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Titel: Fast and fair simultaneous confidence bands for functional parameters  
(joint work with Matthew Reimherr, Penn State University)

Abstract:

Quantifying uncertainty using confidence regions is a central goal of statistical inference. Despite this, methodologies for confidence bands in Functional Data Analysis are still underdeveloped compared to estimation and hypothesis testing. In this work, we present a new methodology for constructing simultaneous confidence bands for functional parameter estimates. Our bands possess a number of positive qualities: (1) they are not based on resampling and thus are fast to compute, (2) they are constructed under the fairness constraint of balanced false positive rates across partitions of the bands' domain which facilitates the typical global, but also novel local interpretations, and (3) they do not require an estimate of the full covariance function and thus can be used in the case of fragmentary functional data. Simulations show the excellent finite-sample behavior of our bands in comparison to existing alternatives. The practical use of our bands is demonstrated in two case studies on sports biomechanics and fragmentary growth curves.

Referenz:

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