Local asymptotic mixed normality of approximate maximum likelihood estimator of drift parameters in diffusion model

Snježana Lubura Strunjak
Faculty of Science Department of Mathematics
University of Zagreb, Zagreb, Croatia

30 January 2020

Abstract

Let X be a diffusion which satisfies a stochastic differential equation of the form: $dX_t = \mu(X_t, \theta)dt + \sigma_0\nu(X_t)dW_t$, where drift parameter θ is unknown and diffusion coefficient parameter σ_0 is known. We have discrete observations $(X_{t_i}, 0 \leq i \leq n)$ along fixed time interval $[0, T]$. Let $\bar{\theta}_n$ be approximate maximum likelihood estimator of drift parameter obtained from discrete observations and let $\hat{\theta}$ be maximum likelihood estimator obtained from continuous observations $(X_t, 0 \leq t \leq T)$ along fixed time interval $[0, T]$. We proved that $\bar{\theta}_n$, when $\Delta_n = \max_{1\leq i\leq n}(t_i - t_{i-1})$ tends to zero, is locally asymptotic mixed normal, with covariance matrix which depends on MLE $\hat{\theta}$ and on path $(X_t, 0 \leq t \leq T)$.