

Title:

Optimal Testing of Equivalence Hypotheses

Author(s):

Joseph P. Romano

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Abstract:

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In this paper, we consider the construction of optimal tests of equivalence hypotheses. Specifically, assume X_1, \dots, X_n are i.i.d. with distribution P . Let $\theta = \theta(P)$ be some real-valued parameter of interest. The null hypothesis asserts $\theta \notin (a, b)$ versus the alternative $\theta \in (a, b)$. For example, such hypotheses occur in bioequivalence studies where one may wish to show two drugs, a brand name and a proposed generic version, have the same therapeutic effect. Very little optimal theory is available for such testing problems, and it the purpose of this paper to provide an asymptotic optimality theory. Thus, we provide asymptotic upper bounds for what is achievable, as well as test constructions that attain the bounds. The focus is on parametric models, but we also consider the nonparametric problem where θ is the mean. The asymptotic theory is based on Le Cam's notion of asymptotically normal experiments. In order to approximate a general problem by a limiting normal problem, an optimal equivalence test is obtained for testing the mean of a multivariate normal mean.