LARGE-SCALE MULTIPLE TESTING WITH MULTI-DIMENSIONAL TEST STATISTICS

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Abstract. Almost all multiple testing procedures assume that an appropriate univariate test statistic is given and try to control the false discovery rate (FDR) under different model assumptions. But in some hypothesis testing problems, multivariate statistics are available and an important stage would be to combine them to obtain a powerful univariate test statistic. In this paper, we consider adaptive methods for constructing nested rejecting regions for z-values in more than one dimension. It is proved that for a class of adaptive methods, though the regions may depend on data, and hence random, the false discovery rate (FDR) would be controlled. This flexibility might be exploited to increase the power. In other words the data can help to perform more powerful tests though the distribution of z-values in non-null cases are unknown. Result for special cases will be investigated using simulated and real data.

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