Ise-Shima International Seminar

-"High Dimensional Statistical Analysis for Time Spatial Processes & Quantile Analysis for Time Series"-

Date: March 5-7, 2017.

Venue: Ise-Shima Royal Hotel.

http://www.daiwaresort.jp/en/ise/index.html/

Organizer: Masanobu TANIGUCHI (Research Institute for Science & Engineering, Waseda University)

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Program (* Speaker)

March 5:

Session (I):16:00-17:00 (Graduate Students Talks)
Supervisor: Masanobu Taniguchi

16:00-16:20   Wenlin Huang, Tetsuya Saito, Yamat Ono (Waseda Univ.)

A test for equality of high-dimensional covariance matrices

16:20-16:40   Yuta Funakoshi, Taihei Iijima and Ryosuke Kuga (Waseda Univ.)

Testing for independence in high-dimensional time series

16:40-17:00   Li Ra Park and Yurie Tamura (Waseda Univ.)

Testing for martingale properties and high-dimensional time series

Session (II):20:00-21:20 (Ph-D Session)
Supervisor: Masanobu Taniguchi

20:00 - 20:20   Hideaki Nagahata (Waseda Univ.)

[Analysis of variance for multivariate time series](#)

20:20 - 20:40   Yoshiyuki Tanida (Waseda Univ.)

[Asymptotic theory of Whittle estimation for high-dimensional time series](#)

20:40 - 21:00   Yujie Xue (Waseda Univ.)

[L^pprediction by local Whittle estimator](#)

21:00 - 21:20   Yoshihiro Suto (Waseda Univ.)

[Numerical studies for shrinkage estimation of autocovariances.](#)

March 6:

Session (III):9:30-12:00

9:30 - 10:00　Toshihiro Abe (Nanzan Univ.)
A simple cylindrical distribution and its applications

10:00 - 10:30　Fumiya Akashi (Waseda Univ.)
Robust GEL test for linear hypothesis of infinite variance time series models

10:30 - 11:00　Xiaoling Dou (Waseda Univ.)
A functional nonparametric unsupervised classification of mouse ultrasonic vocalization data

11:00 - 11:30　Junichi Hirukawa* (Niigata Univ.), Hamdi Raïssi, and Steffen Grønneberg
Investigating long run linear relationships between non constant variances of time series variables

11:30 - 12:00　Yan Liu* (Waseda Univ.), Kun Chen, Ngai Hang Chan and Masanobu Taniguchi
A frequency domain bootstrap for irregularly spaced spatial data

12:00 - 12:30　Hiroshi Shiraishi*(Keio Univ.) and Zudi Lu
Semi-parametric estimation for optimal dividend barrier with insurance portfolio (Asymptotic Theory)

Session (IV):14:00-17:00

14:40-14:40　N.H. Chan (Chinese Univ. of Hong Kong)
Recent Developments of High-Dimensional Time Series

14:40-15:20   Meihui Guo* (National Sun Yat-sen Univ), Inchi Hu, and Shih-Feng Huang

Importance Sampling for Conditional Tail Expectation

15:20 - 15:40   Break

Session (V):15:40-17:00

15:40 -16:20   Alessandra Luati* (Univ. Bologna), Karim Abadir, and Paolo Paruolo

The predictive density of GARCH(1,1) processes

16:20 -17:00   Mohsen Pourahmadi (Texas A&M Univ)

What Are the Useful Ideas or Methods in High-Dimensional Covariance Estimation?

March 7:

Session (VI):10:00-12:00

10:00 -10:40   Tommaso Proietti* (Univ. of Rome), Alessandra Luati, and Stefano Grassi

Generalised linear cepstral models for locally stationary processes

10:40 - 12:00

Discussion on "Future of High Dimensional Statistics"

Abstracts

Session (II):20:00-21:20 (Ph-D Session)

Nagahata, H.

Title: Analysis of variance for multivariate time series

Abstract: For independent observations, analysis of variance (ANOVA) has been noughly tailored. Recently there has been much demand for ANOVA of dependent observations in many fields. For example it is important to analyze differences among industry averages of financial data. However ANOVA for dependent observations has been immature. In this paper, we study ANOVA for dependent observations. Specifically, we show the asymptotics of classical tests proposed for independent observations and give a sufficient condition for them to be asymptotically χ^2 distributed. If the sufficient condition is not satisfied, we suggest a likelihood ratio test based on Whittle likelihood and derive an asymptotic χ^2 distribution of our test. Some numerical examples for simulated and real financial data are given as applications of these results. This paper opens a new aspect for the analysis of variance for time series.
(Joint work with Taniguchi, M.)

