
Academic Year: (2022 / 2023)

Review date: 19-05-2022

Department assigned to the subject: Statistics Department

Coordinating teacher: MEILAN VILA, ANDREA

Type: Electives ECTS Credits : 3.0

Year : 1 Semester : 2

OBJECTIVES

Become familiar with different analytical tools, based on data, to make business decisions

Capacity to develop skills to analyze and find relationships between many variables/features

Relax some of the assumptions in classical linear regression

Deal with the curse of dimensionality in high-dimensional problems

Acquire knowledge about the main tools in advanced predictive tools and handle the R language with those models

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction.

1.1. Motivating examples.

1.2. Linear regression: a brief review.

1.3. Extensions of linear models.

2. Non-linear relationships.

2.1. Introduction.

2.2. Transformations.

2.3. Interactions.

2.4. Polynomial regression.

2.5. Non-linear regression models.

3. Generalized regression models.

3.1. Introduction.

3.2. Model formulation and estimation.

3.3. Inference for model parameters.

3.4. Model selection.

3.5. Model diagnostics.

3.6. Extensions.

4. Regularization methods.

4.1. Introduction.

4.2. Ridge regression.

4.3. LASSO regression.

4.4. Elastic Net.

4.5. Selection of tuning parameters.

5. Dimension reduction methods.

5.1. Introduction.

5.2. Principal component regression.

5.3. Partial least squares.

- 6. Ensemble methods.
- 6.1. Introduction.
- 6.2. Boosting.
- 6.3. Bagging.
- 6.4. Stacking.

LEARNING ACTIVITIES AND METHODOLOGY

Lectures: the contents of the course will be introduced, explained and illustrated with examples. Teaching materials will be provided on Aula Global.

Computer Labs: Examples and cases studies with the R language.

ASSESSMENT SYSTEM

% end-of-term-examination:	50
% of continuous assessment (assignments, laboratory, practicals...):	50

Continuous evaluation through two tests (50%) and final exam (50%).

BASIC BIBLIOGRAPHY

- G. James, D. Witten, T. Hastie and R. Tibshirani An Introduction to Statistical Learning with Applications in R, Springer, 2013
- Kevin P. Murphy Machine Learning: A Probabilistic Perspective, The MIT Press, 2012
- Machine Learning with R Brett Lantz, Packt Publishing, 2015