Méthodes statistiques basées sur la parcimonie

Alexandre TSYBAKOV, CREST et Université Paris 6

The performance of statistical estimators in several scenarios, such as adaptive nonparametric estimation, aggregation of estimators and estimation under the sparsity constraint can be assessed in terms of sparsity oracle inequalities (SOI) for the prediction risk. One of the challenges is to find estimators that attain the sharpest SOI under minimal assumptions on the dictionary. Methods of estimation adapted to the sparsity scenario like the Lasso, the Dantzig selector or their modifications, can be easily realized for very large dimensions of the problem but their performance is conditioned by severe restrictions on the dictionary. Such methods fail when the elements of the dictionary are not approximately non-correlated. On the other hand, there exist NP-hard methods, such as the BIC, which have nice theoretical properties, in the sense that they enjoy very sharp SOI without any assumption on the dictionary. This talk will give an overview of recent statistical results on sparse recovery, with an emphasis on Sparse Exponential Weighting, a new technique aiming to realize a compromise between the theoretical optimality and computational efficiency. The method is based on aggregation with exponential weights using a heavy-tailed sparsity favoring prior. The theoretical performance of Sparse Exponential Weighting in terms of SOI is comparable with that of the BIC and is even better in some aspects. No assumption on the dictionary is needed. At the same time, we show that the method is computationally feasible for relatively large dimensions of the problem. We prove that Langevin Monte-Carlo (LMC) algorithms can be successfully used for computing Sparse Exponential Weighting estimators.

Références

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Alexandre TSYBAKOV, CREST, 3, av.Pierre Larousse, 92240, Malakoff
alexandre.tsybakov@ensae.fr