

Laboratory

A World of Tensors

Deep Learning for Artificial Intelligence (DLAI)

DEEP LEARNING FOR ARTIFICIAL INTELLIGENCE
Masters @ UPC TelecosBCN BARCELONA (6TH Edition).
Fall Edition 2023



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We will focus on...

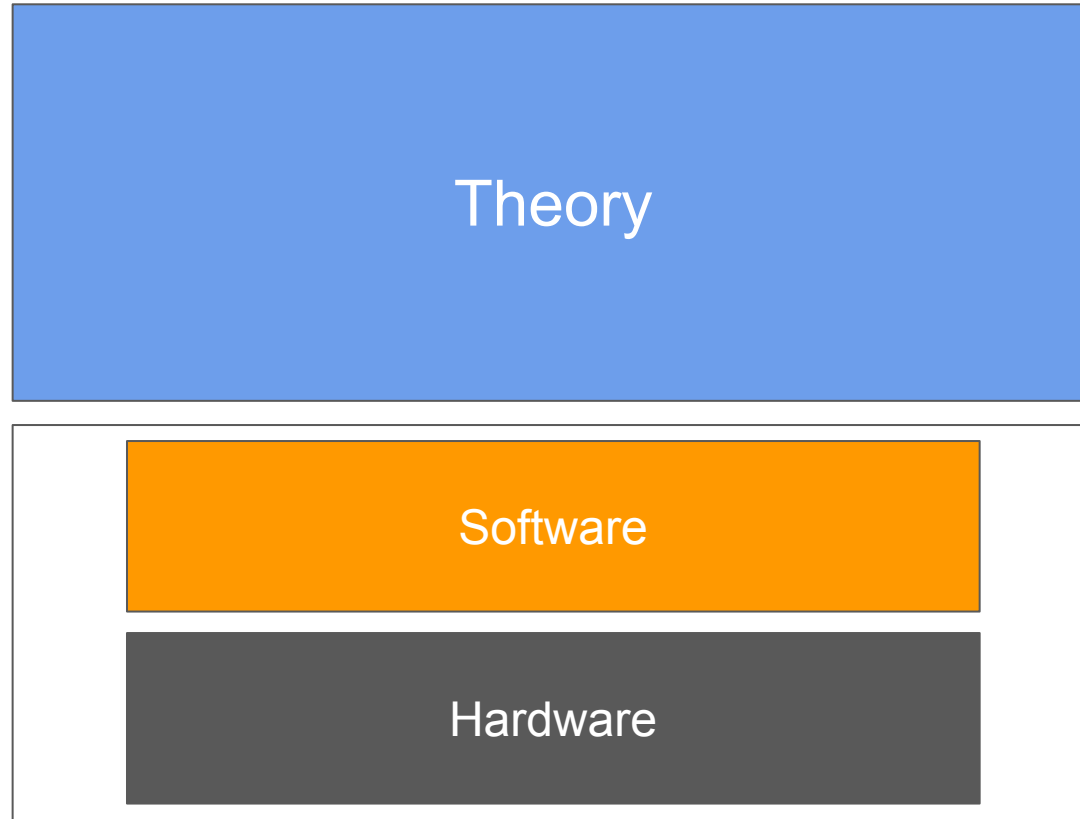


The diagram consists of two stacked rectangular boxes. The top box is blue and contains the word 'Theory' in white text. The bottom box is yellow and contains the word 'Practice' in white text. Both boxes have a thin black border.

