

69158 - Applications of Deep Learning

Syllabus Information

Academic year: 2024/25

Subject: 69158 - Applications of Deep Learning

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 615 - Máster Universitario en Robótica, Gráficos y Visión por Computador / Robotics, Graphics and Computer Vision

ECTS: 3.0

Year: 1

Semester: Second semester

Subject type: Optional

Module:

1. General information

The objective of the course is to study the main techniques and applications of deep machine learning in the context of robotics, graphics and computer vision, and to be able to apply them in real examples.

2. Learning results

The student must be able to:

- Know and apply advanced techniques of deep and reinforcement learning.
- Apply machine learning techniques to extract knowledge in environments that handle large amounts of data.
- Apply machine learning techniques to extract knowledge in environments with small amounts of data, interactive or sequential data.
- Apply the knowledge acquired to specific problems in application domains related to Robotics, Computer Vision and Computer Graphics
- Understand the different types of Machine Learning systems most appropriate for each application.
- Identify the machine learning problems under investigation for which there are no known solutions within the field of Robotics, Computer Vision and Computer Graphics.
- Synthetically present the proposed technical and / or scientific results.
- Evaluate relevant bibliographic sources.

3. Syllabus

1. Advanced deep learning techniques
 - a. Deep reinforcement learning
 - b. Bayesian deep learning
 - c. Generative models.
2. Applications:
 - a. Deep machine learning for robotics.
 - b. Deep machine learning for computer vision.
 - c. Deep machine learning for computer graphics.

4. Academic activities

The course consists of 3 ECTS credits that correspond with a dedication of the student estimated 75 hours distributed in the following way:

- Lectures, practice and lab sessions: 22 h
- Assignments of practical application or research work: 25 h
- Personalized tutor-student tutoring: 5 h
- Study: 20 h
- Assessment and evaluation activities: 3 h

5. Assessment system

Continuous evaluation:

P1 [30%] - Written and laboratory test. One or several tests on practical cases proposed by the professors or on the project developed by the student.

P2 [60%] - Directed work. Works, exercises, and reports of the laboratory practices, in which the knowledge and skills acquired in the course will be put into practice.

P3 [10%] - Oral presentations and debates. The oral presentations of the works, exercises and practicals will be evaluated. Evaluation of the realisation of practices during the sessions.

The final grade will be calculated according to the following formula: $0.3 \cdot P1 + 0.6 \cdot P2 + 0.1 \cdot P3$.

Overall evaluation:

P1 [40%] - Written/oral and laboratory test. One or several tests on practical cases proposed by the professors or on the project developed by the student.

P2 [60%] - Directed work. Works, exercises and laboratory practice reports, in which the knowledge and skills acquired in the course will be put into practice.

The final grade will be calculated according to the following formula: $0.4 \cdot P1 + 0.6 \cdot P2$.

6. Sustainable Development Goals

8 - Decent Work and Economic Growth

9 - Industry, Innovation and Infrastructure

16 - Peace, Justice and Strong Institutions