

Name: Hiroki Masuda

Research field: Theoretical statistics and probability theory

Key words: Statistical inference, Lévy process, statistical modeling of population dynamics

Present research: My primary research focuses on the statistics of Lévy processes and Lévy-driven models. A Lévy process is a continuous-time random walk realized on a Poisson space or a Wiener-Poisson space. To effectively handle its diverse non-Gaussianity, I am working to develop statistical methods that strike a balance between theory and practical/computational applications. More specifically, my research focuses on elucidating optimal phenomena in asymptotic inference for purely non-Gaussian Lévy-driven models; Gaussian and non-Gaussian quasi-likelihood analyses, together with their complementary properties; extensions to regularized (sparse and non-sparse) estimation; construction of model-assessment devices, such as information criterion and Bayesian and non-Bayesian sparse estimation; robustification of quasi-maximum likelihood methods; applications to hidden Markov process models; and related numerics, including random number generation of Lévy-driven models.

These topics are interrelated and contribute to the development and expansion of the field of statistics for dynamic phenomena. Recently, I have been participating in a software development project for the statistical analysis of stochastic processes, and I also have a particular interest in the application of stochastic-process modeling to the life sciences and medical fields; in connection with the latter, I am also engaged in basic research on statistical inference for population dynamics.

Notice for the students: Students should have already acquired the fundamentals necessary to mathematically describe and handle statistical models, including courses related to measure-theoretic probability theory, mathematical statistics, and basic statistical asymptotic theory. For the seminar, students will select and read literature (textbooks or research papers) in consultation with me.

Modern probability and statistics cover an extremely wide range of topics. Research topics for master's theses are not limited to the content of the research overview described above. Explore your areas of interest with an eager attitude aimed at deeply understanding the mathematics and mechanisms of statistical methods.