



THE UNIVERSITY OF
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DEPARTMENT OF STATISTICS

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“Online Quantile Regression with Constant Step-size Stochastic
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Abstract

Quantile Regression (QR) is powerful for modeling conditional quantiles, but its adoption in large-scale and streaming settings is hindered by computational burden. Classical estimation via linear programming scales poorly, and while convolution-type smoothing methods (“conquer”) enable efficient gradient-based optimization with valid inference, they rely on full-batch passes unsuitable for online environments. We study stochastic gradient descent methods – both stochastic subgradient descent (S-subGD) and SGD on convolution-smoothed loss – under a constant step-size regime for online quantile regression. Through numerical experiments, we demonstrate that constant step-size variants converge significantly faster than their decaying step-size counterparts, remain stable, and achieve asymptotic normality, making them well-suited for modern online and streaming data environments.