

Semiparametric Expectile Regression

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Abstract

While a simple mean regression attempts to describe the expectation of a response as a function of the covariates, the results of a quantile or expectile regression offer a much broader view. In principle, a dense set of expectiles or quantiles allows for an analysis of the complete conditional distribution of the response. This can lead to new insight in the dependency between the response and its covariates.

The results of a quantile regression can be acquired by minimising the asymmetrically weighted sum of the absolute residuals and in analogy an expectile regression is computed from the least asymmetrically weighted squares (LAWS) of the residuals. Hence the computation of expectile regression is much easier, though its interpretation is more complex than for a quantile. But only in expectile regression, one can build flexible additive models that contain different kinds of effects. For continuous univariate covariates, smooth regression curves can be fitted using penalised splines. Additionally the model can include spatial effects based on Markov random fields and tensor product splines, for example.

In our work, we also construct pointwise confidence intervals for each fitted expectile. For the construction we use the asymptotic normality of the regression coefficients. Further, the software package `expectreg` is available for R and includes the proposed methods.

(joint work with Thomas Kneib, University Göttingen, and Göran Kauermann, Linda Schulze Waltrup, LMU)