

On multivariate rank regression

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Abstract: An extension of rank regression techniques to multivariate linear models is proposed and studied. Unlike the co-ordinatewise rank regression techniques considered by some earlier authors, our approach is affine equivariant, and it is based on a transformation and retransformation procedure originally developed by Chakraborty and Chaudhuri (1996, 1997) for constructing an affine equivariant version of multivariate median. Affine equivariance is expected to lead to superior statistical performance of our procedure compared to other non-equivariant procedures especially in the presence of substantial correlations among different response variables in multi-response problems. Some of the statistical properties of the proposed multivariate rank regression estimates are discussed, and a few results based on numerical investigation of the performance of these estimates are presented.

Key words: Affine equivariance, Hodges-Lehmann estimate, multivariate linear model, statistical efficiency, transformation retransformation estimates, Wilcoxon's rank scores.

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1 Introduction: multivariate linear model and rank regression

Linear model is a widely used statistical tool for empirical analysis to understand and make inference about the nature of inter-dependence that exists among different variables in the data. Perhaps it will not be an overstatement to say that various forms of linear model pervade almost every