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Finite-sample exact prediction bands for functional data: an application to mobility demand prediction

Monday, 17 May 2021 13:00 (20 minutes)

The talk will focus on the prediction of a new unobserved functional datum given a set of observed functional data, possibly in presence of covariates, either scalar, categorical, or functional. In particular we will present an approach (i) able to provide prediction regions which could visualized in the form of bands, (ii) guaranteed with exact coverage probability for any sample size, (iii) not relying on parametric assumptions about the specific distribution of the functional data set, and finally (iv) being computational efficient. The method is built on a combination of ideas coming from the recent literature pertaining to functional data analysis (i.e., the statistical analysis of datasets made of functions) and conformal prediction (i.e., a nonparametric predictive approach from Machine Learning). During the talk we will present the general theoretical framework and some simulations enlightening the flexibility of the approach and the effect on the amplitude of prediction bands of different algorithmic choices. Finally, we will apply the method to the joint prediction of bike pick-ups, drop-offs, and unbalance in the docking station network of the largest bike-sharing provider in the city of Milan (Italy).

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