SEMINAR

DEPARTMENT OF STATISTICS
THE CHINESE UNIVERSITY OF HONG KONG

A practical interval estimation method for spectral density function

INVITED SPEAKER

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TIME

July 17, 2024 (Wed) · 2:00 pm - 3:00 pm

VENUE

LSB LT4 · Lady Shaw Building - LT4 · CUHK

ABSTRACT

The spectral density function can play a key role in time series analysis, where nonparametric interval estimation of the spectral density is a fundamental issue. However, the prevailing pointwise interval methods for spectral densities, including chi-square approximation and frequency domain bootstrap (FDB), can be misleading in practice, perhaps more so than appreciated, as confidence intervals often exhibit low coverage accuracy as well as high sensitivity to tuning parameters. To provide a practical alternative, we propose a new hybrid method that combines the strengths of empirical likelihood (EL) and FDB. The method involves developing an EL statistic for spectral density inference along with a corresponding bootstrap approximation under time dependence, where we allow for general time processes as well as for two different types of kernel smoothing found in application (so-called A- or K-windows). Such windows require differing theories and implementations in practice. As an advantage, the FDB-EL procedure is formally valid under mild conditions for application to a broad range of processes, including both linear and nonlinear time series. Simulation studies demonstrate that FDB-EL-based confidence intervals are effective compared to other methods, as intervals maintain good coverage accuracy while being less sensitive to bandwidth parameters. The confidence interval procedure is illustrated with an application to studying the wind spectrum. Extension to simultaneous confidence intervals has also been discussed.