On testing the equality of high dimensional mean vectors with unequal covariance matrices

Jiang Hu¹ · Zhidong Bai¹ · Chen Wang² · Wei Wang¹

Received: 17 September 2014 / Revised: 11 August 2015 / Published online: 8 October 2015
© The Institute of Statistical Mathematics, Tokyo 2015

Abstract In this article, we focus on the problem of testing the equality of several high dimensional mean vectors with unequal covariance matrices. This is one of the most important problems in multivariate statistical analysis and there have been various tests proposed in the literature. Motivated by Bai and Saranadasa (Stat Sin 6:311–329, 1996) and Chen and Qin (Ann Stat 38:808–835, 2010), we introduce a test statistic and derive the asymptotic distributions under the null and the alternative hypothesis. In addition, it is compared with a test statistic recently proposed by Srivastava and Kubokawa (J Multivar Anal 115:204–216, 2013). It is shown that our test statistic performs better especially in the large dimensional case.

Keywords High-dimensional data · Hypothesis testing · MANOVA

1 KLASMOE and School of Mathematics and Statistics, Northeast Normal University, Changchun 130024, Jilin, People’s Republic of China
2 Department of Statistics and Applied Probability, National University of Singapore, Singapore 117546, Singapore