.