COLLOQUIUM

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Multivariate Quantile Regression: A Directional Approach

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Refreshments: 10:00 a.m.

Abstract

Quantile regression plays an important role in statistics and its univariate version has been largely used in many fields, like economics, agriculture, finance, public health and so on. There are several extensions to multivariate quantile regression, which may at times enjoy certain favorable properties, like robustness, rotation equivariance, even affine equivariance. However, when going to applications, they barely satisfy our needs, especially in terms of interpretation. Directional quantile envelopes, the intersection of the halfspaces determined by directional quantiles, allow for explicit probabilistic interpretation, compared to other multivariate quantile concepts. The construction of directional quantile envelopes can be adapted to elaborate frameworks that require more sophisticated estimation methods than simply evaluating quantiles for empirical distributions. The estimates are affine equivariant whenever the estimators of directional quantiles are translation and scale equivariant. The estimating frameworks provide a way to perform multivariate quantile regression, which can be used to obtain bivariate growth charts, with possible adjustments for other factors.

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