

# DEEP LEARNING FOR COMPUTER VISION

Summer Seminar UPC TelecomBCN, 4 - 8 July 2016



## Instructors



Xavier  
Giró-i-Nieto



Elisa  
Sayrol



Amaia  
Salvador



Jordi  
Torres



Eva  
Mohedano



Kevin  
McGuinness

## Organizers



UNIVERSITAT POLITÈCNICA  
DE CATALUNYA  
BARCELONATECH



**Barcelona  
Supercomputing  
Center**  
*Centro Nacional de Supercomputación*



Dublin City University  
Ollscoil Chathair Bhaile Átha Cliath



Centre for Data Analytics



Co-funded by the  
Erasmus+ Programme  
of the European Union



+ info: [TelecomBCN.DeepLearning.Barcelona](https://TelecomBCN.DeepLearning.Barcelona)

# Instructors

## Xavier Giro-i-Nieto

Associate Professor at Universitat Politècnica de Catalunya (UPC)

- Web: <https://imatge.upc.edu/web/people/xavier-giro>



UNIVERSITAT POLITÈCNICA DE CATALUNYA  
BARCELONATECH

Department of Signal Theory  
and Communications

*Image Processing Group*



**SONY**



**COLUMBIA UNIVERSITY**  
IN THE CITY OF NEW YORK

# Instructors

## Elisa Sayrol

Associate Professor at Universitat Politècnica de Catalunya (UPC)



Web: <https://imatge.upc.edu/web/people/elisa-sayrol>



UNIVERSITAT POLITÈCNICA DE CATALUNYA  
BARCELONATECH

---

Department of Signal Theory  
and Communications

*Image Processing Group*

# Instructors

## Amaia Salvador

PhD Candidate

Image Processing Group (GPI), Universitat Politècnica de Catalunya

<https://imatge.upc.edu/web/people/amaia-salvador>



Escola d'Enginyeria de Terrassa  
UPC - ESEIAAT



Image Processing Group  
Signal Theory and Communications Department  
Universitat Politècnica de Catalunya. BARCELONATECH



INP ENSEIHT



# Instructors

## Jordi Torres

Professor at Universitat Politècnica de Catalunya (UPC)

- Web: <http://www.JordiTorres/Barcelona>
- Twitter: [@JordiTorresBCN](https://twitter.com/JordiTorresBCN)



UNIVERSITAT POLITÈCNICA  
DE CATALUNYA  
BARCELONATECH



**Barcelona  
Supercomputing  
Center**  
*Centro Nacional de Supercomputación*

# Instructors

## Eva Mohedano

PhD Candidate

Insight Centre for Data Analytics

<https://www.insight-centre.org/users/eva-mohedano>



# Instructors

## Kevin McGuinness

Research Fellow at Dublin City University (DCU)  
Insight Centre for Data Analytics

<https://www.insight-centre.org/users/kevin-mcguinness>

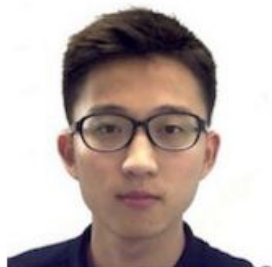


# Management

Instructor	Area
Xavier Giró	Coordination
Kevin McGuinness	Lectures
Elisa Sayrol	Logistics & Evaluation
Jordi Torres	Lab
Amaia Salvador	Project
Eva Mohedano	Web and online material



# Teaching assistants / contributors



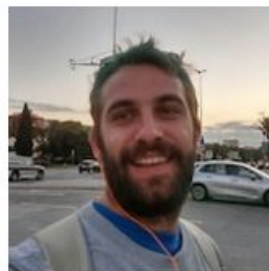
Junting  
Pan



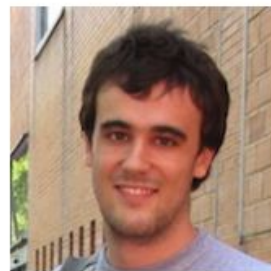
Míriam  
Bellver



Albert  
Jiménez



Andrea  
Ferri

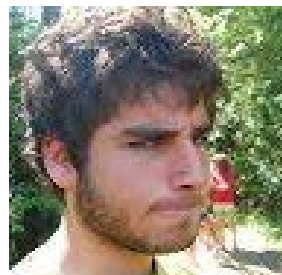
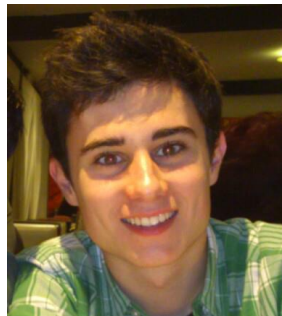