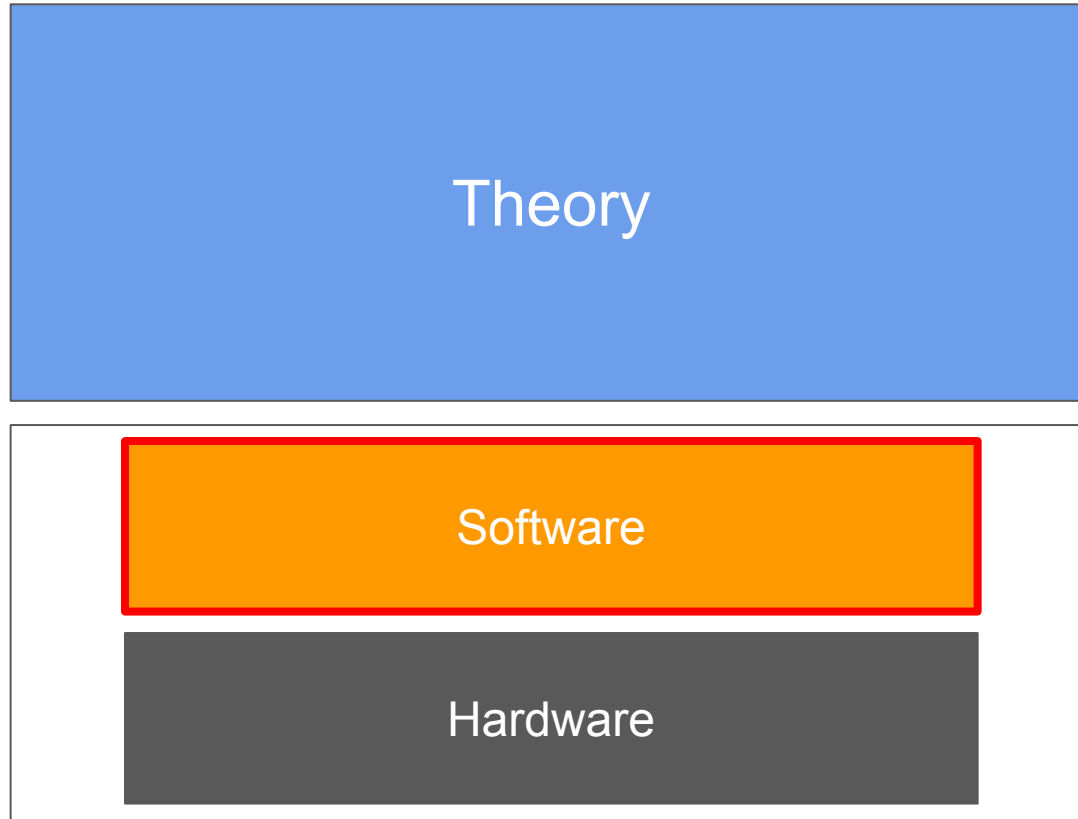
Theory

Practice

We will focus on...



We will focus on...



Software frameworks

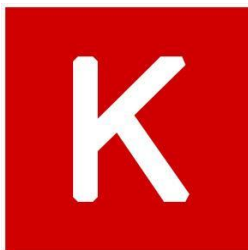
There are many deep learning frameworks



theano



PYTORCH



Software frameworks

All our labs will be developed in PyTorch:

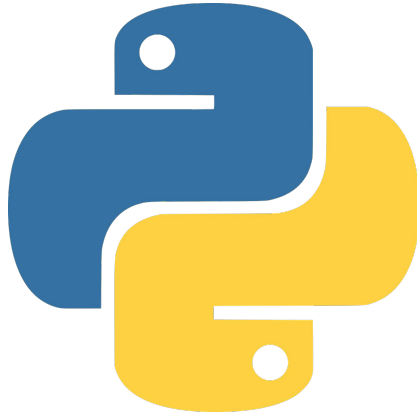
- Simple.
- Object-oriented programming.
- Widely used in research.
- Production ready too!



PyTorch is moving to the Linux Foundation under the name PyTorch Foundation, with a governing board of leaders from AMD, AWS, GC, Meta, Azure and NVIDIA.

Chintala, S. (n.d.). *Pytorch strengthens its governance by joining the Linux Foundation*. PyTorch. Retrieved September 13, 2022, from <https://pytorch.org/blog/PyTorchfoundation/>

Programming environment



Google Colab

The screenshot displays the Google Colaboratory web interface. At the top, the header includes the 'co' logo, the text 'Hello, Colaboratory', and a menu with options: Archivo, Editar, Vista, Insertar, Entorno de ejecución, Herramientas, and Ayuda. On the right side of the header are links for 'COMPARTIR', 'CONECTAR', and 'EDICIÓN'. Below the header is a toolbar with icons for 'CÓDIGO', 'TEXTO', 'CELDA' (with up and down arrows), and 'COPIAR EN DRIVE'. A left sidebar contains a table of contents with links to 'Índice', 'Fragmentos de código', 'Welcome to Colaboratory!', 'Local runtime support', 'Python 3', 'TensorFlow execution', 'Visualization', 'Forms', 'Examples', 'For more information:', and 'SECCIÓN'. The main content area features a 'Welcome to Colaboratory!' section with a description of the project and links to 'Google Drive' and 'FAQ'. Below this is a 'Local runtime support' section. A 'Python 3' section is expanded, showing a list of bullet points about notebook creation and language settings. At the bottom, a code cell is shown with the following Python code:

```
[ ] import sys
print('Hello, Colaboratory from Python {}'.format(sys.version_info[0]))
```

 Below the code cell, the output 'Hello, Colaboratory from Python 3!' is displayed.

co Hello, Colaboratory

Archivo Editar Vista Insertar Entorno de ejecución Herramientas Ayuda

CÓDIGO TEXTO CELDA CELDA COPIAR EN DRIVE

COMPARTIR CONECTAR EDICIÓN

Índice Fragmentos de código

Welcome to Colaboratory!

Local runtime support

Python 3

TensorFlow execution

Visualization

Forms

Examples

For more information:

SECCIÓN

Welcome to Colaboratory!

Colaboratory is a Google research project created to help disseminate machine learning education and research. It's a Jupyter notebook environment that requires no setup to use and runs entirely in the cloud.

Colaboratory notebooks are stored in [Google Drive](#) and can be shared just as you would with Google Docs or Sheets. Colaboratory is free to use.

For more information, see our [FAQ](#).

Local runtime support

Colab also supports connecting to a Jupyter runtime on your local machine. For more information, see our [documentation](#).

