

Penalized expectile regression: an alternative to penalized quantile regression

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Abstract This paper concerns the study of the entire conditional distribution of a response given predictors in a heterogeneous regression setting. A common approach to address heterogeneous data is quantile regression, which utilizes the minimization of the L_1 norm. As an alternative to quantile regression, we consider expectile regression, which relies on the minimization of the asymmetric L_2 norm and detects heteroscedasticity effectively. We assume that only a small set of predictors is relevant to the response and develop penalized expectile regression with SCAD and adaptive LASSO penalties. With properly chosen tuning parameters, we show that the proposed estimators display oracle properties. A numerical study using simulated and real examples demonstrates the competitive performance of the proposed penalized expectile regression, and its combined use with penalized quantile regression would be helpful and recommended for practitioners.

Keywords Asymptotics · Expectile regression · Heteroscedasticity · Penalized regression · Variable selection

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