Tanida, Y.

Title: Asymptotic theory of Whittle estimation for high-dimensional time series

Abstract: Recently, in many fields, e.g., electrical and genome engineering, high-dimensional and small sample size data are often observed, and the various methods have been investigated to deal with such data appropriately. Most of classical results discussed estimation of the autocovariance matrices for non-Gaussian dependence processes. However, in time series analysis, the sample autocovariance matrices are only special case of the integral functional of spectral density matrix. In this paper, we develop the estimation theory for Whittle functional D of high-dimensional non-Gaussian dependent processes. Using a sample version of D based on thresholded periodogram matrix, we introduce a Whittle estimator of unknown parameter, and elucidate its asymptotics. Some numerical studies illuminate an interesting feature of the results.
(Joint work with Taniguchi, M.)

Xue, Y.

Title: L^p prediction by local Whittle estimator

Abstract: To estimate the spectral density, there are many approaches. For Gaussian stationary processes, Taniguchi (1979) has defined two divergences in fitting a certain parametric family of spectral densities $\{f_\theta(\lambda); \theta \in \Theta\}$ to a Gaussian stationary process with true spectral density $g(\lambda)$. In this paper, we introduce a local Whittle likelihood of the spectral density $\{f_\theta(\lambda)$ for the form of $|1 - \varphi(\lambda)|^\wedge(-p)$. It is shown that the asymptotic variance of $\left|1 - \varphi_{\hat{\theta}}(\lambda)\right|^\wedge(-p)$ which minimizes the local Whittle likelihood around λ, is $O(\frac{1}{Nh})$, where $h \to 0$, and $Nh \to \infty$ as $N \to \infty$. It is the same order as the smoothed periodogram estimator, but for fixed h, the former potentially has a smaller bias.
(Joint work with M. Taniguchi)

Suto ,Y.

Numerical studies for shrinkage estimation of autocovariances.

Abstract: The estimation for autocovariances of dependent data is an important issue for time series analysis. In this talk, we introduce an empirical Bayes estimator for the usual sample autocovariance estimator, and the estimator is optimal when the estimator shrinks the usual sample autocovariance estimator with respect to the generalized mean squares error. Then we illustrate the goodness of the estimator for the autocovariance matrix of a vector-valued Gaussian stationary process by using some time series models. We observe the asymptotic behavior of the practical estimator by Monte Carlo analysis. This result seems useful to investigate the autocovariance structure of vector-valued Gaussian dependent observations.
(Joint work with Taniguchi, M.)

Session (III):9:30-12:00

Abe, T.

Title: simple cylindrical distribution and its applications

Abstract: In this talk, we consider a cylindrical model obtained by combining the sine-skewed von Mises distribution with the Weibull distribution. The WeiSSVM model has numerous good properties such as, simple normalizing constant and hence very tractable density, parameter-parsimony and interpretability, maximum entropy characterization, good circular-linear dependence structure, easy random number generation thanks to known marginal/conditional distributions, and flexibility illustrated via excellent fitting abilities. As an illustrative example, our model is applied in analyses of periwinkle data set.

Akashi, F.

Title: Robust GEL test for linear hypothesis of infinite variance time series models

Abstract: This talk constructs the generalized empirical likelihood (GEL) test for the infinite variance time series models. In particular, we focus on the general linear hypothesis on the coefficients of the autoregressive moving average models, and the framework can grasp various important problem such as model diagnostics of real data. The self-weighted GEL test statistic is constructed, and it is shown that the proposed test statistic has a standard chi-square limit distribution without assuming the finite variance of the model. Therefore, various important tests can be carried out with no prior estimation for the unknown quantity of the models such as the tail-index of the innovations. It is also illustrated that the proposed test performs better than the self-weighted Wald-type test by Pan et al. (2007) in finite sample case.

Dou, X.

Title: A functional nonparametric unsupervised classification of mouse ultrasonic vocalization data

Abstract: Mouse ultrasonic vocalization (USV) data are studied in various fields of science. However, methods of automatic data classification and clustering of USV data remain to be developed. Non-harmonic mouse ultrasonic vocalization (USV) calls can be considered as functional data of USV functional variables. We use a functional nonparametric clustering method (Ferraty and View, 2006) to classify USV calls by shape. This method involves the mode of the distribution of a functional random

variable, a kernel type functional estimator for defining the density of functional random variables, and a descending hierarchical method for classifying functional data.

Hirukawa, J.

