ノンパラメトリック変数誤差回帰に対する信頼バンド

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In this presentation, we discuss a method to construct uniform confidence bands for a nonparametric regression function where a predictor variable is subject to a measurement error. We allow for the distribution of the measurement error to be unknown, but assume that there is an independent sample from the measurement error distribution. The sample from the measurement error distribution need not be independent from the sample on response and predictor variables. The availability of a sample from the measurement error distribution is satisfied if, for example, either 1) validation data or 2) repeated measurements (panel data) on the latent predictor variable with measurement errors, one of which is symmetrically distributed, are available. The proposed confidence band builds on the deconvolution kernel estimation and a novel application of the multiplier (or wild) bootstrap method. We establish asymptotic validity of the proposed confidence band under ordinary smooth measurement error densities, showing that the proposed confidence band contains the true regression function with probability approaching the nominal coverage probability. We also propose a novel data-driven method to choose a bandwidth, and conduct simulation studies to verify the finite sample performance of the proposed confidence band. Applying our method to a combination of two empirical data sets, we draw confidence bands for nonparametric regressions of medical costs on the body mass index (BMI), accounting for measurement errors in BMI. Finally, we discuss extensions of our results to specification testing, cases with additional error-free regressors, and confidence bands for conditional distribution functions. This is a joint work with Yuya Sasaki (Johns Hopkins University).

参考文献

Kato, K. and Sasaki, Y. (2017). Uniform confidence bands for nonparametric errors-in-variables regression. arXiv: 1702:03377.