

Quantiles, Expectiles and Jackknife Model Averaging in Ultra-High Dimensional Regressions

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Abstract: Both quantile and expectile regressions are useful tools for modelling data with heterogeneous conditional distributions. This paper develops the Jackknife model averaging method for heteroskedastic quantile regressions and expectile regressions with ultra-high dimensional data. First, we propose an algorithm to screen all candidate variables and then select the relevant predictors for model averaging. In particular, we use the expectile partial correlation for screening in the expectile regression, in the spirit of the quantile partial correlation used for screening in the quantile regression (Ma, Li and Tsai, 2017). Theoretical results indicate that the screening procedure can achieve the sure screening set. Second, the model averaging expectile estimator using the leave-one-out cross-validated weight is shown to be asymptotically normal and asymptotically optimal in the sense of out-of-sample final prediction error. Numerical results demonstrate the nice performance of the screening procedure and the averaging estimators. Despite the fact that there exists a one-to-one mapping from expectiles to quantiles, it is found that the expectile-based model averaging estimator provides superior performance for estimating the conditional tail quantiles, as compared to the direct quantile-based approach (Lu and Su, 2015).