



# Finite-sample exact prediction bands for functional data

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20.11.2023, 15.00 (c.t.)

Department of Statistics, Ludwigstr. 33, Room 144  
and online via Zoom (Link)  
(Meeting-ID: 913-2473-4411; Password: StatsCol22)

The talk will deal with the key challenge of creating prediction bands for a new observation in the functional data framework given a training set of observed functional data and possibly in presence of covariates, either scalar, categorical, or functional. Starting from the investigation of the literature concerning this topic, we propose an innovative approach building on top of Conformal Prediction and Functional Data Analysis able to overcome the main drawbacks associated to the existing approaches. Under minimal distributional assumptions (i.e., exchangeability of the random functions), we will show how the new proposed nonparametric method (i) is able to provide prediction regions which could be visualized in the form of bands, (ii) is guaranteed with exact coverage probability also for finite sample sizes, and finally (iii) is computationally efficient. Different specifications of the method will be compared in terms of efficiency in some simulated and real case scenarios also in the case of multi-dimensional domain and/or codomain.

## References:

Diquigiovanni, J., Fontana, M., Vantini, S. (2023): "The Importance of Being a Band: Finite-Sample Exact Distribution-Free Prediction Sets for Functional Data", *Statistica Sinica*, in press (available online).

Diquigiovanni, J., Fontana, M., Vantini, S. (2022): "Conformal prediction bands for multivariate functional data", *Journal of Multivariate Analysis*, 189, 104879.

Ajroldi, N., Diquigiovanni, J., Fontana, M., Vantini, S. (2023): "Conformal prediction bands for two-dimensional functional time series", *Computational Statistics and Data Analysis*, 2023, 187, 107821.

## Biography:

Simone Vantini is Associate Professor of Statistics at MOX – Department of Mathematics of Politecnico di Milano, from where he also received his PhD. His scientific focus has been toward the statistical analysis of data that cannot fit the standard embedding in Euclidean spaces, in particular Functional Data Analysis and Analysis of Network-valued Data.