

Estimating multivariate and conditional density functions using local Gaussian approximations

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Abstract:

The traditional method for estimating probability density functions non-parametrically is the kernel density estimator (KDE). A major problem with the KDE, however, is that it does not work very well for multivariate data, which is a consequence of the so-called "Curse of Dimensionality". This talk will introduce the locally Gaussian density estimator (LGDE), which is especially designed to handle multivariate data. We impose a basic restriction on the dependence between variables that drastically reduces the variance of the estimates, but experiments using simulated data indicate that the price we have to pay in terms of increased bias, is not very high in many cases.

We apply the method on some financial data, which motivates the need for estimates of conditional densities. Indeed, conditional density estimates are easily obtained within the LGDE framework, and this will be illustrated using real and simulated data.

The theoretical foundation of our estimators will be presented briefly.