Universidade de Vigo

IDENTIFYING DATA

(*)Procesado e análise de imaxe

Subject	(*)Procesado e análise de imaxe				
Code	V05G300V01931				
Study programme	(*)Grao en Enxeñaría de Tecnoloxías de Telecomunicación				
Descriptors	ECTS Credits		Choose	Year	Quadmester
	6		Optional	4th	1st
Teaching language	English				
Department					
Coordinator	Alba Castro, José Luis				
Lecturers	Alba Castro, José Luis				
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General description	This course follows "Fundamentals of Image Processing" (3rd year). The student will acquire knowledge and skills on high-level techniques to analyze and extract relevant information from images of different application field in computer vision, medical imaging and multimedia resources. The course is lectured and assessed in english. The documentation is also in english.				

Competencies

Code	
A4	CG4: The ability to solve problems with initiative, to make creative decisions and to communicate and transmit knowledge and skills, understanding the ethical and professional responsibility of the Technical Telecommunication Engineer activity.
A82	(CE73/OP16) The ability to construct, exploit and manage artificial vision, medical imaging, and multimedia data base systems.
B1	The ability for critical reading of scientific papers and docs.
B3	The development of discussion ability about technical subjects

Learning aims

Expected results from this subject	Training and Learning Results	
Know how to solve problems with initiative, for decision making, creativity, and to communicate and transmit knowledge, skills and abilities, understanding the ethic and professional responsibility on the activity of a telecommunications engineer. Know how to build, exploit and manage machine vision systems, medical image systems and Multimedia DataBases.	A4 A82	B1 B3

Contents

Topic	
Image analysis	Segmentation based on color, texture, boundaries and models. Descriptive and robust feature extraction. Examples on actual problems.
Objects Description and Classification	Classical, probablilistic and conexionist decisors. Feature reduction and selection. Representation versus discrimination. Examples on actual problems.
Aplications	Medical image processinga. DICOM Stándard Real-time video processing RGB-D image processing

Planning

	Class hours	Hours outside the classroom	Total hours
Master Session	11	11	22
Tutored works	24	83	107
Presentations / exhibitions	2	4	6
Introductory activities	3	0	3
Multiple choice tests	2	0	2
Reports / memories of practice	0	10	10

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Master Session	Each 3-hour class will include one hour of explanation of subject contents, encouraging critical discussion and assimilation through computer programming and visualization.
Tutored works	Each 3-hour session will include 2 hours of "hands-on" working to assimilate the explained concepts through problem-based learning (PBL). Every Problem/Task will take 4 or 5 weeks of the subject during which the student will have to discover, alone or with the professor guidance, what he needs to solve the problem effectively.
Presentations / exhibitions	The third and last task will be presented in front of the class mates. The students from the same group will have to split the presentation, so both of them explain one part of the work.
Introductory activities	In the first class of the course, concepts learned in FPI will be reviewed. Also the programming tools for the course will be presented (Matlab, C/C++, QT, OpenCV)

Personalized attention

Methodologies	Description
Introductory activities	Personalized attention will be carried out during the 3-hour sessions in the lab, guiding and advising each student to make the most of his time for solving the practical problem at hand. Plus, the student can make use of the counseling hours whenever he needs them.
Master Session	Personalized attention will be carried out during the 3-hour sessions in the lab, guiding and advising each student to make the most of his time for solving the practical problem at hand. Plus, the student can make use of the counseling hours whenever he needs them.
Tutored works	Personalized attention will be carried out during the 3-hour sessions in the lab, guiding and advising each student to make the most of his time for solving the practical problem at hand. Plus, the student can make use of the counseling hours whenever he needs them.
Presentations / exhibitions	Personalized attention will be carried out during the 3-hour sessions in the lab, guiding and advising each student to make the most of his time for solving the practical problem at hand. Plus, the student can make use of the counseling hours whenever he needs them.

Assessment

	Description	Qualification
Multiple choice tests	These tests are linked to the delivery of each guided task and are meant to score each student individually	15
Reports / memories of practice	The score of the guided task includes: the follow-up of each student, the techniques used, the results achieved and the presentation of them	85

Other comments on the Evaluation

Attendance is compulsory in continuous assessment, unless special circumstances are alleged. Continuous assessment will be based on the student lab work and guided tasks related to contents of the subject. There will be an official final exam scheduled by the "Junta de Escuela" that the students that didn't pass the continuous assessment will have to take if they want to pass the course. This final exam will be scored from 0 to 10 points and includes all the topics explained during the course and also concepts and techniques explained for the guided tasks. To pass this exam the student has to score, at least, 5 points. The students that are eager to improve their continuous assessment score can also take the final exam. In this case the final score of the course will be the maximum score of the final exam and continuous assessment. Throughout the semester the students will be receiving feedback about his performance on the continuous assessment, along with the scores obtained in the tests and guided tasks. Delivering any of the guided tasks or sitting any test will automatically mean that the student is following the course in the continuous assessment mode. That means that he will appear as "presented" in the records of the subject even if the final exam is not taken.

The continuous assessment contains the next milestones:

Guided task 1: linked to the image analysis topic (20%). 15% for the computer work and 5% for the test.

Guided task 2: linked both to the image analysis and classification topics (20%). 15% for the computer work and 5% for the test.

Guided task 3: linked to all topics (40%). 35% for the computer work an 5% for the test.

Public presentation of the 3rd guided task (20%).

The July final exam will only be held for students who failed the course both in continuous assesment mode or final exam. The score of the subject will be the score of this exam. The exam will be scored between 0 and 10. To pass the subject, at least 5 points are needed.

Sources of information

Rafael C. Gonzalez, Richard E. Woods, **Digital Image Processing**, 3ª (2008),

Robert Laganière, **OpenCV 2 Computer Vision Application Programming Cookbook**, 2011,

Jasmin Blanchette, Mark Summerfield, **C++ GUI Programming with Qt 4**, 2008,

Richard O. Duda, Peter E. Hart, David G. Stork, **Pattern Classification**, 2ª (2001),

OpenCV book can be freely dowload from here

Recommendations

Subjects that it is recommended to have taken before

(*)Matemáticas: Probabilidade e estatística/V05G300V01204

(*)Programación I/V05G300V01205

(*)Fundamentos de son e imaxe/V05G300V01405

(*)Procesado dixital de sinais/V05G300V01304

(*)Fundamentos de procesado de imaxe/V05G300V01632

(*)Sistemas de imaxe/V05G300V01633