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Young Researchers Day
26 September 2008

How can boundary points and noise level be estimated in deconvolution problems?

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Abstract.
We are interested in estimating the density f_X of a real-valued random variable X based on noisy i.i.d. observations $Y_k = X_k + \epsilon_k$, where ϵ is an additive error. In most of the literature concerning this deconvolution problem, the density of the noise is supposed to be known. In contrast to this, we assume that ϵ is normally distributed with unknown variance σ^2. First, we show that (f_X, σ^2) can be identified from Y when f_X vanishes on a set of positive Lebesgue measure. It is worth pointing out that this condition makes no appeal to the Fourier transforms of the involved densities. In particular, it is fulfilled by densities with bounded support. As far as estimation is concerned, we give an overview of some relevant literature and propose an estimation procedure in a special case.