RECENT PHD THESIS

Université catholique de Louvain-la-Neuve (UCL)

Maik Schwarz. *Non parametric estimation in the presence of noise with unknown distribution (2011)* – Promotor. Pr. Dr. Ingrid Van Keilegom. Co promoter. Prof. Dr. Rainer Dahlhaus

This thesis is concerned with the development of estimation techniques in four models involving statistical inverse problems with noise in the operator. Firstly, we consider a density deconvolution model on the real line: a probability density is to be estimated from observations which are subject to an independent additive measurement error. Assuming that the error is centered and normally distributed with unknown variance, we develop an intuitive time-domain condition on the target density which allows for its identification and consistent estimation by means of a minimum distance estimator. Next, we consider a stochastic frontier model. Our aim consists in estimating the support boundary of a two dimensional probability distribution based on observations with independent additive and normally distributed noise in one dimension. Exploiting the deconvolution techniques from the first chapter, we develop a consistent two step procedure for the non parametric estimation of the frontier, using in particular the m-frontier technique. In the following chapter, we look at the special density deconvolution model where the densities are supported on the circle instead of the real line. We drop the normality hypothesis for the error distribution. Instead, we assume that in addition to the sample of contaminated observations, a sample drawn from the error distribution is available. Minimax theory in both sample sizes is developed and a fully data-driven estimator is defined and shown to be minimax optimal over a wide range of density classes. Finally, we consider a regression model with instrumental variables. The minimax rates for the non parametric estimation of the structural function are developed and shown to be attained by an adaptive estimator in certain cases.