



Asymptotics for function derivatives estimators based on stationary and ergodic discrete time processes

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Abstract

The main purpose of the present work is to investigate kernel-type estimate of a class of function derivatives including parameters such as the density, the conditional cumulative distribution function and the regression function. The uniform strong convergence rate is obtained for the proposed estimates and the central limit theorem is established under mild conditions. Moreover, we study the asymptotic mean integrated square error of kernel derivative estimator which plays a fundamental role in the characterization of the optimal bandwidth. The obtained results in this paper are established under a general setting of discrete time stationary and ergodic processes. A simulation study is performed to assess the performance of the estimate of the derivatives of the density function as well as the regression function under the framework of a discretized stochastic processes. An application to financial asset prices is also considered for illustration.

Keywords Nonparametric estimation · Density estimation · Regression estimation · Kernel estimation · Function derivative · Ergodic discrete time processes · Martingale differences

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