

ROBUST AND EFFICIENT MEAN ESTIMATION: APPROACH BASED ON THE PROPERTIES OF SELF-NORMALIZED SUMS

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Abstract: Let X be a random variable with unknown mean and finite variance. We present a new estimator of the mean of X that is robust with respect to the possible presence of outliers in the sample, provides tight sub-Gaussian deviation guarantees without any additional assumptions on the shape or tails of the distribution, and moreover is asymptotically efficient. This is the first estimator that provably combines all these qualities in one package. Our construction is inspired by robustness properties possessed by the self-normalized sums. Finally, theoretical findings are supplemented by numerical simulations highlighting the strong performance of the proposed estimator in comparison with previously known techniques. [Joint with S. Minsker]