

A high-performance Likelihood Ratio Test for high-dimensional MANOVA

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Abstract

Is it possible to develop a likelihood ratio test for high-dimensional MANOVA? Would such test perform well? Would it be able to outperform existing tests? Would it be applicable to extremely small samples? Would it be applicable to non-normal random variables, as uniform, extremely skewed distributions, or even heavy tailed distributions with success? Would it have a nice, rather simple to compute and well performing, asymptotic distribution? Although most researchers in the area of Statistics may think that the answer to all of the above questions is a ‘No’, it will be shown that it is actually a ‘Yes’! And to all of them!

The presentation also shows the advantages of the LRT developed in relation to other existing tests, namely in terms of power and control of the Type I error rate. A quite simple, but very well-performing, Normal asymptotic distribution is obtained for the test statistic and a number of simulation results show the advantages of the LRT and its adequacy even for non-normal, highly skewed and/or heavy tailed distributions.