Universidad Zaragoza

Year : 2019/20

29847 - Computer Vision

Syllabus Information

Academic Year: 2019/20
Subject: 29847 - Computer Vision
Faculty / School: 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
Year: 4
Semester: 440 - Second semester
444 - Second semester
Subject Type: Optional
Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

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 and concepts to digital images.
- Laboratory sessions every two weeks. Students will carry out practical tasks related to their 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 to the concepts learned. They are used as formative and summative assessments.
- Student personal work essential to achieve significant learning and to have success with all the assessment activities proposed.

4.2.Learning tasks

The course includes the following learning tasks:

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1. Lectures (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 ***4.3 Syllabus***.

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 solve individually providing a reasoned report with the achieved results.

These activities cover all the contents of the subject from image acquisition to characteristics extraction.

4. Personal work (30 hours) off-site sessions.

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 project 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 subject at these specific hours.

6. Assessment (1 hour) Attendance compulsory

Students have to explain their final project to the teacher who could ask them different questions about the work. However, a continuous formative and summative 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.- Lectures (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 includes optional sections to be developed by the student after the sessions.

4. Personal work (75 hours) Off-site sessions

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 project 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 subject at these specific hours.

6. Assessment (3 hours)

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

4.3.Syllabus

The course will address the following topics:

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1. Introduction to computer vision.
2. Image. Basic concepts.
3. Analysis and processing of the digital signal. Basic mathematical tools.
4. Image improvement. Image smoothing and enhancement.
5. Image segmentation. Edge detection and region extraction.
6. Image feature extraction
7. Introduction to 3-D image

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1. Acquisition and Image Processing.
2. Feature detection.

3. Segmentation.
4. 3D camera model.
5. Image alignment homography and epipolar geometry.
6. Structure from Motion. Bundle Adjustment.
7. Automatic learning. Basic concepts.
8. Visual recognition.

Practice Sessions

1. Open CV. Acquisition 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.

4.4.Course planning and calendar

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 timetable.

4.5.Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=29847&year=2019