Alberto  
Montes

# Acknowledgments



UNIVERSITAT POLITÈCNICA  
DE CATALUNYA



# Acknowledgments



 **COLUMBIA UNIVERSITY**  
IN THE CITY OF NEW YORK



Microsoft  
**Research**



 **NICTA**



**lfh** ///  
st.pölten



 **DCU**  
Dublin City University  
Ollscoil Chathair Bhaile Átha Cliath



**UNIVERSITAT DE  
BARCELONA**

# Densely linked slides



# Motivation

## The best job in the world: Data scientist.

25 Best Jobs in America

f 28k



in 9.4k

g+ 412

Want a new job? Glassdoor is here to help, identifying the 25 Best Jobs in America for 2016. The jobs that make this list have the highest overall Glassdoor Job Score, determined by combining three key factors – number of job openings, salary and career opportunities rating. These jobs stand out across all three categories.

United States ▼

2016 ▼

glassdoor.com

1



### Data Scientist

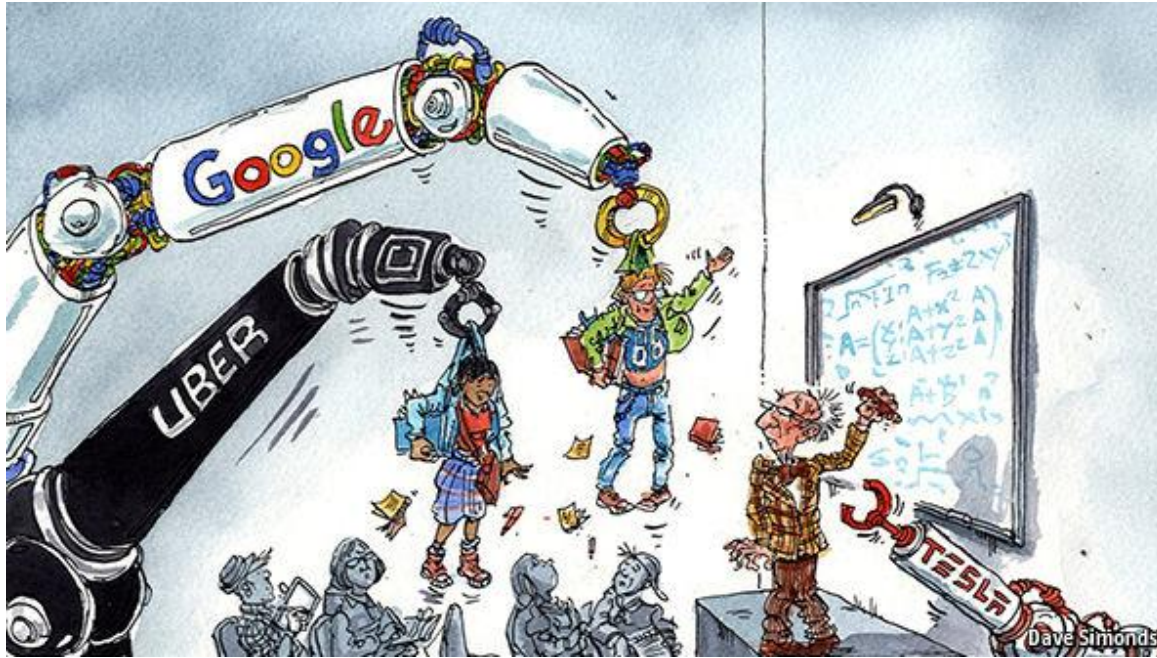
Job Openings	1,736
Median Base Salary	\$116,840
Career Opportunity	4.1
Job Score	4.7

Source: [25 Best jobs in America](#) (Glassdoor)



# Motivation

The Economist, [“Million-dollar babies”](#) (02/04/2016)



# Motivation

Nature, [“AI talent grab sparks excitement and concern”](#) (26/04/2016)



# Motivation

Exponential increase of generated multimedia content..





