Last update: 06-05-2019

230376 - DLV - Deep Learning for Vision

Coordinating unit: 230 - ETSETB - Barcelona School of Telecommunications Engineering

Teaching unit: 739 - TSC - Department of Signal Theory and Communications

Academic year: 2019

Degree: MASTER'S DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Teaching unit Optional)
MASTER'S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Teaching unit Optional)

ECTS credits: 3 Teaching languages: English

Teaching staff

Coordinator: Xavier Giró i Nieto

Others: Giró Nieto, Xavier
Sayrol Clols, Elisa
Ruiz Hidalgo, Javier

Requirements

Deep Learning for Artificial Intelligence

Degree competences to which the subject contributes

Specific:

CE1. Ability to apply information theory methods, adaptive modulation and channel coding, as well as advanced techniques of digital signal processing to communication and audiovisual systems.

Transversal:

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

CT5. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

Teaching methodology

- Lectures
- Group work
- Group work (distance)

Learning objectives of the subject

The aim of this course is to train students in methods of deep learning for computer vision. Convolutional neural networks (convnets) will be presented and analyzed in detail to understand the potential of these state of the art tools in visual pattern recognition. Engineering tips and scalability issues will be addressed to solve tasks such as image classification, object detection or automatic textual captioning.

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Study load

Total learning time: 75h	Hours large group:	12h	16.00%
	Hours small group:	12h	16.00%
	Self study:	51h	68.00%

Content

1. State of the Art in Computer Vision

Learning time: 12h
Theory classes: 12h

Description:
- Still images: Object detection, image and instance segmentation, saliency prediction, visual search.
- Videos: Action recognition, object tracking, video object segmentation, super-resolution, self-supervised learning.
- 3D & volumes: 3D Analysis, 3D reconstruction, medical applications.

2. Industry Talks

Learning time: 2h
Theory classes: 2h

Description:
Talks by industrial professionals who are applying deep learning to address their challenges.

Planning of activities

Exam

Hours: 10h
Guided activities: 1h
Self study: 9h

Description:
Written exam to evaluate the learning over the lecture contents.

Project

Hours: 51h
Theory classes: 2h
Guided activities: 12h
Self study: 37h

Description:
Development and training of a deep neural network that will solve a computer vision task.

Descriptions of the assignments due and their relation to the assessment:
Oral presentation in class.
Release of the source codes and trained models.

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Qualification system

Exam: 50%
Project: 50%
Attendance: -10 % penalty for each not completed day

Bibliography

Basic:

Goodfellow, I.; Bengio, Y.; Courville, A. Deep learning [on line]. 2016 [Consultation: 20/02/2018]. Available on: <http://www.deeplearningbook.org/>.

Others resources:

Hyperlink

Fei-Fei Li, Andrej Karpathy, "CS231n: Convolutional neural networks for visual recognition". Stanford University, 2015

http://cs231n.stanford.edu/

Nom reCourse website.
4th Summer School on Deep Learning for Vision. Barcelona. UPC ETSETB TelecomBCN (June 25 - July 3, 2019)

https://telecombcn-dl.github.io/2019-dlcv/