Degree competences to which the subject contributes

CE26. (ENG) AUD: Coneixements i capacitats per aprofundir en tecnologies específiques de l’àmbit.

Learning objectives of the subject

Provide a vision of image and video processing, with special emphasis on content analysis applications. Give an overview of the principal feature extraction techniques. Familiarize students with the fundamental principles of the geometry of one, two and multiple cameras and technologies of 3D recording and playback. Study detection, tracking and object recognition algorithms. Show examples of application, such as face recognition, extraction of foreground objects or 3D TV. Develop specific skills associated with academic work as detailed below.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group:</th>
<th>30h</th>
<th>20.00%</th>
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<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Hours small group:</td>
<td>30h</td>
<td>20.00%</td>
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<td></td>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Self study:</td>
<td>90h</td>
<td>60.00%</td>
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</tbody>
</table>
### Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Learning Time</th>
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</thead>
</table>
| **(ENG) INTRODUCCIÓ** | - Introduction to computer vision  
- Image formation, 3D sensors | **Learning time:** 8h  
- Theory classes: 2h  
- Self study: 6h |
| **(ENG) ESTRUCTURA D'IMATGE** | - Color, texture and contours  
- Corners and blob detection  
- Grouping and modeling: RANSAC | **Learning time:** 13h  
- Theory classes: 4h  
- Self study: 9h |
| **(ENG) APLICACIONS MULTICÀMERA I 3D** | - Single camera geometry  
- Camera calibration  
- Epipolar geometry: rectification, disparity and depth  
- 3D reconstruction: stereo and multiview, "structure from motion" | **Learning time:** 26h  
- Theory classes: 8h  
- Self study: 18h |
| **(ENG) DETECCIÓ I RECONÈIXEMENT** | - Specific object recognition: Face detection and recognition  
- Bag of words models  
- Discriminative models  
- Part-base models | **Learning time:** 26h  
- Theory classes: 8h  
- Self study: 18h |
### Planning of activities

#### (ENG) LABORATORI

- **Hours**: 60h
  - Laboratory classes: 30h
  - Self study: 30h

#### (ENG) EXAMEN 1

- **Hours**: 2h
  - Theory classes: 2h

#### (ENG) EXAMEN 2

- **Hours**: 2h
  - Theory classes: 2h

### Qualification system

- Examinations: 80% (1st term: 40%, 2nd term: 40%)
- Laboratory: 20%

### Bibliography

**Basic:**


**Others resources:**

(ENG) SEGMENTACIÓ DE VÍDEO I SEGUIMENT D’OBJ ECTES

**Description:**
- Background subtraktion
- Object tracking: Mean-shift, Kalman filter, particle filter

**Learning time:** 13h
- Theory classes: 4h
- Self study: 9h