Local Bilinear Multiple-Output Quantile Regression

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(Joint work with Zudi Lu, Davy Paindaveine, and Miroslav Siman)

A new multiple output concept of quantile regression, based on a directional version of Koenker and Bassett¹s traditional one, has been introduced in Hallin, Paindaveine and Siman, Annals of Statistics 2010, 635-703, essentially for multivariate location problems. The empirical counterpart of that concept produces polyhedral contours that (in the location case) coincide with the Tukey halfspace depth contours. In a regression context, however, that concept cannot account for nonlinear or/and heteroscedastic dependencies. A local bilinear version of those contours is proposed here, which asymptotically recovers the conditional halfspace depth contours of the multiple-output response. A Bahadur representation is established, along with asymptotic normality results. Examples are provided.