

Functional Data Analysis in R

Manuel Oviedo de la Fuente, manuel.oviedo@udc.es



This course offers an introduction to functional data analysis (FDA) in R using the `fda.usc` package [1]. In particular, it focuses on the following points:

1. Functional data representation: “the data are curves” discretized in a grid
 - `fdata` class definition
 - Fixed and data-driven basis
 - Smoothing
2. Exploratory analysis of functional data
 - Location and dispersion statistics
 - Depth measurements and outlier detection
3. Functional regression
 - Linear, non-linear and generalized models
 - Variable selection
4. Functional Classification
 - based in regression models (logistic, non-parametric and additive).
 - based on depth measures
 - k-means clustering

Requirements: Install `fda.usc` package, <https://cran.r-project.org/web/packages/fda.usc/>

Course material: http://manuel.oviedo.securized.net/fda.usc_bookdown/

Reference books: [2] and [3]

References

- [1] Febrero-Bande, M. and Oviedo de la Fuente, M. (2012). Statistical computing in functional data analysis: the R package `fda.usc`. *Journal of Statistical Software*, **51**(4):1–28.
- [2] Ramsay, J. and Silverman, B. (2005). *Functional Data Analysis*. Springer.
- [3] Ferraty, F. and Vieu, P. (2006). *Nonparametric functional data analysis: theory and practice*. Springer.