

A simple nonparametric estimator of a monotone regression function

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In this paper a new method for monotone estimation of a regression function is proposed. The estimator is obtained by the combination of a density and a regression estimate and is appealing to users of conventional smoothing methods as kernel estimators, local polynomials, series estimators or smoothing splines. The main idea of the new approach is to construct a density estimate from the estimated values $\hat{m}(i/N)$ ($i = 1, \dots, N$) of the regression function to use these “data” for the calculation of an estimate of the inverse of the regression function. The final estimate is then obtained by a numerical inversion. We prove asymptotic normality of the new estimate and compare the asymptotic properties with the unconstrained estimate. In particular it is shown that for kernel estimates or local polynomials the monotone estimate is first order asymptotically equivalent to the unconstrained estimate. We also illustrate the performance of the new procedure by means of a simulation study and discuss several other applications of the approach including multivariate isotone regression and the construction of non crossing quantile estimates