FCU-Waseda International Symposium

Time Series, Machine Learning and Causality Analysis

Date: 6-7 September 2019
Venue: Fourth International Conference Room, B1
Ren-Yan Building, Feng Chia University, Taichung.

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Program

September 6

09:50 – 10:00 Dean Mitchell M. Tseng (International School of Technology and Management, FCU), Opening

Session (I): 10:00~12:10 chaired by Cathy W.S. Chen

10:00 – 10:50 Kou Fujimori (Waseda University)
Generalized maximum composite likelihood estimators for determinantal point processes
10:50 – 11:30 Mike K.P. So (Hong Kong University of Science and Technology)
Interfirm Relationship Analysis from Dynamic and Duel-View Company Network: A Latent Space Modeling Approach
11:30 – 12:10 Henghsiu Tsai (Academia Sinica)
Approximate Maximum Likelihood Estimation of a Threshold Diffusion Process

12:10 – 13:30 Lunch break

Session (II): 13:30~15:00 chaired by Takayuki Shiohama

13:30 – 14:20 Yoichi Miyata (Takasaki City University of Economics)
On the Laplace approximation to the marginal likelihood of high dimensional models
14:20 – 15:00 Chor-Yiu Sin (National Tsing Hua University)
Large portfolio frontier with conditional Value-at-Risk: the case with S&P 500 index constituents

15:00 – 15:30 Coffee break

Session (III): 15:30~17:00 chaired by Mike K.P. So

15:30 – 16:10 Edward M.H. Lin (Tunghai University)
Behavioural Big Data Analysis with Bayesian Method for Risk Management of Financial Institution
16:10 – 17:00 Akitoshi Kimura (Waseda University)
Granger causality of irregular sampled time series
17:00 – 17:20 Farewell Ceremony

18:00 – Dinner

September 7

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

Abstract

Fujimori, Kou Waseda University, Japan
(co-author: Sota Sakamoto, Yasutaka Shimizu**)**
Title: Generalized maximum composite likelihood estimators for determinantal point processes
Abstract: The maximum composite likelihood estimator for stationary parametric models of determinantal point processes will be discussed. Since the joint intensities of these point processes are given by determinant of positive definite kernels, we have the explicit form of the joint intensities for every order. This fact enables us to consider the generalized maximum composite likelihood estimator for every order. In this talk, we will establish such maximum composite likelihood estimator and prove the moment convergence of the estimator, which leads us to construct an information criterion.

So, Mike K.P. Hong Kong University of Science and Technology, Hong Kong
Title: Interfirm Relationship Analysis from Dynamic and Duel-View Company Network: A Latent Space Modeling Approach
Abstract: Interfirm relationship is crucial to our understanding of firms' collective and interactive behavior. It provides us many business implications in various aspects that help firms improve performance and governance. Toward this end, this study proposes a latent space approach to model the temporal change of interfirm relationship from dynamic company network which is still underresearched in existing literature. We assume that the probability of link between firms depends only on a underlying latent space and this latent space is transited overtime based on the Markov chain property. In this regard, firms that are close to each other in the latent space are more likely to develop linkage. As an attempt to represent the full picture of interfirm relationship, we extend the latent space model to consider two complementary company network views - the investment network and the news network which we refer them as the duel-view network. We estimate model parameters within the Bayesian framework using Markov Chain Monte Carlo procedures. We also demonstrate the value of the model by various empirical analyses.

Tsai, Henghsiu Academia Sinica, Taiwan
(co-author: Ting-Hung Yu, Heiko Rachinger**)**
Title: Approximate Maximum Likelihood Estimation of a Threshold Diffusion Process
Abstract: In order to estimate the parameters of a two-regime threshold diffusion process with discretely sampled data, an approximate maximum likelihood method (AMLE) based on approximating the log-likelihood function of the observations is proposed. Both the drift and the diffusion term are allowed to be either linear or non-linear. In order to choose the most appropriate among these four possibilities, three information criteria are employed. Further, a likelihood ratio test can help to determine whether threshold effects are present. Via simulations, the finite sample performance of the proposed AMLE is compared to an alternative quasi-likelihood estimator and the finite sample performance of the information criteria as well as the likelihood ratio test are studied. Finally, the efficacy of our approach is demonstrated with two financial time series.

