Künsch, Hans R.

The jackknife and the bootstrap for general stationary observations. (English) Zbl 0684.62035
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Summary: We extend the jackknife and the bootstrap method of estimating standard errors to the case where the observations form a general stationary sequence. We do not attempt a reduction to i.i.d. values. The jackknife calculates the sample variance of replicates of the statistic obtained by omitting each block of ℓ consecutive data once. In the case of the arithmetic mean this is shown to be equivalent to a weighted covariance estimate of the spectral density of the observations at zero. Under appropriate conditions consistency is obtained if $\ell = \ell(n) \to \infty$ and $\ell(n)/n \to 0$.

General statistics are approximated by an arithmetic mean. In regular cases this approximation determines the asymptotic behavior. Bootstrap replicates are constructed by selecting blocks of length ℓ randomly with replacement among the blocks of observations. The procedures are illustrated by using the sunspot numbers and some simulated data.

MSC:

62G05 Nonparametric estimation
62G15 Nonparametric tolerance and confidence regions
62M10 Time series, auto-correlation, regression, etc. in statistics (GARCH)

Keywords:

variance estimation; statistics defined by functionals; time series; influence function; jackknife; bootstrap; general stationary sequence; sample variance; arithmetic mean; weighted covariance estimate of the spectral density; consistency; approximation; sunspot numbers

Full Text: DOI