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Sieve bootstrap for time series. (English) Zbl 0874.62102

Bernoulli 3, No. 2, 123-148 (1997).

Summary: We study a bootstrap method which is based on the method of sieves. A linear process is approximated by a sequence of autoregressive processes of order $p = p(n)$, where $p(n) \rightarrow \infty$, $p(n) = o(n)$ as the sample size $n \rightarrow \infty$. For given data, we then estimate such an $AR(p(n))$ model and generate a bootstrap sample by resampling from the residuals. This sieve bootstrap enjoys a nice nonparametric property, being model-free within a class of linear processes.

We show its consistency for a class of nonlinear estimators and compare the procedure with the blockwise bootstrap, which has been proposed by *Künsch* in 1989. In particular, the sieve bootstrap variance of the mean is shown to have a better rate of convergence if the dependence between separated values of the underlying process decreases sufficiently fast with growing separation. Finally, a simulation study helps to illustrate the advantages and disadvantages of the sieve compared to the blockwise bootstrap.

MSC:

62M10 Time series, auto-correlation, regression, etc. in statistics (GARCH)

62G09 Nonparametric statistical resampling methods

Cited in **5** Reviews
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Keywords:

Akaike information criterion; ARMA; autoregressive approximation; autoregressive spectrum; stationary sequence; threshold model; linear process; autoregressive processes; $AR(p(n))$ model; residuals; sieve bootstrap; model-free; consistency; blockwise bootstrap; rate of convergence

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