29847 - Computer Vision

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura 326 - Escuela Universitaria Politécnica de Teruel
Degree	440 - Bachelor's Degree in Electronic and Automatic Engineering 444 - Bachelor's Degree in Electronic and Automatic Engineering
ECTS	6.0
Course	4
Period	Half-yearly
Subject Type	Optional
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

The learning process designed so that students can pass the subject is based on the following tasks:

- Classroom sessions where the lecturer explains the main theoretical concepts and will illustrate the application of this theoretical material via exercises and cases. Active students' participation is intended. So, they will continuously work with a computer applying the explained image processing functions an concepts to digital images.
- Laboratory sessions every two weeks. Students will carry out practical tasks related to the learning skills. They will work individually (one student-one computer) but they can exchange their views on the questions proposed so that

they can discover knowledge collaboratively. The assessment of this activity will contribute to the final mark.
- Supervised projects. Students must solve a set of exercises or practical questions related with the concepts learned. They are used as formative and sumative assessment.
- Student personal work essential to achieve significant learning and to have success with all the assessment activities proposed.

5.2.Learning activities

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1. Classrooms sessions (45 hours) Attendance is optional.

The theoretical concepts and their application via exercises and cases are explained by the lecturer. Students are encouraged to take part actively in the resolution of practical questions. In this way, they will assimilate the learning concepts building their own knowledge.

The concepts worked upon this in-face sessions are aligned to the thematic blocks described in 5.3 Program .

2. Laboratory sessions (14 hours) Attendance is compulsory.

Students carry out experimental tasks following the information provided in the lab session instructions. It is very advisable to understand this information before attending to the laboratory room. Every student must produce a report on the activity after the end of the session.

With these activities, students will train the skills required to carry out the final project of the subject.

3. Supervised projects (60 hours)

The teacher proposes a set of practical exercises that students must solved individually providing a reasoned report with the achieved results.

These activities covers all the contents of the subject from image adquisition to characteristics extraction.

4. Personal work (30 hours) Non-presential

It is very important for the student to work in a continuous and independent way on the understanding of the theoretical concepts, the resolution of exercises and cases and the writing of the lab and the projects reports. Students must also learn how to use the software tools chosen to process digital images.

5. Tutorials

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The lecturer allocates a tutorial timetable. All the students can solve doubts related to the subjecto at these specific hours.

6. Assessment (1 hours) Attendance compulsory

Students have to explain thier final project to the teacher who could ask them different questions about the work. However, a continuous formative and sumative assessment takes place during the whole semester by means of the laboratory sessions and the supervised projects. In this way, students can check their learning during the progress of the course.

En la EINA de Zaragoza:

1.- Classrooms sessions (30 hours) Attendance is optional. The theoretical concepts and their application via exercises and cases are explained by the lecturer. Students are encouraged to take part actively in the resolution of practical questions. In this way, they will assimilate the learning concepts building their own knowledge. The concepts worked upon this in-face sessions are aligned to the thematic blocks described in 5.3 Program .

2. Laboratory sessions (6x3=18 hours) Attendance is compulsory. Students carry out experimental tasks following the information provided in the lab session instructions. It is very advisable to understand this information before attending to the laboratory room. Every student must produce a report on the activity after the end of the session.

3. Supervised projects (24 hours)

Lab exercise include optional sections to be developed by the student after the sessions.

4. Personal work (75 hours) Non-presential

It is very important for the student to work in a continuous and independent way on the understanding of the theoretical concepts, the resolution of exercises and cases and the writing of the lab and the projects reports. Students must also learn how to use the software tools chosen to process digital images.

5. Tutorials

The lecturer allocates a tutorial timetable. All the students can solve doubts related to the subjecto at these specific hours.

6 Asessment (3 hours)

Written exam (2 hours). Oral talk 1 hour.

5.3.Program

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1. Introduction to computer vision.

2. Image. Basic concepts.

3. Analysis and processing of digital signal. Basic mathematical tools.

4. Image improvement. Image smoothing and enhacement.

5. Image segmetantion. Edge detection and region extraction.

6. Image feature extraction

7. Introduction to 3-D image

CAMPUS DE ZARAGOZA

1. Adquisition and Image Processing.
2. Feature detection.
3. Segmentation.
4. 3D camera model.
5. Image alignment homography and epipolar geometry.
6. Structure from Motion. Bundle Ajustment.
7. Automatic learning. Basic concepts.
8. Visual recognition.

Programa de prácticas

1. Open CV. Adquisition and Image Processing.
2. Interest point detection. Descriptors and putative matching.
3. Geometry estimation: homography and epipolar geometry.
4. Image segmentation.
5. Basic visual recognition.
6. Advanced visual recognition.

5.4.Planning and scheduling

The schedule of lectures, practice sessions and laboratory sessions is decided upon by the university centre and will be

published before the beginning of the course.

Every teacher will inform about his/her tutorial time table.

5.5.Bibliography and recomended resources

*Visión por computador. Imágenes digitales y aplicaciones, Pajares, G. de la Cruz, J.M. Ed. Ra-Ma.
*Digital Image Processing, Castleman, K.R. Ed. Prentice Hall.
*Digital Image Processing, Pratt, W.K. Ed. Wiley.