Poster Snapshot

One-Step Robust Estimation of Location Vector and Scale Matrix using Density Power Reweighting

Soumya Chakraborty (ISI)

Robust estimation of location vector and scale matrix is a cornerstone in the field of multivariate analysis and its applications. An estimator is said to be robust if it is peripherally affected by model misspecification or presence of outliers in the data. Robustness faces hard trade-off with asymptotic efficiency. In addition, many of the robust estimation procedures are computer intensive in nature. The trade-off between robustness and efficiency increases proportionally with data dimension in case of multivariate location-scale estimation framework along with computational cost. Additionally, many of the M-estimators of multivariate location and scale have breakdown values converging to zero as the data dimension grows unboundedly. In this work, a new one-step robust estimation procedure is proposed in the location-scale set-up which updates an initial highly robust estimate with density power weights and the updated estimate becomes more efficient and the breakdown of the initial highly robust estimate becomes the breakdown of the one-step update. The one-step estimates are naturally less computer intensive as it avoids iterations till convergence. Many of the multivariate robust estimates like Minimum Covariance Determinant (MCD), Minimum Volume Ellipsoid (MVE), S estimates, MM estimates are found to be benefitted by this one-step update in terms of bias and mean squared errors in simulation experiments.