Probabilistic Methods in AI

Academic Year: (2022 / 2023)   **Review date: 31-05-2022**

Department assigned to the subject: Statistics Department

Coordinating teacher: JIMENEZ RECAREDO, RAUL JOSE

Type: Electives ECTS Credits : 3.0

Year : 1 Semester : 1

OBJECTIVES

The objective of the course is to offer a complete introduction to the probability theory necessary for the field of artificial intelligence, combining breadth and depth, and offering the basic material as well as the discussion of recent developments in the field.

DESCRIPTION OF CONTENTS: PROGRAMME

Review of fundamentals of probability theory.
Multivariate models: Joint distribution of several variables. Multivariate normal distribution. Linear Gaussian systems. Mix models.
Maximum likelihood. Regression and classification with MV. Expectation-maximization algorithm. Model selection criteria.
Information theory: Entropy and relative entropy.
Linear models: Logistic, linear regression and generalized linear models.
Non-parametric models: Classification and clustering with KNN. Probabilistic classifiers. kernel methods. Bagging, random forest, boosting.

LEARNING ACTIVITIES AND METHODOLOGY

Teaching presentations accompanied by electronic material, such as digital presentations
e-learning activities
Theoretical-practical lessons, synchronous teaching tutorials
Team work
Individual student work
Home works and

ASSESSMENT SYSTEM

Team home work (30%), individual student home work (30%) and midterms (40%).

% end-of-term-examination:	0
% of continuous assessment (assigments, laboratory, practicals…):	100

BASIC BIBLIOGRAPHY

- Jason Brownlee Probability for Machine Learning , Machine Learning Mastery , 2020

- Kevin Patrick Murphy Machine Learning: A Probabilistic Perspective , MIT Press, 2012