ON A LEAST ABSOLUTE DEVIATIONS ESTIMATOR OF A CONVEX FUNCTION

E. Lim, University of Miami, USA, lim@miami.edu
Y. Luo, University of Miami, USA, ly1987510@gmail.com

When estimating a performance measure f_* of a complex system from noisy data over a domain of interest, the underlying function f_* is often known to have a certain shape characteristic such as convexity. In this case, one often uses convexity to better estimate f_* by fitting a convex function to data. However, the traditional way of fitting a convex function to data, which is done by computing a convex function minimizing the sum of least squares, takes too long to compute the fit. It also runs into an "out of memory" issue when the number of data points exceeds a few hundred. In this paper, we propose a computationally efficient way of fitting a convex function by computing the fit minimizing the sum of least absolute deviations rather than the sum of squares. We present numerical examples to illustrate the performance of the proposed estimator. We also establish the consistency of the proposed estimator and its derivative by proving that, under modest assumptions, the estimator and its derivative converge almost surely to the true values as the number of data points increases to infinity.