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Efficient estimation of conditional variance functions in stochastic regression. (English)

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Summary: Conditional heteroscedasticity has often been used in modelling and understanding the variability of statistical data. Under a general set-up which includes nonlinear time series models as a special case, we propose an efficient and adaptive method for estimating the conditional variance. The basic idea is to apply a local linear regression to the squared residuals. We demonstrate that, without knowing the regression function, we can estimate the conditional variance asymptotically as well as if the regression were given. This asymptotic result, established under the assumption that the observations are made from a strictly stationary and absolutely regular process, is also verified via simulation. Further, the asymptotic result paves the way for adapting an automatic bandwidth selection scheme. An application with financial data illustrates the usefulness of the proposed techniques.

MSC:

62M10 Time series, auto-correlation, regression, etc. in statistics (GARCH)

Keywords:

absolutely regular; ARCH; volatility; efficient estimator; heteroscedasticity; nonlinear time series; local linear regression; conditional variance

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