

# Extreme Quantile Estimation for Single Index Model

Deyuan Li

*Fudan University*

*E-mail: deyuanli@fudan.edu.cn*

**Abstract:** It is important to quantifying and predicting rare events which have huge effects. Existing work on analysing such effect mainly rely on either parametric model like linear quantile regression which lack of flexibility or non parametric model which subject to "the curse of dimensionality". We propose a new semi-parametric approach based on single index quantile regression. The proposed estimation are presented in three steps by first obtaining a root  $n$ -estimator of index parameter and then applying local polynomial regression to estimate the intermediate conditional quantiles which are then extrapolated to the tails. We establish asymptotic normality of the proposed estimator which balances better between model flexibility and parsimony. We also study its performance for finite sample by simulation and real data analysis to Los Angeles mortality rate, showing it is more accurate and stable than existing methods.