

# On Additive Conditional Quantiles with High-Dimensional Covariates

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**Summary:** We investigate the estimation of the conditional quantile of a response when many covariates are involved. In particular, we model the conditional quantile of a response as a nonlinear additive function of relevant covariates. Within this set-up, we propose a nonparametric smoother to estimate the unknown functions. The estimator provides direct computation of the nonlinear functions. Because it does not require any iteration, the estimator allows fast and routine data analysis. On the theoretical front, we also show asymptotic properties of the estimator including mean squared error and limiting distribution. The theory confirms that for moderate dimension of the covariates, the estimator escapes the “curse of dimensionality” problem. Both simulated and real data examples are provided to illustrate the methodology. In addition to the efficient identification of nonlinear conditional quantile components, we also discuss how the methodology of this paper can be applied to estimate linear parameters of a partially linear model. A small simulation study is used to elaborate the application.

**Some key words:** Additive models, reweighted Nadaraya-Watson, asymptotic properties, dimensionality reduction, nonparametric.