Theory of Probability and its Applications 1998 vol.43 N2, pages 269-281

Local asymptotic efficiency of a sequential probability ratio test for d-guarantee discrimination of composite hypotheses

Volodin I., Novikov A.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

A sequential Wald test for discrimination of two simple hypotheses $\theta = \theta 1$ and $\theta = \theta 2$ with boundaries A and B is applied to distinguish composite hypotheses $\theta < \theta 0$ and $\theta > \theta 0$, the parameters $\theta 1$, $\theta 2$, A, and B being chosen in such a way that d-posteriori probabilities of errors do not exceed the given restrictions $\beta 0$ and $\beta 1$. An asymptotic behavior of boundaries A, B and the average observation time are studied when $\beta = \max\{\beta 0, \beta 1\} \to 0$. An asymptotic ($\beta \to 0$) comparison is made of $E\theta v$ with the least given number of observations necessary for discrimination of composite hypotheses with the same restrictions $\beta 0$, $\beta 1$ on d-posteriori probabilities of errors. It is shown that the minimum (in a neighborhood of the point $\theta = \theta 0$) gain of the average observation time makes up 25%. Therefore, there are sequential tests within the bounds of a d-posteriori approach that give a gain in the size of observations for every value of a parameter tested.

Keywords

Asymptotic efficiency, Average size of observations, Bayesian paradigm, d-guarantee, d-posteriori approach, Discrimination of composite hypotheses, Necessary size of a sample, Regular statistical experiments, Sequential tests, Strict restrictions on d-risks