

Workshop on robust statistics and related fields at TUS

Date: 16 November, 2026 (Monday)

Venue: Tokyo University of Science

Room: 852 (Building 8)

Room available: 13:00-17:45

Organizer: Takeshi Kurosawa

(Tokyo University of Science/The Institute of Statistical Mathematics)

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Registration Fee: Not required.

Registration: The pre-registration is not required.

[Program]

0. 13:15-13:20 Greeting

Chair: Takeshi Kurosawa (Tokyo University of Science/The Institute of Statistical Mathematics)

1. 13:20-14:00

Kouji Tahata (Tokyo University of Science)

Title: From Scalar to Matrix Correction: A Multinomial Extension of the OLS-Logit Correspondence

2. 14:20 - 15:00

Tomoyuki Nakagawa (Meisei University)

Title: On Robustness of Generalized Bayesian Inference via Density Power and Gamma Divergences

3. 15:20 - 16:00

Shonosuke Sugasawa (Keio University/The Institute of Statistical Mathematics)

Robust Fréchet Regression via Weight Regularization

4. 16:20 - 17:10

Alan H. Welsh (Research School of Finance, Actuarial Studies and Statistics, Australian National University/The Institute of Statistical Mathematics)

Title: Evaluating scale estimators

[Note]

The room is available until 17:45 and must be vacated by that time.

[Abstract]

● Kouji Tahata (Joint work with Takeshi Kurosawa)

Title: From Scalar to Matrix Correction: A Multinomial Extension of the OLS–Logit Correspondence

Abstract: The correspondence between logistic regression and ordinary least squares provides a useful alternative representation of binary logistic coefficients. In this study, we extend this relationship to multinomial responses with covariates under a common-covariance latent Gaussian model. Using a reduced one-hot representation and a population Frisch–Waugh–Lovell decomposition, we show that the binary scalar correction becomes a matrix correction in the multinomial setting. Specifically, the population least-squares coefficient matrix for the predictor block satisfies an exact identity with the identifiable baseline-category multinomial logit coefficient matrix and the residual covariance matrix of the reduced response. This formulation clarifies why the multinomial problem generally cannot be reduced to separate binary corrections for individual categories. We also discuss identifiability, the roles of the full and reduced one-hot representations, and recovering multinomial logit coefficients from the population least-squares quantities.

- Tomoyuki Nakagawa

Title: On Robustness of Generalized Bayesian Inference via Density Power and Gamma Divergences

Abstract: We investigate the robustness of generalized Bayesian inference via density power and gamma divergences. We first discuss the robustness properties of the resulting generalized posterior distributions against outliers and model contamination. We then consider applications of these divergence-based approaches to statistical models for directional data and ordinal categorical data. Through these applications and numerical experiments, we examine the practical behavior of the generalized posterior distributions and compare the robustness properties of the two divergence-based approaches.

- Shonosuke Sugawara (Joint work with Hao Li, Shota Katayama)

Title: Robust Fréchet Regression via Weight Regularization

Abstract: The Fréchet regression is a useful method for modeling random objects in a general metric space given Euclidean covariates. However, the conventional approach could be sensitive to outlying objects in the sense that the distance from the regression surface is large compared to the other objects. In this study, we develop a robust version of the global Fréchet regression by incorporating weight parameters into the objective function. We then introduce the Elastic net regularization, favoring a sparse vector of robust parameters to control the influence of outlying objects. We provide a computational algorithm to iteratively estimate the regression function and weight parameters. We also propose the Bayesian information criterion to select the tuning parameters for regularization, which gives adaptive robustness along with observed data. The finite sample performance of the proposed method is demonstrated through numerical studies on matrix and distribution responses.

- Alan H. Welsh

Title: Evaluating scale estimators

Abstract: We discuss the robustness properties of estimators of scale that include the estimator proposed by Rousseeuw and Croux (1993, J. Amer. Statist. Assoc.). The estimators are based on the quantiles of the absolute paired differences of observations. For comparison, we also explore analogous estimators based on the quantiles of absolute deviations from the median (which includes the well-known median absolute deviation from the median). We use theoretical and empirical calculations to derive and illustrate the properties of the estimators. The focus is both on the properties of the estimators and nature of the properties themselves. Our calculations provide insight into both the estimators and the fundamental robustness properties we use to compare estimators.