Preface

This volume contains several contributions on the general theme of dependence for several classes of stochastic processes, and its implications on asymptotic properties of various statistics and on statistical inference issues in statistics and econometrics.

The chapter by Berkes, Horváth and Schauer is a survey on their recent results on bootstrap and permutation statistics when the negligibility condition of classical central limit theory is not satisfied. These results are of interest for describing the asymptotic properties of bootstrap and permutation statistics in case of infinite variances, and for applications to statistical inference, e.g., the change-point problem.

The paper by Stoev reviews some recent results by the author on ergodicity of max-stable processes. Max-stable processes play a central role in the modeling of extreme value phenomena and appear as limits of component-wise maxima. At the present time, a rather complete and interesting picture of the dependence structure of max-stable processes has emerged, involving spectral functions, extremal stochastic integrals, mixed moving maxima, and other analytic and probabilistic tools. For statistical applications, the problem of ergodicity or non-ergodicity is of primary importance.

The main statistical problem for long memory processes is estimation of the long memory parameter. This problem has been extensively studied in the literature and optimal convergence rates of certain popular estimators of the memory parameter were established under the assumption that the spectral density is second order regularly varying at zero. The paper by Soulier discusses the situation when the spectral density does not satisfy the second order regularity condition, and obtains a lower bound on the convergence rate of estimator. It turns out that in such a case, the rates of convergence can be extremely slow.

In statistical inference for time series and random fields, the important question is to prove the asymptotic normality of certain quadratic forms written as integrals of the periodogram with certain kernels. By the well-known cumulant criterion, this problem can be reduced to estimation of cumulants of the quadratic form; however, such cumulants have a complicated form of Fejér graph integrals and are generally difficult to analyze. The paper by Avram, Leonenko and Sakhno reviews and extends their earlier asymptotic results on asymptotic behavior of Fejér graph integrals and applies them to prove asymptotic normality of tapered estimators.

Vedel, Wendt, Abry and Jaffard consider two classes of multifractal processes, i.e., infinitely divisible motions and fractional Brownian motions in multifractal time, and three different types of multiresolution quantities: increment, wavelet and Leader coefficients, which are commonly involved in the analysis and modeling of scale invariance in applications. They study, both analytically and by means of numerical simulations, the impact of varying the number of vanishing moments of the mother wavelet on the decay rate of the higher order correlation functions of these multiresolution coefficients. They found that increasing the number of vanishing moments of the mother wavelet significantly fastens the decay of the correlation functions, but does not induce any faster decay for the higher order correlation functions.

It is well-known that real world signals often display erratic oscillations (erratic Hölder exponents) which are not characteristic for "classical" stochastic processes such as diffusions or Gaussian processes, and which have been termed multifractional behavior. An interesting and challenging task for probabilists is to construct new classes of random multifractals and to rigorously describe multifractional properties. The paper by Ahn, Leonenko and Shieh deals with the multifractal products of the processes being the exponents of Ornstein- Uhlenbeck processes driven by Lévy motion. The paper reviews some known results and studies some questions related with tempered stable and normal tempered stable distributions.

The chapter by Wu and Mielniczuk revisits the concept of statistical dependence, viewed as the state of variables being influenced by others. With this understanding of dependence, they introduce new dependence measures which are easy to work with and are useful for developing an asymptotic theory for complicated stochastic systems. They also explore relations of the introduced dependence concept with nonlinear system theory, experimental design, information theory and risk management.

Haye and Farrell's paper develops the limit theory for robust regression estimation when inputs are linear long range dependent processes; limit theory for functions of such models comes from the elegant martingale decomposition of Ho and Hsing (1995, 1996). The difficult point is to establish an uniform inequality affordable following Wu's ideas. As usual, rates depend on the Hurst exponent. Robust regression extends the formerly studied case of least squares error minimization and should be very helpful for dealing with real data.

The same regression models are considered by Schmitz and Steinebach to get an automatic monitoring of changes in linear regression models; CUSUM procedures inherited from Horváth *et al.* (2004) allow to provide a time segmentation on which the model is a simple regression with dependent inputs. Extremities of the considered intervals are the change-point epochs and almost sure validations of the method are proved; the method is illustrated in different dependence frameworks: the econometrician's Near Epoch Dependence, M-dependence and strong mixing AR. The most interesting feature is that distributional convergences allow to derive asymptotic confidence sets.

Nonstationarity is a deep difficulty when handling with really observed times series. Kouamo, Moulines and Roueff test for homogeneity of times series through a multiscale idea; it is well known that wavelets are associated to difference operators extending on the discrete derivative. The considered retrospective method makes changes into the spectral density become changes of the variance of the wavelet coefficients. Hence a CUSUM procedure is worked out to achieve the authors program for a Gaussian case.

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