POLITECNICO
MILANO 1863

Deep Learning: Theory, Techniques & Applications

- Introduction to the course -

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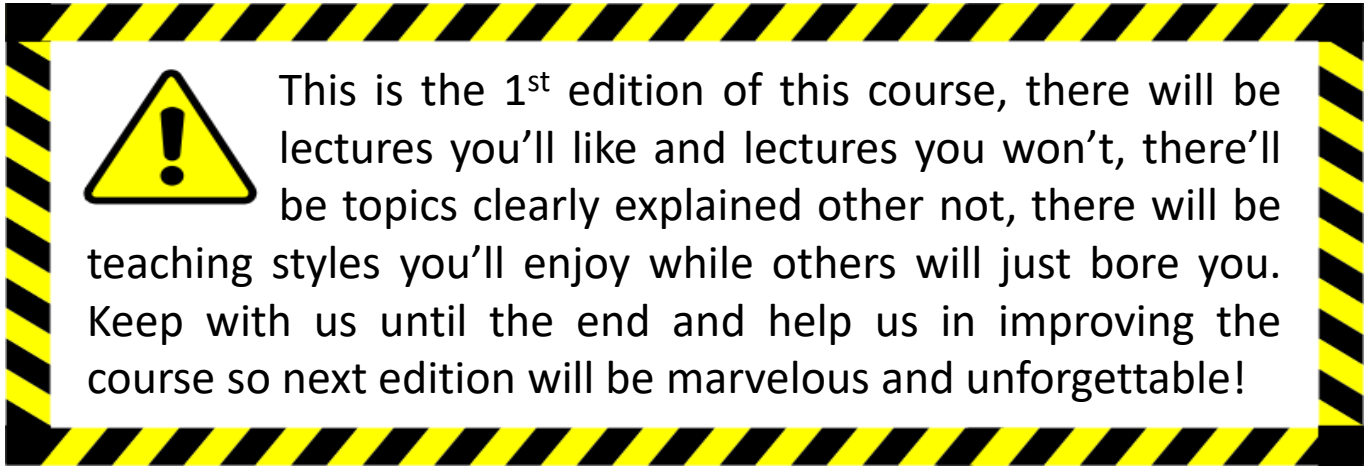
Thanks!

Course Objectives

"Introduce the deep learning basics as well as its applicationswith an on-hands approach where students will be challenged with the practical issues of data collection, model design, model training and performance evaluation. Starting from the foundations of Neural Networks and Deep Learning, the course will introduce the most successful models, algorithms, and tools, for image understanding, sequence prediction and sequence to sequence translation through deep neural models. […]"



Course syllabus

Introduction to Deep Learning and Neural Network
- Deep Learning introduction
- From the Perceptron to Neural Networks
- Recurrent architectures

12h lectures

Image classification with neural networks
- Image Classification
- Classification by Convolutional Networks
- Tensorflow and PyTorch

16h lectures

Deep Learning Application (and more)
- Text classification and language modeling
- 3D shape recognition
- …

8h seminars

It’s a «code-sharing» course

Dictionary

code sharing

code-sharing

noun

agreement between two or more airlines to list certain flights in a reservation system under each other's names.

Translations, word origin, and more definitions

Basically, you buy a company ticket you flight with another one ...

- Deep Learning: Theory, Techniques, and Applications
- Image Classification: Modern Approaches

It has pros & cons, e.g., you get twice as much hours of lectures for free!!

