

## **Executive Summary of the UGC-Major Research Project Report**

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**Title of the Research Project:** Robust Statistics and its applications in Computer Vision

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All statistical techniques implicitly or explicitly rely on the assumptions such as normality, linearity and homogeneity. Also these techniques heavily depend on the parameters like location and scale. The conventional estimator of these parameters such as mean/mean vector and standard deviation/covariance matrix is very sensitive to the extreme observations/outliers. Now-a-days, due to invention of the fast computers the voluminous of data has been collected and stored. There is a need to extract the complete information from the data repositories. In these contexts conventional statistical techniques do not provide the reliable results. These techniques were developed two hundred centuries ago and also heavily rely on the number of assumptions. Many robust alternatives are entrenched during the past few decades.

This works relating to the robust estimators are reviewed thoroughly along with the studies on the strengths and limitations of the estimators. A new robust estimator has been proposed namely rank based weighted scale estimator (RWS-estimator) to estimate the location and scatter parameters. The performance of the estimator has been assessed by applying it in various multivariate techniques with and without outliers. The efficiency of the RWS estimator has been successfully validated while conducting the computer vision task such as image compression. The RWS estimator possess the features like, less time to estimate the parameters compared with other robust estimators, less storage space and more clarity while applying in the image compression.

Due to invention of the fast computers the voluminous of data has been collected and stored. The data may be quantitative or image/image sequence. There is a need to extract the complete information from the data repositories. The established RWS estimator can be used implicitly or explicitly to extract the information from the data bases. The end user can send/receive the images very quickly, since the established estimator has less time to estimate the parameters, less storage space and more clarity while applying in the image compression. The established estimator can be used wherever the statistical techniques are applicable, which depend on location and scatter parameters. Also, it will be beneficial to the research communities who use multivariate statistical techniques, especially classification and data reduction techniques. Certainly, the established estimator will further be more beneficial to computer vision communities.