TMU International Conference on Statistical Modelling and Inference 2023

Date : 1st - 2nd November 2023

Venue :
Tokyo Metropolitan University,
Marunouchi Satellite Campus, Room A

Guest speakers :
David Preinerstorfer (University of St. Gallen)
Guendalina Palmirotta (University of Luxembourg)

Supported by:
Tokyo Metropolitan University

Organizers:
Hiroaki Ogata (Tokyo Metropolitan University)
Toshihiro Abe (Hosei University)
Takayuki Shiohama (Nanzan University)
Yoich Miyata (Takasaki City University of Economics)

Program

1st November

13:10-13:20:   Opening address

13:20-13:50:   Jun'ichi Hirukawa (Niigata University)

Innovation algorithm of fractionally integrated ($I(d)$) process and applications on the estimation of parameters

13:50-14:20:   Yasuhito Tsuruta (The University of Nagano)
【ZOOM】

Automatic data-based bin width selection for rose diagram

14:20-14:50:   Yoichi Miyata (Takasaki City University of Economics)

An extension of the Weibull sine-skewed von Mises distributions and its application to hidden Markov models

14:50-15:10:   Coffee Break

15:10-15:40:   Fumiya Akashi (The University of Tokyo)

Robust reduced rank estimation for low-rank vector AR models

15:40-16:10:   Kazuyoshi Yata (University of Tsukuba)

Threshold-based PCA in high-dimensional settings

16:10-16:30:   ⬤ ⬤ Coffee Break ⬤ ⬤

16:30-17:00:   Tomoaki Imoto (University of Shizuoka)

The construction of a cylindrical distribution as a method of specifying the symmetric marginals.

17:00-17:30:   Takayuki Shiohama (Nanzan University)

Complex-valued time series models with generalized cardioid-type spectral distributions

2nd November

10:00-11:00:   David Preinerstorfer (University of St. Gallen)

Combined p-norm based testing in high-dimensional statistics

11:00-11:10:   ⬤ ⬤ Coffee Break ⬤ ⬤

11:10-12:10:   Guendalina Palmirotta (Université du Luxembourg)

A spherical k-sample distance test for astronomical applications

12:10-12:20:   Closing address

Abstract

Jun'ichi Hirukawa (Niigata University)

Title :
Innovation algorithm of fractionally integrated ($I(d)$) process and applications on the estimation of parameters

Abstract:
The long memory phenomena frequently occur in the empirical studies of various fields. The fractionally integrated process is the one of the suitable candidate which appropriately represents the long memory property. There are two recursive algorithms for determining the one-step predictors of time series, that is, the Durbin-Levinson algorithm and the innovation algorithm. The Durbin-Levinson algorithm for the fractionally integrated process is well-known and widely used, which naturally derives the Cholesky factorization of the inverse matrix of the covariance matrix of the process. In this talk, we derive the innovation algorithm for the fractionally integrated process. The result is also applied to the derivation of the Cholesky factorization of the covariance matrix of the process in the explicit form. Moreover, the asymptotic theory of Gaussian maximum likelihood estimator (GMLE) is derived in terms of the innovation algorithm.
(Joint work with Kou Fujimori (Shinshu University))

Yasuhito Tsuruta (The University of Nagano)   【ZOOM】

Title :
Automatic data-based bin width selection for rose diagram

Abstract:

A rose diagram is a representation that circularly organizes data with the bin width as the central angle. This diagram is widely used to display and summarize circular data. Some studies have proposed the selector of bin width based on data. However, only a few papers have discussed the properties of these selectors from a statistical perspective. Thus, the aim is to provide a data-based bin width selector for rose diagrams using a statistical approach such as minimizing an error criterion. The mean integrated square error of the rose diagram and its optimal bin width are derived, and two new selectors are proposed: normal reference rule and biased cross-validation. The numerical experiment is conducted under some simulation scenarios to investigate how a choice of bin width affects the performance of the rose diagram under finite samples. Its result shows that biased cross-validation or normal reference rule outperforms some previous selectors.

