

Title:

On Control of the False Discovery Proportion

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Abstract: `[natbib amsmath [dvips]graphicx`

Consider the multiple testing problem of testing null hypotheses H_1, \dots, H_s . A classical approach to dealing with the multiplicity problem is to restrict attention to procedures that control the familywise error rate (*FWER*), the probability of even one false rejection. However, if s is large, control of the *FWER* is so stringent that the ability of a procedure which controls the *FWER* to detect false null hypotheses is limited. Consequently, it is desirable to consider other measures of error control. We will consider methods based on control of the false discovery proportion (*FDP*) defined by the number of false rejections divided by the total number of rejections (defined to be 0 if there are no rejections). The false discovery rate proposed by Benjamini and Hochberg (1995) controls $E(\text{FDP})$. Here, we construct methods such that, for any γ and α , $P\{\text{FDP} > \gamma\} \leq \alpha$. Based on p -values of individual tests, we consider stepdown procedures that control the *FDP*, without imposing dependence assumptions on the joint distribution of the p -values. A greatly improved version of a method given in Lehmann and Romano (2004) is derived and generalized to provide a means by which any sequence of nondecreasing constants can be rescaled to ensure control of the *FDP*. We also provide a stepdown procedure that controls the *FDR* under a dependence assumption.