



# THE UNIVERSITY OF CHICAGO

Department of Statistics

## MASTER'S THESIS PRESENTATION

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Testing High Dimensional Normality  
via Multivariate Skewness and Kurtosis

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Eckhart 117, 5734 S. University Avenue

### ABSTRACT

Many modern methods in high dimensional statistics assume multivariate normality, including graphical models, multivariate analysis of variance and discriminant analysis. Existing tests of multivariate normality do not perform well for the high-dimensional setting where the dimension  $p$  can be much larger than the sample size  $n$ . We propose two new tests of high dimensional normality via multivariate skewness and kurtosis, and investigate their theoretical and numerical properties. The limiting null distributions of the test statistics are derived and corresponding bootstrap calibrations of the tests are studied. Numerical performance of these two tests and their bootstrap calibrations are compared using simulations. When the null hypothesis of joint normality is rejected, it is often of interest to capture the largest subset from all of the  $p$  variables, which can be viewed as a multivariate normal distribution. New procedures are introduced and their asymptotic properties are studied.

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