

Multiple Hypotheses Testing: From Finite to Infinite Number of Tests

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Abstract:

In this talk, I shall first give a brief overview of my research, and then present my research in multiple hypotheses testing. In the case of a finite number of hypotheses, there is a trend of developing new multiple testing procedures that control the false discovery rate (FDR) as opposed to the family-wise error rate (FWER). However, the FDR is the expectation of false discovery proportion (FDP) which varies from one test to another. In this part of research, we explore the functional relationship between FWER and FDR, and provide a general result for the variance of FDP of any generic multiple tests. The variance is a reflection of the efficiency of a test. It is a quadratic form of the true FDR level and is stochastically related to the random variables from the alternative hypothesis. Then a new and efficient FDR controlling procedure is proposed. The performance of the proposed procedure is compared with some recently published ones. In the case of an infinite number of hypotheses, we consider testing the equality of functional curves. A new procedure is derived based on samples with homoscedastic or heteroscedastic errors. Our analysis and simulation results show that this new procedure is proper and powerful. Connections between them can be discussed. Applications to genetic and environmental data will be given.