Title:

Efficient estimation of functionals of high-dimensional parameters

Abstract:

A problem of estimation of a functional $f(\theta)$ of an unknown high-dimensional or infinite-dimensional parameter θ of a statistical model $P_{\theta}, \theta\in \Theta$ based on i.i.d. observations $X_1,\dots, X_n\sim P_{\theta}$ will be considered. In such problems, plug-in estimators $f(\hat \theta)$ based on a reasonable estimator $\hat \theta$ of unknown parameter (such as MLE) are most often suboptimal in the case of nonlinear functional due to their large bias. We will discuss two examples of this problem: estimation of functionals of unknown location parameter of a high-dimensional log-concave distribution and estimation of functionals of unknown covariance operator of possibly infinite-dimensional Gaussian model with its complexity characterized by the effective rank of the covariance. In both examples, using different methods of bias reduction, it was possible to develop estimators of smooth functionals with optimal dependence of the error rates on the sample size, on the degree of smoothness of the functional and on the dimension or effective rank of the model.