ESCUELA TÉCNICA SUPERIOR DE INGENIERÍA

DOI-GITI-324 Statistics II

SEMESTER: Spring

CREDITS: 4.5 ECTS (3 hrs. per week)

LANGUAGE: Spanish

DEGREES: GITI

Course overview

This course focuses on a set of standard statistical learning tools for modeling and understanding complex datasets. In particular, the course describes the selected tools grouped according to three main learning tasks: supervised (regression and classification problems) and unsupervised learning. To accomplish this objective, the course aims to find a good balance between theory and practice.

Prerequisites

Basic knowledge of Calculus and Algebra is required (understand and manipulate equations, manipulate exponents and logarithms using their basic rules, full understanding of functions and inverse functions, understand limits, derivatives and integrals, know rules for product and summation, etc). It is also required basic knowledge of Statistics (descriptive statistics, discrete and continuous probability distribution models, sampling and basics of statistical inference).

Basic knowledge of Programming is required for the practice sessions.

Course contents

Theory:

1. Analysis of variance. One-way and two-way ANOVA with interaction effects.
2. Linear regression. Simple and Multiple regression models. Parameter estimation and statistical significance of the estimated parameters.
3. Classification models. Discriminant analysis. Classification trees.
4. Principal Component Analysis. Component estimation and dimensionality reduction. Principal components interpretation.
5. Factorial Analysis. Factor loading estimation. Factor rotation.
6. Clustering Analysis. Hierarchical clustering and dendrograms. K-means.

Textbook

- **James, G., Witten, D., Hastie, T. and Tibshirani, R.** (2015). *Introduction to Statistical Learning with applications in R.* Sixth Edition. Springer.

Grading

The following conditions must be accomplished to pass the course:

- A minimum overall grade of at least 5 over 10.
- A minimum grade in the final exam of 4 over 10.

The overall grade is obtained as follows:

- Final exam accounts for 50% of the final grade if the grade in this exam is at least 4. In other case, final exam accounts for 100 % of the overall grade.
- Other exams accounts for 30%. Typically there is 1 mid-term exam (2-hour long) and 2 additional short exams (1-hour long). They are weighted according to their duration. Mid-term exam accounts for 15%, whereas short exams accounts for 15% in total.
- Practical assignment account for 15% of the final grade.
- Active participation in the class accounts for 5% of the final grade.