Robust estimations of moments for unimodal distributions

Tuban Lee

This manuscript was compiled on June 8, 2023

A. Invariant Moments. All popular robust location estimators, such as the trimmed mean, Winsorized mean, Hodges-Lehmann estimator, Huber M-estimator, and median of means, are symmetric. As shown previously, a γ-weighted Hodges-Lehmann mean ($\mathrm{WHLM}_{k,\epsilon,\gamma}$) can achieve consistency for the population mean in any γ-symmetric distribution with a finite mean. However, it falls considerably short of consistently handling other common distributions. Shifting from semiparametrics to parametrics, consider an estimator with a non-sample-dependent breakdown point