

Local Empirical and U-Statistic Processes: Methods and Applications

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Local empirical and U-statistic processes are based upon an estimator of the density of a function of one or of several i.i.d. variables. They have numerous applications in the study of rates of consistency of various kernel-type estimators of density and regression functions. The tools for the study of these processes come from modern empirical process theory. Besides discussing applications of these processes, we shall describe the probability inequalities and moment bounds for local empirical and U-statistic processes that were developed to derive their asymptotic properties.

These lectures will be largely based on the following papers:

U. Einmahl and D. M. Mason (2000), An empirical process approach to the uniform consistency of kernel-type function estimators, *Journal of Theoretical Probability* **13**, 1-37.

U. Einmahl and D. M. Mason (2005), Uniform in bandwidth consistency of kernel-type function estimators, *Annals of Statistics* **33**, 1380-1403.

U. Einmahl, J. Dony and D. M. Mason (2006), Uniform in bandwidth consistency of local polynomial regression function estimators, Proceedings of *Workshop: Perspectives in Modern Statistical Inference: Parametrics, Semiparametrics Nonparametrics III*, held in July, 2005 at Mikulov, Czech Republic. Special issue of *Austrian Journal of Statistics*, **35**. pp 105-120.

E. Giné and D. M. Mason, On local U-statistic processes and the estimation of densities of functions of several sample variables, *Annals of Statistics*., to appear.

E. Giné and D. M. Mason, Laws of the iterated logarithm for the local U-statistic process, *J. Theoretical Probability*, to appear.

E. Giné and D. M. Mason, Uniform in bandwidth estimation of integral functionals of the density function. Submitted for publication.