Yoichi Miyata (Takasaki City University of Economics)

Title :
An extension of the Weibull sine-skewed von Mises distributions and its application to hidden Markov models

Abstract:
The Weibull sine-skewed von Mises distributions in which the circular marginal distributions are the sine-skewed wrapped Cauchy and the conditional distributions of a linear random variable are the Weibull are known to be identifiable, and have simple normalizing constants and easy random number generation algorithms. In this talk, extending the models, we propose a new family of cylindrical distributions in which the circular marginal distributions are the extended sine-skewed wrapped Cauchy. The proposed distributions also have simple normalizing constants and easy random number generation algorithms, and allow marginal distributions of a circular random variable to be skewed more significantly than that of the above models. In addition, a hidden Markov model with each component being the proposed distribution are shown.

(Joint work with <u>Takayuki Shiohama (Nanzan University)</u> & <u>Toshihiro Abe (Hosei University)</u>)

<u>Fumiya Akashi (The University of Tokyo)</u>

Title :
Robust reduced rank estimation for low-rank vector AR models

Abstract:
TBA

<u>Kazuyoshi Yata (University of Tsukuba)</u>

Title :
Threshold-based PCA in high-dimensional settings

Abstract:
In this talk, we consider threshold-based sparse principal component analysis (TSPCA) methods in high-dimensional settings. We first illustrate that TSPCA gives a preferable performance in high-dimensional data. However, the estimator depends largely on the threshold value. By using a new PCA method called the noise-reduction (NR) methodology, we propose a new sparse estimator of the PC directions and show that it holds the consistency property without any threshold values. Finally, we investigate the performance of PCA by the new PC directions in actual data analyses.
(Joint work with <u>Makoto Aoshima (University of Tsukuba)</u>)

<u>Tomoaki Imoto (University of Shizuoka)</u>

Title :
The construction of a cylindrical distribution as a method of specifying the symmetric marginals.

Abstract:

This talk proposes a method for constructing a cylindrical distribution from two base distributions about symmetric linear and circular random variables. The base distributions are shown to be marginal distributions of the cylindrical distribution constructed by the proposed methods. The constructed probability density function is expressed without additional complicated functions and normalizing constants. The random number generation and the property of the Fisher information are considered, and the moments and correlation for the special case of the proposed method are provided. The illustrative examples are also shown in this talk.

Takayuki Shiohama (Nanzan University)

Title :
Complex-valued time series models with generalized cardioid-type spectral distributions.

Abstract:
This study considers the complex-valued time series models whose spectral density functions are generalized cardioid distribution on the circle. The generalized cardioid distribution can express some important circular distributions including, von Mises, wrapped Cauchy, and cardioid distributions as a special case. However, it is known that the shape parameter of that distribution has a singular point on the parameter space. Hence, It is required to develop some practical estimation procedures in order to cope with such problems. Monte Carlo simulations and real data analysis are conducted to illustrate the proposed estimation procedures and verify the asymptotic results.

David Preinerstorfer (University of St. Gallen)

Title :
Combined p-norm based testing in high-dimensional statistics

Abstract:

In this talk, we review our current results on p-norm based tests in high-dimensional problems. In particular, we discuss how combination procedures based on p-norm based tests can lead to superior consistency properties. Furthermore, we investigate the question how large the portion of the parameter space can be on which one can achieve improvement over the likelihood ratio test. While most results in this talk are located in a Gaussian sequence model, we also provide an outlook on how the results generalize to other settings.

Guendalina Palmirotta (Université du Luxembourg)

Title :
A spherical k-sample distance test for astronomical applications

Abstract:
A fundamental statistical problem is the comparison of the equality of k populations. These problems are present in several applications in astronomy where spherical data is present, such as data from impact craters or comet orbits. In this talk, a new distance-based k-sample test for spherical data will be presented. The asymptotic distribution, numerical experiments, and some applications in astronomy will be discussed.
(Joint work with Eduardo García-Portugués (Carlos III University of Madrid))