

ASYMPTOTIC MINIMAXITY IN THE CHANGE-POINT PROBLEM

BY ANDREW L. RUKHIN
University of Maryland

A lower bound on the limit of the minimax risk under the zero-one loss function is established in the classical setting of the change-point estimation problem. This bound is attained by the maximum likelihood estimator in the situation when the two probability distributions before and after the change point are completely known. The nature of this bound is related to the multiple decision problem and a variety of inequalities relating it to the information-type measures is deduced. Minimaxy of the maximum likelihood procedure is proved for normal observations with unknown means.

1. Introduction and Summary. In this paper the classical setting of the change-point estimation problem which was studied by many authors (see Hinkley, 1970; Cobb, 1978) is considered. It is well known that in this setting there is no consistent estimator of the change-point so that to study the asymptotic efficiency the setting is usually modified to allow the parameter (Carlstein, 1988) or the distributions (Ritov, 1990) to depend on the sample size in some fashion.

In Section 2 a positive lower bound on the limit of the minimax risk under the zero-one loss function is established. Although the maximum likelihood estimator is not consistent (its deviation from the true parameter is positive with positive probability) it attains this bound when the two probability distributions before and after the change-point are completely known. The nature of this bound is related to the classification problem, and this relationship is used to derive various inequalities for the probability of the correct decision in terms of information-type characteristics.

When the observations are normal with unknown means it is shown in Section 3 that the maximum likelihood procedure is asymptotically minimax

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