

NMST611 *Advanced Statistics Seminar*

## Depth-based Portmanteau test of independence for functional time series

**Antonio Elias Fernandez**

Universidad de Málaga

October 5, 2022

15:40, Praktikum KPMS

### **Abstract**

Depth measures have been a cornerstone to build nonparametric methodologies for independent and identically distributed samples of functional data. These methods have covered the problems of visualization, outlier detection, classification, and clustering, among others. In contrast, the use of this concept to study time-dependent functional data has been seldom touched.

In this talk, we explore the use of functional depths to study Functional Time Series (FTS) which are sets of curves indexed in time and potentially dependent. Concretely, we study the temporal dynamics of the relative position of each time curve with respect to the centre of the data given by functional depths. Then, we motivate how functional depth can retain insightful information on the temporal dependency and allow us to exploit the autocorrelation of the time series of depths to develop an independence test for FTS.

The performance of the test is evaluated by simulation comparing with the state-of-the-art alternatives and exploring different time dependency structures, namely, time-independent samples, functional dynamic factor models, functional autoregressive models (FAR), functional moving average models (FMA), functional autoregressive and moving average models (FARMA), and functional autoregressive models with seasonality (SFAR).