NONPARAMETRIC METHODS IN CHANGE-POINT PROBLEMS: A GENERAL APPROACH AND SOME CONCRETE ALGORITHMS

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A general approach to change-point problems is proposed. This approach is based upon two ideas. The first idea is that any change-point problem can be reduced to the problem of detection of changes in the mean value of some new sequences. The second idea is that the nonparametric family of Kolmogorov-Smirnov type statistics can be used for change-point detection in these sequences. This general approach is implemented in two cases: (a) the problem of gradual change-point detection, and (b) change-point detection in two-phase regression model.

1. Introduction. Change-point problems attract considerable interest nowadays. Much was done in the field of parametric change-point estimation (see Shaban (1980) and Krishnaiah and Miao (1988) for bibliography).

In this report we are dealing with nonparametric change-point detection methods. These methods do not use a priori information about data and are the most useful for applications (see Csörgö and Horváth (1988) for a review).

A general approach to change-point problems is proposed. This approach is based upon two ideas. The first idea is that any change-point problem can be reduced to the problem of detection of changes in the mean value of some new sequences. The second idea is that the nonparametric family of Kolmogorov-Smirnov type statistics can be used for change-point detection in these sequences.

This general approach is implemented in two cases: (a) the problem of gradual change-point detection, (b) change-point detection in two-phase regression model. For more details see Brodski and Darkhovski (1993).

2. Main Ideas. Since we are dealing with detection of different changes in probabilistic characteristics of random sequences, we need a general formulation of this problem. Any property of a random sequence is determined by

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