

# Composite quantile regression for the receiver operating characteristic curve

Xiaogang Duan\*

Department of Statistics, Beijing Normal University, Beijing 100875, China  
xgduan@amss.ac.cn

Xiao-Hua Zhou

Department of Biostatistics, University of Washington, Seattle, Washington 98195, U.S.A.  
azhou@u.washington.edu

The covariate-specific receiver operating characteristic curve is frequently used to evaluate the classification accuracy of a diagnostic test when it is associated with certain covariates. In this paper, we proposed a new procedure for estimating this curve based on a reformulation of the conventional location-scale model as well as the idea of composite quantile regression. Asymptotic normality of the proposed estimators is established, both for the regression parameters and the covariate-specific receiver operating characteristic curve at a fixed false positive point. Simulation results show that the new estimators compare favorably to their main competitors in terms of the standard error. We apply the new procedure to data from the national Alzheimer's coordinating center.

Keywords: Composite quantile regression; Location-scale model; Receiver operating characteristic curve.