Title: Investigating long run linear relationships between non constant variances of time series variables

Abstract: In this talk a methodology for investigating long run linear relationships between the non constant variance structures of time series variables is developed. The asymptotic behavior of a cumulative sum (CUSUM) test statistic for detecting departures from a linear relationship in variance is established. Noting that the processes under study have unknown time-varying variances structures our tools are based on a wild bootstrap technique. The theoretical outputs are illustrated by means of Monte Carlo experiments. The existence of linear relations between the non constant variances of the consumer price indexes for energy and transportation in the U.S. is established.
(Joint work with H. Raïssi and S. Grønneberg)

Liu, Y.

Title: A frequency domain bootstrap for irregularly spaced spatial data

Abstract: In this talk, we consider the problem of bootstrapping irregularly spaced spatial data. Although there are many methods to bootstrap dependent data, we adopt a frequency domain bootstrap from computational time and its scope of application. The frequency domain bootstrap is a methodology to bootstrap periodogram based on studentized periodogram ordinates. We take a specific increasing set of discrete frequencies for the bootstrap since the domain of the finite Fourier transform is not bounded for irregularly spaced data. We show that the frequency domain bootstrap is second-order correct for classes of ratio statistics under mixed increasing domain. The performance of the frequency domain bootstrap is shown in our simulation study. The method is also applied to some real examples.
(Joint work with K. Chen, N.H. Chan and M. Taniguchi)

Shiraishi, H.

Title: Semi-parametric estimation for optimal dividend barrier with insurance portfolio (Asymptotic Theory)

Abstract: We consider a semi-parametric estimation of the optimal dividend barrier which means that the claim frequency part is parametrically modeled by a Poisson process and the claim amount is assumed to be unknown. Under this setting, an optimal dividend barrier estimator is proposed in terms of the intensity parameter estimator and the empirical distribution function of the claim amount. Then, its consistency and asymptotic normality are considered.
(Joint work with Z, Lu)

Session (IV):14:00-17:00

Chan, N.H.

Title: Recent Developments of High-Dimensional Time Series

Abstract: Recent progresses of high-dimensional time series will be reviewed. Topics include: long-memory, structural break, and nonstationay time series will be discussed. Some recent developments on the change-point estimation including the celebrated COGA and related algorithms will be introduced. The talk concludes with some future outlook on high-dimensional time series.

Guo, M.

Title: Importance Sampling for Conditional Tail Expectation

Abstract: We study efficient ways to simulate conditional tail expectation (CTE) via importance sampling. CTE plays an important role in many fields. Here we focus on its application to expected shortfall in financial risk management. We construct the optimal importance sampling schemes for CTE in an exponentially embedded family of distributions as well as in a family of truncated exponential distributions. Superiority of the exponential truncation approach over exponential embedding approach is established. A simulation study is performed to evaluate the proposed approaches. An empirical study on stock market indices is also presented.

(Joint work with I. Hu and S.F. Huang)

Session (V):15:40-17:00

Luati, A.
Title: The predictive density of GARCH(1,1) processes

Abstract: We derive the predictive probability density function of a GARCH(1,1) process, under Gaussian or Student-t innovations. The analytic form is novel, and replaces current methods based on approximations and simulations.
(Joint work with K. Abadir and P. Paruolo)

Pourahmadi, M.
Title: What Are the Useful Ideas or Methods in High-Dimensional Covariance Estimation?

Abstract: There are many wonderful ideas for analysis of high-dimensional data, but only a few are useful and actually used in practice. For high-dimensional covariance estimation and cognizant areas, ideas and methods based on shrinking the eigenvaluse have proved to be the most useful as they make minimal structural assumptions like sparsity, factor models, etc. We present an overview of such developments in the last six decades

Session (VI):10:00-12:00

Proietti, T.
Title: Generalised linear cepstral models for locally stationary processes

Abstract: The paper introduces the class of generalised linear cepstral models for modelling the time-varying spectral density of a locally stationary process. The class is based on the truncated Fourier series expansion of the Box-Cox transformation of the spectral density; the coefficients of the expansions can be termed generalised cepstral coefficients and are related to the generalised autocovariances of the series. The link

function depends on a power transformation parameter and encompasses the exponential model. Other important special cases are the inverse link (which leads to modelling the inverse spectrum), and the identity link. The cepstral coefficients are allowed to vary over time according to linear combinations of logistic interventions at fixed or estimated locations. Pseudo-likelihood inference is based on the pre-periodogram. One of the merits of this model class is the possibility of nesting alternative spectral estimation methods (autoregressive, exponential, etc.) under the same likelihood-based framework.

(Joint work with A. Luati and S. Grassi)