The Course Program

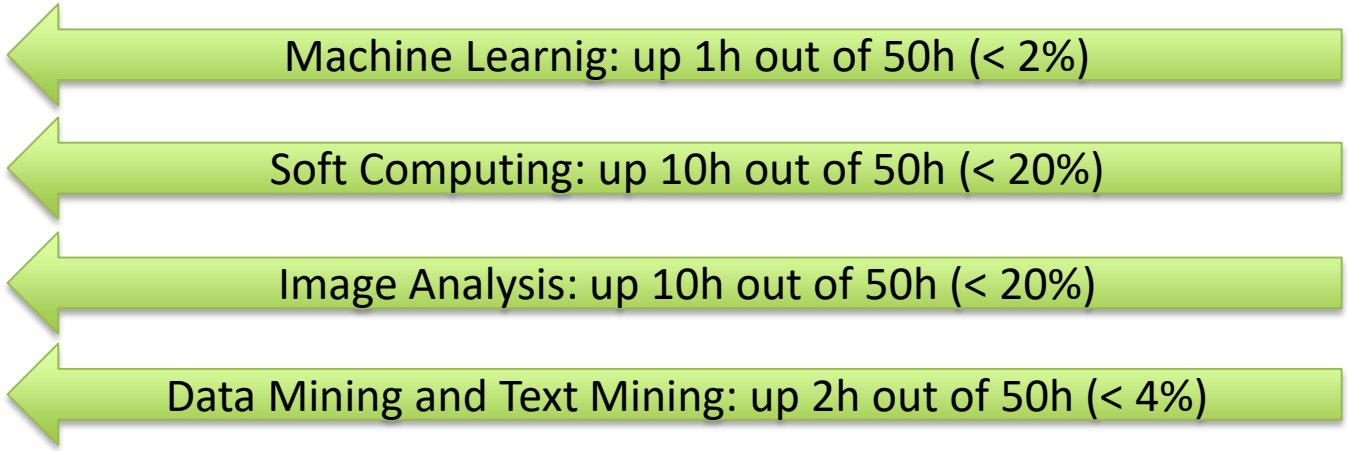
Date	Deep Learnig Classes (09:30-13:00)	Image Classification Classes (14:15-17:45)	
12/02/2018	Introduction to Deep Learning, Classification and Feed Forward Neural Networks	Introduction to Image Classification and basics of image handling in Python	Prof. G. Boracchi
14/02/2018	Overfitting and regularization, gradient descent variations, tips & tricks	Hand-crafted features for image classification	
16/02/2018	Recurrent neural networks, vanishing gradient issues, Long-Short Term Memories	Computer Vision features for image classification	
19/02/2018	TensorFlow and PyTorch	Data-driven feature extraction and Convolutional Neural Networks	Eng. A. Giusti
21/02/2018	Deep neural networks architectures for image classification and structural learning (with guests)	Advanced CNNs and Best practices in image classification	
23/02/2018	Special guests: Variational Autoencoder, Shape Classification, Overview of DeepMind research.	An overview on extended problems in image classification	

Overlap with Other Courses

This is a PhD course meant to zero every PhD student atteing about Deep Learning theory and techniques with a certain emphasis on Image Classification.

It has been designed such that you do not need to know necessarily about:

- Machine Learnig
- Deep Learning
- Neural Networks
- Image Classification
- Data Mining



In case you have taken them all you know already 50-60% of the topics,
but that won't necessarily help with the evaluation ... more later on this ;-)

Course Logistics (1)

Classes changed due to high number of attendee (still subject to change):

- February 12th, Aula S.0.2. Ed 3, 260 seats
- February 14th, Aula S.0.2. Ed 3, 260 seats
- February 16th, Aula S.0.5. Ed 3, 174 seats ← Likely to change
- February 19th, Aula S.0.5. Ed 3, 174 seats ← Likely to change
- February 21th, Aula S.0.2. Ed 3, 260 seats
- February 23th, Aula N.1.2. Ed 2, 168 seats ← Very likely to change

Programming environment

- Python 3.6 with Miniconda or Anaconda framework from conda.io
- …

Course Logistics (2)

All course information about the course is available on the websites

- http://chrome.ws.dei.polimi.it/index.php/Deep_Learning_Course
- http://home.deib.polimi.it/boracchi/teaching/ImageClassification.htm

Attendance is mandatory and checked with signatures (after morning break):

- PhDs are committed to attend 70% lectures from the DL course lectures, i.e., 6+ out of 9 lectures (the same holds for IC if you follow both)
- Master students do not have such strict requirement, but we advice you to sign the paper every lecture you attend anyway
- If you need just an attendance certificates we will issue it based on the attendance signatures we take during the lectures

Course Evaluation (still draft)

The course is evaluated with a project using Tensorflow and presented in a public [TBC] in the form of a poster as if it was in a conference.

Do not blame me, the idea came to one of your colleagues!!

It counts for IC if it is about images

- You have to chose a dataset or a problem
- Design/develop the model in tensorflow
- Train, tune, evaluate the model
- Compare the result against the state of the art or a baseline
- Write a short paper about your work (up to 6 pages double column)
- Give a spotlight presentation of the work in public (3 min) [TBC]
- Present the poster in public (3 hours) [TBC]

If you think this is weird you should wait for the grading procedure ...

