Séminaire de Probabilités et Statistique

Mardi 27 septembre 2022 à 14h55

Laboratoire Dieudonné

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Deconvolution with unknown noise distribution for multivariate signal

This paper considers the deconvolution problem in the case where the target signal is multidimensional and no information is known about the noise distribution. More precisely, no assumption is made on the noise distribution and no samples are available to estimate it: the deconvolution problem is solved based only on observations of the corrupted signal. We establish the identifiability of the model up to translation when the signal has a Laplace transform with an exponential growth ρ smaller than 2 and when it can be decomposed into two dependent components. Then we propose an estimator of the probability density function of the signal, which is consistent for any unknown noise distribution with finite variance. We also prove rates of convergence and, as the estimator depends on ρ which is usually unknown, we propose a model selection procedure to obtain an adaptive estimator with the same rate of convergence as the estimator with a known tail parameter. This rate of convergence is known to be minimax when $\rho = 1$.

Ressources : Annals of Statistics, https://arxiv.org/abs/2006.14226

This is a joint work with Élisabeth Gassiat and Sylvain Le Corff.