NCKU-Waseda International Symposium

Time Series, Machine Learning and Causality Analysis

Date: 4-5 September 2019
Venue: 3F Conference Room, Department of Statistic,
National Cheng Kung University, Tainan.

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Program

September 4

09:50 – 10:00 Ray-Bing Chen (National Cheng Kung University), Opening

Session (I): 10:00~12:10 chaired by Liang-Ching Lin

10:00 – 10:50 Masanobu Taniguchi (Waseda University)
Joint circular distributions in view of higher order spectra of time series

10:50 – 11:30 Cheng-Te Li (National Cheng Kung University)
Network Representation Learning and Its Applications

11:30 – 12:10 Shuen-Lin Jeng (National Cheng Kung University)
Sentiment Analysis on Journal News for Stock Movement Prediction across Multiple Regions

12:10 – 13:30 Lunch break

Session (II): 13:30~15:10 chaired by Shuen-Lin Jeng

13:30 – 14:20 Yoichi Miyata (Takasaki City University of Economics)
On the identifiability of possibly asymmetric circular distributions

14:20 – 15:10 Akitoshi Kimura (Waseda University)
The asymptotic variance estimators of the correlation estimator between latent processes

15:10 – 15:40 Coffee break

Session (III): 15:40~17:10 chaired by Kou Fujimori

15:40 – 16:20 Liang-Ching Lin (National Cheng Kung University)
Modeling Financial Interval Time Series

16:20 – 17:10 Takayuki Shiohama (Tokyo University of Science)
Some Recent Developments in Time Series Modeling for Cylindrical Data

18:00 – Dinner

September 5

Session (IV): 10:00~17:00 Free Discussion

Abstract

Taniguchi, Masanobu Waseda University, Japan
(co-author: Shogo Kato, Hiroaki Ogata, Arthur Pewsey**)**
Title: Joint circular distributions in view of higher order spectra of time series
Abstract: Circular data analysis is emerging as an important component of statistics. For this half century, various circular distributions have been proposed, e.g., von Mises distribution, wrapped Cauchy distribution, among other things.
Also, regarding the joint distribution, Wehrly and Johnson(1980) proposed a bivariate circular distribution which is related to a family of Markov processes on the circle.
Because the sample space is on a circle, various new statistical methods have been developed. In this talk we provide a new look at circular distributions in view of spectral distributions of time series because the typical circular distributions correspond to spectral densities of time series models. For example, autoregressive AR(1) spectral density corresponds to wrapped Cauchy distribution, and von Mises distribution corresponds to exponential spectral density (Bloomfield(1973)), etc.
Furthermore we introduce a class of joint circular distributions from the higher order spectra of time series, which can describe very general joint circular distributions. Hence we can develop the statistical inference for dependent observations on the circle. We present a family of distributions on the circle derived from the ARMA spectral density. It is seen that the proposed family includes some existing circular families as special cases. For these special cases, the normalizing constant and trigonometric moments are shown to have simple and closed form. We develop the asymptotic optimal inference theory based on the local asymptotic normality (LAN) on the circle. Because the observations are permitted to be dependent, the theory opens a new paradigm in the estimation for joint circular distributions.

Li, Cheng-Te National Cheng Kung University, Taiwan
Title: Network Representation Learning and Its Applications
Abstract: Network embedding, i.e., network feature representation, is a powerful technique for typical machine learning tasks in social and information networks, such as link prediction and node classification. Network embedding aims at learning an effective vector transformation so that nodes in a network can be projected into a low-dimensional feature space. State-of-the-art network embedding methods mainly focus on homogeneous networks, i.e., nodes and links are of the same types. We have developed novel embedding learning algorithms in heterogeneous information networks that contain different types of nodes and links. The goal is to let the learned embedding preserve not only graph proximity between nodes but also relational and attributed information associated on nodes and links. Based on heterogeneous network embedding learning, in this talk, I will present two of our recent studies. One is how to deliver a more effective recommender system through user identification behind shared accounts. The other is how to boost the performance of link prediction and node classification in both homogeneous and heterogeneous realms. I will also demonstrate the promising prediction power of our embedding learned models by the experiments conducted on six real-world network datasets.

Jeng, Shuen-Lin National Cheng Kung University, Taiwan
(co-author: Yun-Hsuan Chan, Tsui-Ying Weng**)**
Title: Sentiment Analysis on Journal News for Stock Movement Prediction across Multiple Regions
Abstract: Stock movement prediction is one of the major challenges in financial market research. The impact of journal news on the stock market has been brought to attention in recent years. How to extract effective news features through sentiment analysis turns into an appealing research direction. In this study, we will construct technical and news features for the stock movement prediction across four regions (United States, China, Hong Kong, and Taiwan). Two statistical models are used to proceed the feature selection. They are vector autoregression with exogenous variables (VARX) using Least Absolute Shrinkage and Selection Operator (LASSO) and Multivariate Adaptive Regression Splines (MARS). The empirical analysis is demonstrated on four market weighted indices and eleven journal news from the four regions.

Miyata, Yoichi Takasaki City University of Economics, Japan
(co-author: Takayuki Shiohama, Toshihiro Abe**)**
Title: On the identifiability of possibly asymmetric circular distributions
Abstract: Sine-skewed circular distributions, which are investigated by Umbach and Jammalamadaka (2009, Statistics and Probability Letter) and Abe and Pewsey (2011, Statistical Papers), are possibly asymmetric circular models and have desirable mathematical properties such as the explicit trigonometric moments. However, to our knowledge, it is not clear if these models are identifiable with respect to the parameters. In this talk, we use Teicher's approach to show the identifiability of the sine-skewed von Mises distribution and sine-skewed wrapped Cauchy distribution. To verify some conditions in our approach, the simultaneous Diophantine approximations and the trigonometric moments are used. If time is allowed, we show the identifiability of a cylindrical distribution combining the sine-skewed von Mises distribution on the circle and the Weibull-type distribution on the non-negative linear under a suitable parameter space.

Kimura, Akitoshi Waseda University, Japan
Title: The asymptotic variance estimators of the correlation estimator between latent processes
Abstract: TBA.

Lin, Liang-Ching National Cheng Kung University, Taiwan
Title: Modeling Financial Interval Time Series
Abstract: In financial economics, a large number of models are developed based on the daily closing price. When using only the daily closing price to model the time series, we may discard valuable intra-daily information, such as maximum and minimum prices. In this study, we propose an interval time series model, including the daily maximum, minimum, and closing prices, and then apply the proposed model to forecast the entire interval. The likelihood function and the corresponding maximum likelihood estimates (MLEs) are obtained by stochastic differential equation and the Girsanov theorem. To capture the heteroscedasticity of volatility, we consider a stochastic volatility model. The efficiency of the proposed estimators is illustrated by a simulation study. Finally, based on real data for S&P 500 index, the proposed method outperforms several alternatives in terms of the accurate forecast.

Shiohama, Takayuki Tokyo University of Science, Japan
Title: Some Recent Developments in Time Series Modeling for Cylindrical Data
Abstract: A combination of wind direction and speed is a typical example of circular and linear observations, and called cylindrical data. Another example includes animal movement data with turning angles and step lengths that correspond to directional and linear data, respectively. Although most cylindrical data arises in the form of time series, little research has been carried out in the field of cylindrical time series analysis. In recent years, there has been much interest in the study for the cylindrical probability distributions for independent data. In this study, we briefly review recent developments on the time series modeling for circular and cylindrical time series. The models include the Markov process, the higher-order Markov process, the state-space modeling, and the copula-based approaches.

Speakers

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