

國立中山大學跨領域及數據科學研究中心

國立中山大學應用數學系

學術演講

講者：Professor Holger Dette
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講題：Quantile spectral analysis

時間：2016/12/20（星期二）11:10 ~ 12:00

地點：理學院四樓理 SC 4009-1 室

茶會：10:30 於理 SC 4010 室（系辦公室）

摘要

We present an alternative method for the spectral analysis of a univariate, strictly stationary time series $\{Y_t\}_{t \in \mathbb{Z}}$. We define a “new” spectrum as the Fourier transform of the differences between copulas of the pairs (Y_t, Y_{t-k}) and the independence copula. This object is called a *copula spectral density kernel* and allows to separate the marginal and serial aspects of a time series. We show that this spectrum is closely related to the concept of quantile regression. Like quantile regression, which provides much more information about conditional distributions than classical location-scale regression models, copula spectral density kernels are more informative than traditional spectral densities obtained from classical autocovariances. In particular, copula spectral density kernels, in their population versions, provide a complete description of the copulas of all pairs (Y_t, Y_{t-k}) . Moreover, they inherit the robustness properties of classical quantile regression, and do not require any distributional assumptions such as the existence of finite moments. In order to estimate the copula spectral density kernel, we introduce rank-based Laplace periodograms which are calculated as bilinear forms of weighted L_1 -projections of the ranks of the observed time series onto a harmonic regression model. We establish the asymptotic distribution of those periodograms, and the consistency of adequately smoothed versions. The finite-sample properties of the new methodology, and its potential for applications are briefly investigated by simulations and a short empirical example.

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