# Motivation

...keeping a record of the memorable personal moments...



Pope Francis @ Philippines, 2015 (Source: AP Photo/Bullit Marquez)

# Motivation

...keeping a record of the memorable personal moments...



Pope Francis @ Ecuador, 2015 (Source: AP)

# Motivation

...(or not).



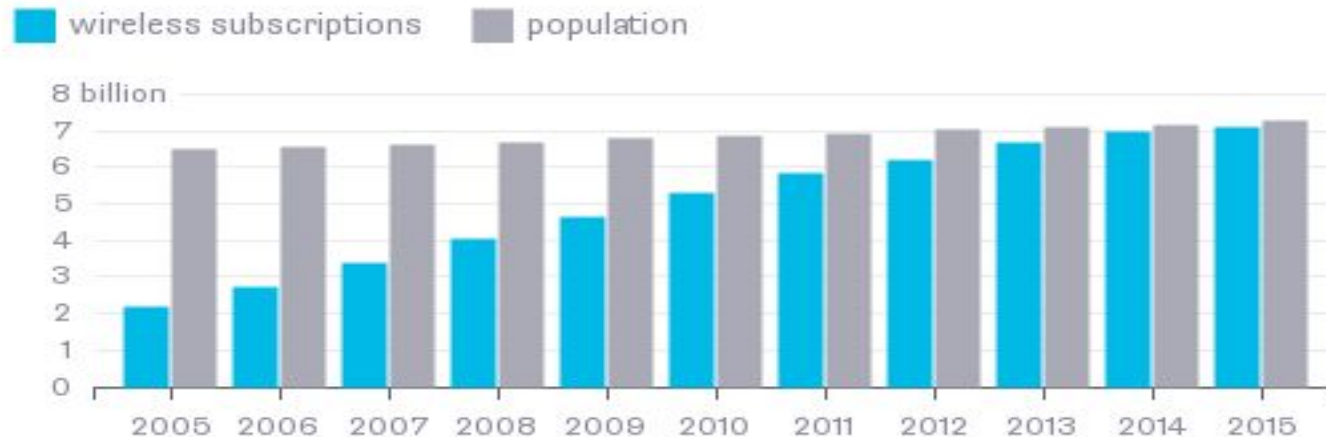
Pope Francis @ USA, 2015

# Motivation

This data growth is motivated by ubiquitous mobile access to...

## A Cell Phone in Every Pocket

Worldwide, there are almost as many mobile phones as people



Sources: International Telecommunication Union; U.S. Census Bureau

**Bloomberg**View



# Motivation

...the **Internet (for visual data transmission)**...



Source: [Cisco Visual Networking Index \(VNI\)](#)

# Motivation

...and **people** !

Person of  
the Year  
(2006)



# Motivation

Need computer vision tools to extract knowledge from these large amount of rich visual data.



# Course sites

plazza

<https://plazza.com/class#summer2016/230360>

## DEEP LEARNING FOR COMPUTER VISION

Summer Seminar UPC TelecomBCN, 4 - 8 July 2016



### Instructors

					
Xavier Giró-i-Nieto	Elisa Sayrol	Amaia Salvador	Jordi Torres	Eva Mohedano	Kevin McGuinness

### Organizers

**UNIVERSITAT POLITÈCNICA  
DE CATALUNYA  
BARCELONATECH**

**telecom  
BCN**

**Barcelona  
Supercomputing  
Center**  
Centro Nacional de Supercomputación

**DCU**  
Dublin City University  
Oisín Chabráin Bheala John Cuth

**Insight**  
Centre for Data Analytics

**GPU  
CENTER OF  
EXCELLENCE**  
Co-funded by the  
Erasmus+ Programme  
of the European Union



+ info: **TelecomBCN.DeepLearning.Barcelona**

<http://telecombcn.deeplearning.barcelona>



# Schedule: Project & Tensorflow

## Monday to Thursday

	BSc Students without project	Project Teams 1 & 2	Project Teams 3, 4, 5
3-4	Lectures		
4-5	TensorFlow		Project
5-6	Lectures		
6-7	Project (optional)	Project	Tensorflow