Miyata, Yoichi Takasaki City University of Economics, Japan

Title: On the Laplace approximation to the marginal likelihood of high dimensional models

Abstract: For recent years, much attention has been paid on several high dimensional models, in which the dimension of a parameter vector grows with the sample size, in the both fields of Bayesian and frequentist statistics. To evaluate each of models, its marginal likelihood could be one of useful tools. In this talk, we consider high dimensional linear and logit models in which the number of covariates increase with the sample size, and assume that its parameter vector has the Laplace distribution. Then, the Laplace approximation using the LASSO (Least Absolute Shrinkage and Selection Operator） estimator is rigorously derived for the marginal likelihood under some suitable conditions. Furthermore, we use this approximation to present an effective way to implement the Bridge sampling method.

Sin, Chor-Yiu National Tsing Hua University, Taiwan

Title: Large portfolio frontier with conditional Value-at-Risk: the case with S&P 500 index constituents

Abstract: Recently there is a big interest in high-dimensional portfolio selection. The high-dimension literature often assumes the number of assets, N, is large relative to the number of time periods, T. In this paper, contrast to most papers in the literature, (i) time-varying heterogeneity such as Garch is allowed (ii) risk is measured by conditional Value-at-Risk (CVaR) rather than variance; (iii) an L_2-regularization rather than an L_1 regularization is imposed. First, as N is large in this project, care must be taken in estimating the variance-covariance matrix, regardless whether there is conditional heteroskedasticity or not. Second, while L1-regularization is prevalent in the literature, some portfolio weights are forced to zero. On the one hand, this may reduce transaction costs considerably, but on the other hand, the solution may be unstable when there is a lot of sample fluctuations. As argued by Still and Kondor (2010, New J. Phys.) and Caccioli, Still, Marsili and Kondor (2013, Eur. J. Finance), with L_2-regularization, the unstable solution problem, in the sense that no finite solution is found, is mitigated if not avoided. This approach is applied to the S&P 500 index constituents and the results are compared with those in Ao, Li and Zheng (2018, Rev. Financial Stud.).

Lin, Edward M.H. Tunghai University, Taiwan
(co-author: Edward W. Sun, Min-Teh Yu**)**

Title: Behavioral Data-Driven Analysis with Bayesian Method for Risk Management of Financial Services

Abstract: Time-varying behavioral features and non-linear dependence are widely observed in big data and challenge the operating systems and processes of risk management in financial services. In order to improve the operational accuracy of risk measures and incorporate customer behavior analytics, we propose a Bayesian approach to efficiently estimate the multivariate risk measures in a dynamic framework. The proposed method can carry the prior information into the Bayesian analysis and fully describe the risk measures' behavior after utilizing the Cornish-Fisher (CF) approximation with Markov chain Monte Carlo (MCMC) sampling. Therefore, the operating systems and processes of risk management can be well performed either based on the first four conditional moments of the underlying model employed to consider some specific behavioral features (e.g., the time-varying conditional multivariate skewness) or the characteristics extracted from the big data. We conduct a simulation study to distinguish the applications of CF approximation and MCMC sampling after comparing them with the classical likelihood based method. We then provide a robust procedure for empirical investigation by using the real data of U.S. DJIA stocks. Both simulation and empirical results confirm that the Bayesian method can significantly improve the operations of risk management.

Kimura, Akitoshi Waseda University, Japan

Title: Granger causality of irregular sampled time series

Abstract: TBA.

