

Error controls in multiple testing under dependence

False discovery rate (FDR) control have received great attention in the multiple testing problem. However, the conventional FDR control does not distinguish direction of effects. It is desirable to modify FDR for accommodating various needs to control the errors. Furthermore, most multiple test are derived based on the model for test statistics, under the independence assumption among the observations. However, observations in areas like genomics and neuroimaging are often correlated. In this paper, we model basic responses to derive optimal likelihood tests for hidden Markov random field models. We compare the numerical performance of the proposed method with existing tests. Real data examples for the gene expression data and the neuroimage data are presented. A numerical study shows that likelihood approach greatly improves existing methods and finding the best fitting model is crucial for the behavior of test procedures.