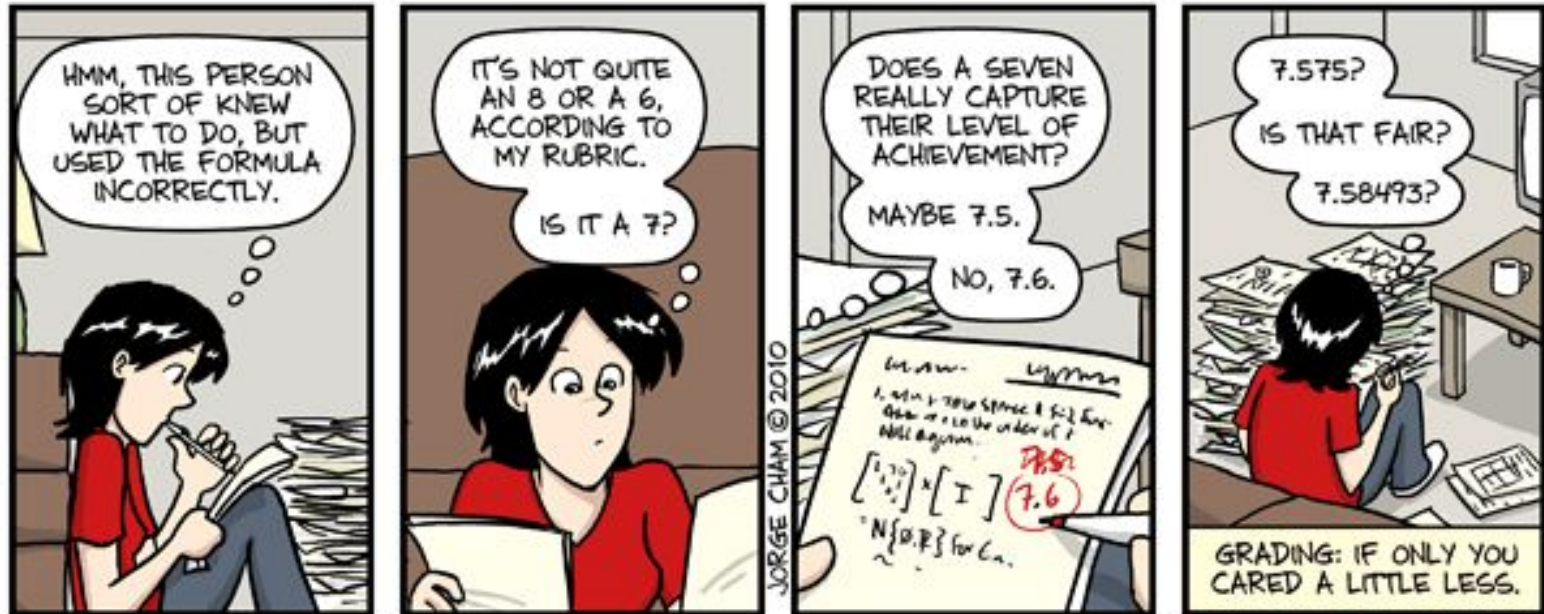
## Friday

	BSc Students without project	Project Teams 1 & 2	Project Teams 3, 4, 5
3-4	Project expo Teams 3, 4 & 5		
4-5	TensorFlow		Closing
5-6	Project expo Teams 1 & 2		
6-7	Closing		Tensorflow

# Grading

	BSc	MSc
Online Tests	60%	30%
Lab	30%	30%
Project	-	30%
Communication	-	10%
Attendance	10%	-10% x miss day

# Grading: Online tests



WWW.PHDCOMICS.COM

[\[Online test preview\]](#)