

Semi-parametric homogeneity test and sample size calculation for a two-sample problem under an inequality constraint

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Abstract

In medical researches such as case-control studies with contaminated controls, frequently encountered is a particular two-sample testing problem in which one sample has a mixture structure. It is very common the case that the exposure in a case-control study may have a positive (or negative) effect on the response variable if the effect exists. This is often ignored by existing tests, which would lead to potentially power loss. Meanwhile, it is of much practical importance to determine a minimal sample size to reach a target power. Based on empirical likelihood and density ratio model, we develop a new EM-test by incorporating the inequality information in the alternative. We show that the proposed EM-test has a mixture of zero and χ_1^2 limiting distribution under the null hypothesis. Its local power analysis and sample size calculations are also investigated. A simulation study and two real data analyses are provided to illustrate the proposed EM-test and sample size formula.

Keywords

Empirical likelihood, EM-test, Sample size calculation, Two-sample problem