Gaussian quasi-information criterion for ergodic Lévy driven model

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Abstract:

Model selection is one of the central issues in statistical modeling. The main objective of this talk is to develop a framework for an Akaike Information Criterion (AIC) type predictive model comparison for ergodic stochastic differential equations driven by a Lévy process (Lévy driven SDE). It is assumed that trend and scale coefficients are correctly specified, and that the process is observed at high frequency over a long time period.

Previously, concerned with diffusion processes, through the Malliavin calculus [3] theoretically validated usage of the conventional AIC penalty term for a relative model comparison, and [1] clarified the correct penalty term of the Bayesian Information Criterion (BIC) which leads to the selection consistency, showing importance of careful treatment of the associated quasi-likelihood. As a matter of fact, much less is known about how to make up information criteria for Lévy driven SDE in a practical yet theoretically validated manner; the recent publication [2] seems to be the only existing result in this direction, where the authors studied BIC type information criterion for Lévy driven SDE through a two-stage stochastic expansion of the Gaussian quasi-marginal likelihoods for the scale and trend coefficients.

In the talk, a brief overview of the relevant results will be given at the beginning, followed by recent theoretical progresses and numerical experiments. Specifically, we will construct a novel easy-to-compute AIC type statistics which is of a non-standard form partially reflecting the non-Gaussianity of the driving Lévy process. The whole story is based on the Gaussian quasi-likelihood constructed through the small-time Gaussian approximation of the transition probability. Also presented will be implementation of the proposed method in the R package *yuima*.

Keywords:

High-frequency sampling; Information criterion; Stochastic differential equation

References:

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