Preface

There is evidence of rapidly increasing interest in the area of change-point analysis among statisticians; this is triggered by an awareness of important applications as well as by newly available theoretical and computational methods. Some of these new methods involve, for instance, progress in the theory of empirical processes, advances in curve estimation methods, and bootstrap methods.

Recent applications of change-point methods in the widest sense include: Statistical image processing and edge detection in noisy images, which can be viewed as a multidimensional change-point respectively boundary detection problem; change-points in economic regression models (split or two-phase regression); detection of discontinuities in astrophysical time series with dependent data; changes in hazard rates as were shown to occur some time after bone-marrow transplantation for leukemia patients; the comparison and matching of DNA sequences; the simultaneous estimation of smoothly varying parts and discontinuities (possibly in a derivative) in curves and surfaces.

The broad applicability of change-point methods in various statistical settings and subject-matter areas as well as the applicability of a large array of mathematical and statistical methods to investigate the various change-point problems makes this an attractive field of research, with still many open and unsettled questions. It was our intention to include articles which reflect this variety, as well as articles which demonstrate the unifying themes in change-point technology and provide an overview.

Examples of statistical change-point problems that are discussed in this volume include:

1. A review article (P. K. Bhattacharya) provides historical perspectives of the classical change-point problem.

2. The problem of testing for, detecting and locating a change in the distribution in a sequence of random variables. This problem has been treated under parametric assumptions and more recently with nonparametric methods. (Csörgö & Szyszkowicz; Darkhovski; Dümbgen; Ferger; Horváth & Parzen; Rukhin; Yao, Huang & Davis)

3. Sequential versions of the above and of other change-point problems, with applications in industrial quality control. (Beibel; Bell, Gordon & Pollak; Bhattacharya & Zhao; Yaschin)

4. Detection and location of a change-point or discontinuity in a regression function with parametric two-phase regression models. (Kim; Siegmund & Zhang)