

On consistent hypothesis testing

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Abstract

We systematically explore conditions of existence of different types of consistent tests. We establish that the existence of discernible (strong consistent) tests follows from the existence of pointwise consistent tests. We show that, if there are consistent tests, then the set of alternatives can be represented as a countable union of nested subsets such that there are uniformly consistent tests for each of these subsets of alternatives. Implementing these results we explore both sufficient conditions and necessary conditions for existence of uniformly consistent, consistent, pointwise consistent and discernible tests for hypothesis testing on a probability measure of independent sample, on a value of statistical functional, on a mean measure of Poisson process, on a solution of linear ill-posed problems in Gaussian noise, on a solution of deconvolution problem and for the problem of signal detection in the heteroscedastic Gaussian white noise. In the last three cases the necessary conditions and the sufficient conditions coincide.