

Most Powerful Tests, P-Value Statistics, and Multiple Testing: Some Recent Optimality Results

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Investigations concerning the role of the powers of the individual tests in multiple hypotheses testing problems such as micro array data analysis, especially in the context of optimally determining the sizes of the individual tests to achieve an overall control of the family-wise error rate or the false discovery rate, appears to be still in its infancy. Examination of the powers is tied-in to desired effect sizes, and in multiple hypotheses testing, it is expected that the individual tests will possess varying powers. In this talk I will provide some recent theoretical results regarding optimal sizes in such multiple hypotheses testing settings. This will entail a brief review of the theory of most powerful tests and the distributions of the P-value statistic. I will then proceed to show the existence and uniqueness of the optimal solution, and then present computational methods for determining these set of optimal sizes. Some concrete illustrations and also comparisons through simulations will be presented.