Course Grading (still draft)

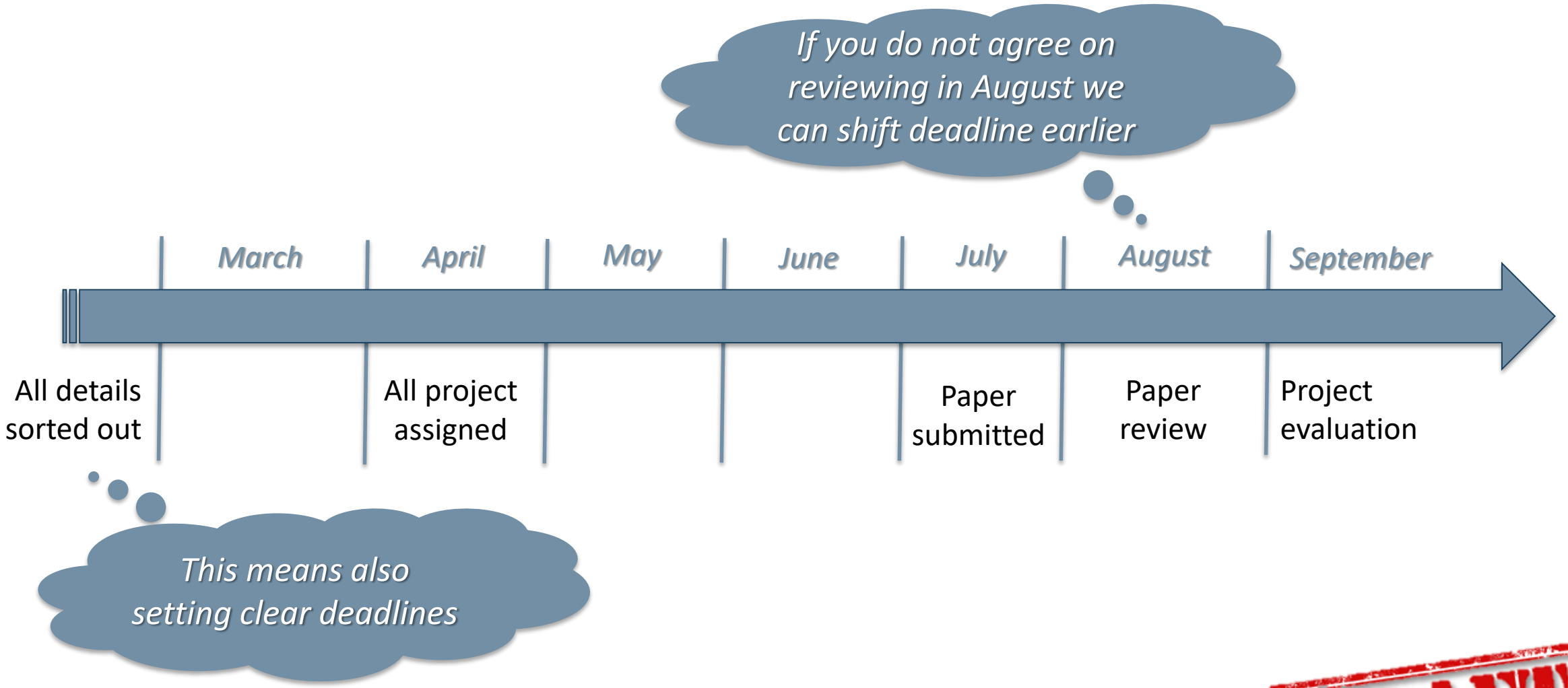
The grade will be given by:

- Prof. Matteo Matteucci (responsible for the grading)
- Prof. Giacomo Boracchi (grading consultant for the course)

The grade will be based on:

- Double blind review of your paper from other groups
- Your review of some one else paper
- Paper spotlight presentation at a public event [TBC]
- Paper poster presentation at a public event [TBC]
- Per Master student evaluation within the group by PhD student
- Personal communication with the teachers
- Attendance to the course
- ...

Project Evaluation GANTT (still draft)



Ironing out the kinks ...

Some details have not been sorted out yet, we are working on it, stay tuned!

- Projects in groups (?)
- How many people per group (?)
- Mixed groups with MS and PhD students (?)
- Computing will be provided (?)
- How many hours per group (?)
- If, where and when the public event (?)
- What if you need to graduate earlier (?)
- What if you cannot the day of the event (?)
- When do we have the public event (?)
- What if I fail the exam (?)
- ...

Frequently Asked Question

Questions?

- ...