▼ **Python 3**

Colaboratory supports both Python2 and Python3 for code execution.

- When creating a new notebook, you'll have the choice between Python 2 and Python 3.
- You can also change the language associated with a notebook; this information will be written into the .ipynb file itself, and thus will be preserved for future sessions.

```
[ ] import sys
print('Hello, Colaboratory from Python {}'.format(sys.version_info[0]))
```

Hello, Colaboratory from Python 3!

<https://colab.research.google.com/>

Evaluation

You must complete individually the online quiz for the lab in Atenea.

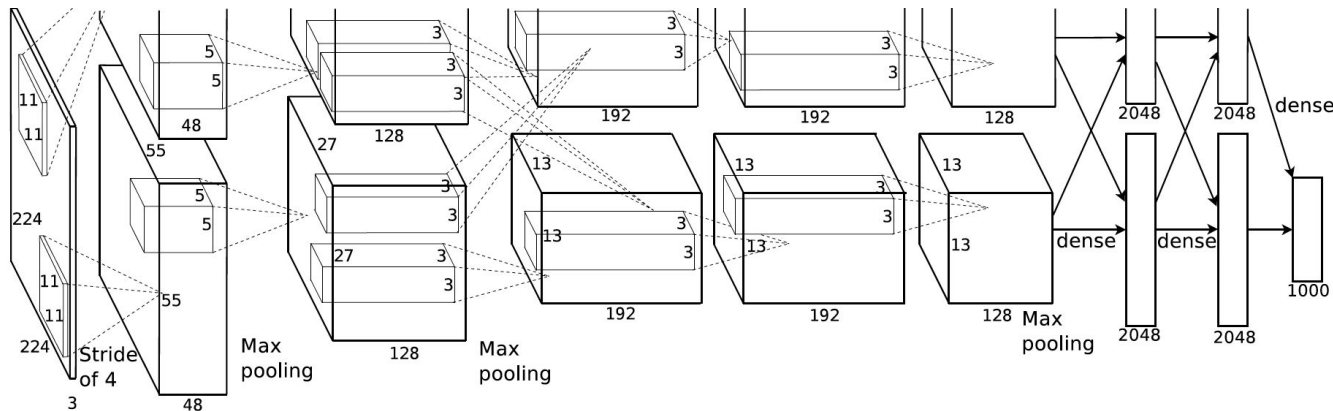
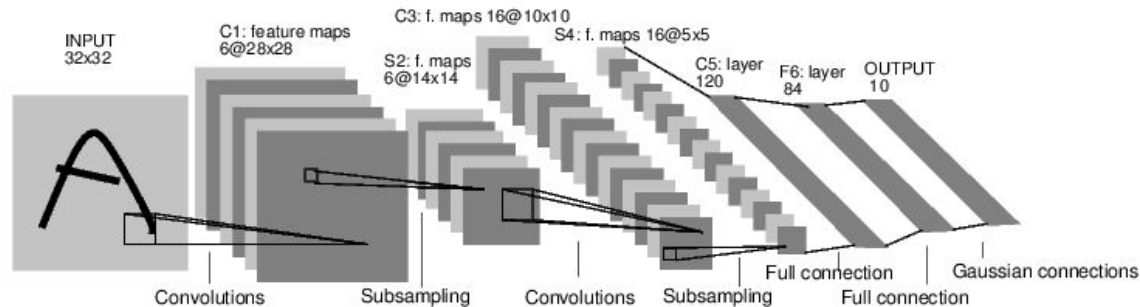
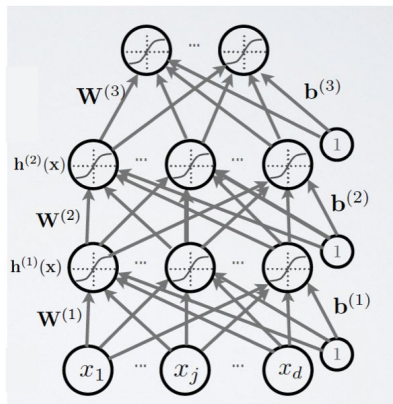


Planning

September 21	Lab01: A World of Tensors
September 28	Lab02: Gradient Descent
October 05	Lab03: Automatic Differentiation
October 19	Lab04: Optimization
October 26	Lab05: Multi-layer Perceptron
November 02	Lab06: Convolutional Neural Network
November 09	Lab07: Overfitting
November 16	Lab08: Transfer Learning
November 23	Lab09: Interpretability
November 30	Lab10: GAN
December 14	Lab11: RNN
December 21	Lab12: Transformers



First day of a DL course...



About today's session

In this lab session, we are going to see:

1. What are tensors, concretely in the PyTorch framework.
2. How to initialize them.
3. How to operate with them, and typical operations for deep learning modeling.

Kick off the lab

1. Launch a web browser (Chrome recommended).
2. Login with your @estudiantat.upc.edu GSuite account.
3. Create a copy [the notebook](#) of this lab to your Gdrive.
4. (Right) Click on the file and choose Open File with “[Google Colaboratory](#)”