Speakers

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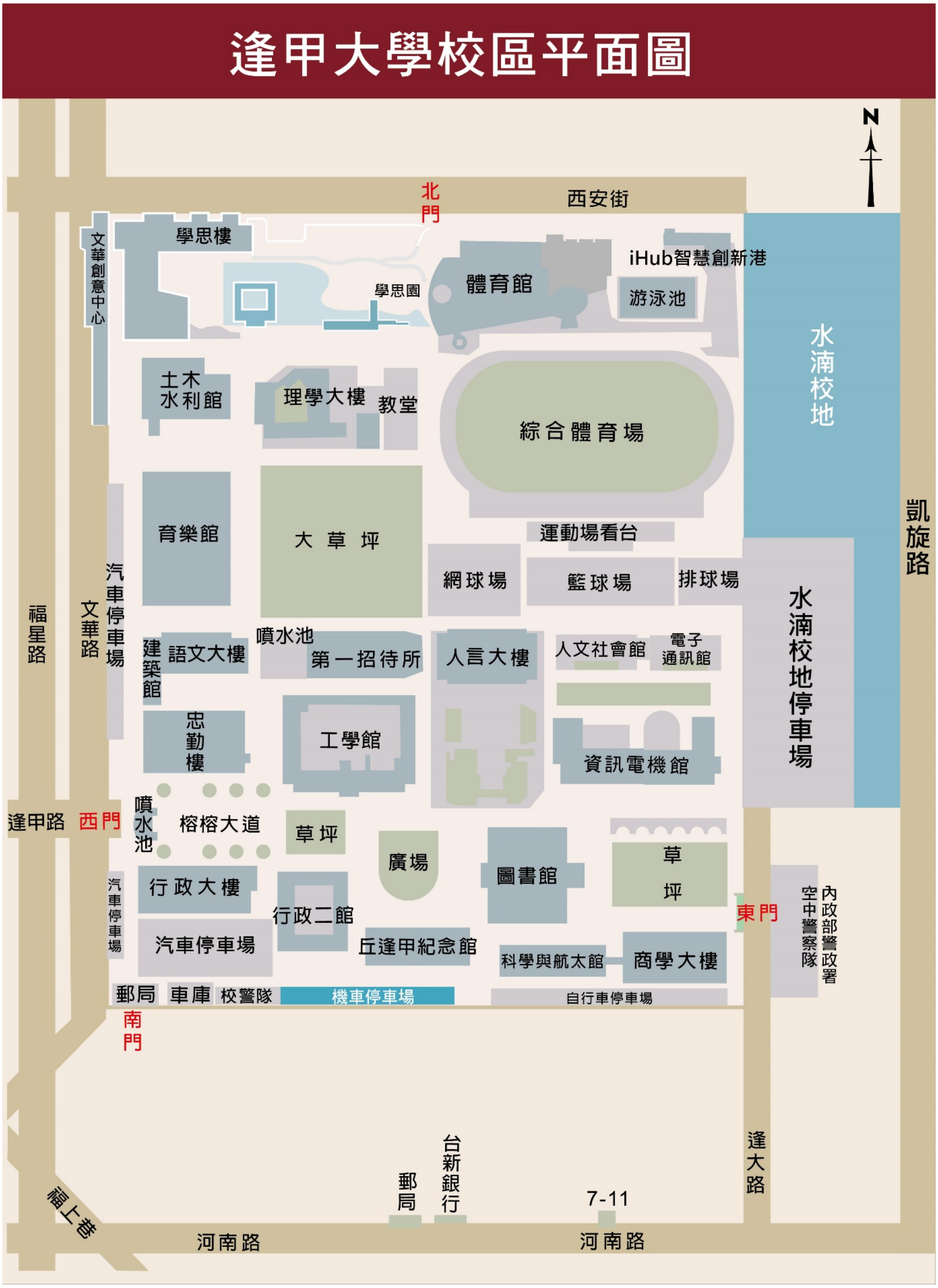
Map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