Introduction to Deep Learning
Part III - Hands-On

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Practical part

Load Tutorials on Binder:

https://mybinder.org/v2/gh/auliyafitri/deep_learning_basics_pytorch/HEAD

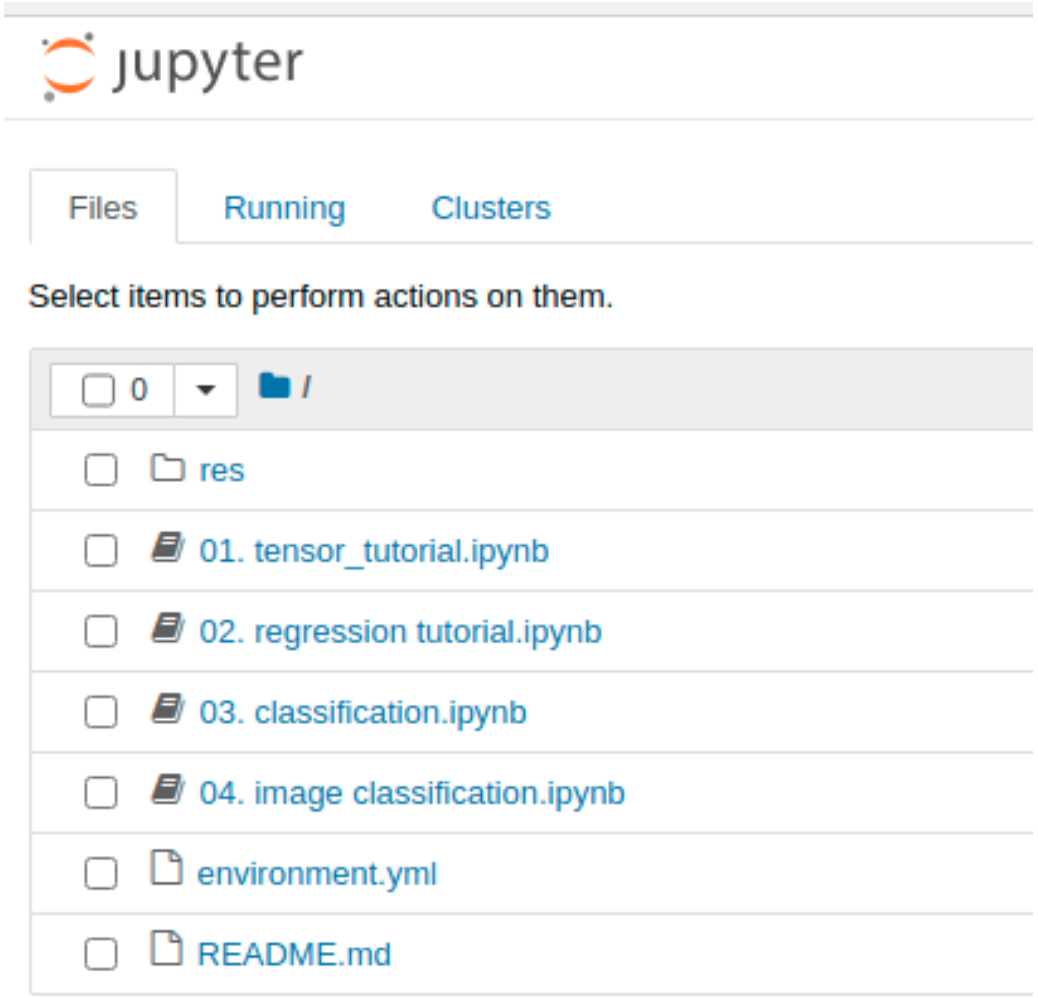
or

https://tinyurl.com/dlbasics-dlr

Practical part

Four parts:	Basics	~20 Minutes (now)
	Regression	~50 Minutes
(Afternoon)		
	Classification	~50 Minutes
(Afternoon)		
	Image Classification	~50 Minutes
(Afternoon)		

Structure:	~15 Minutes	Present Jupyter Notebook
	~25 Minutes	Excercises and Self-Study
	~10 Minutes	Wrap-Up and Discussion



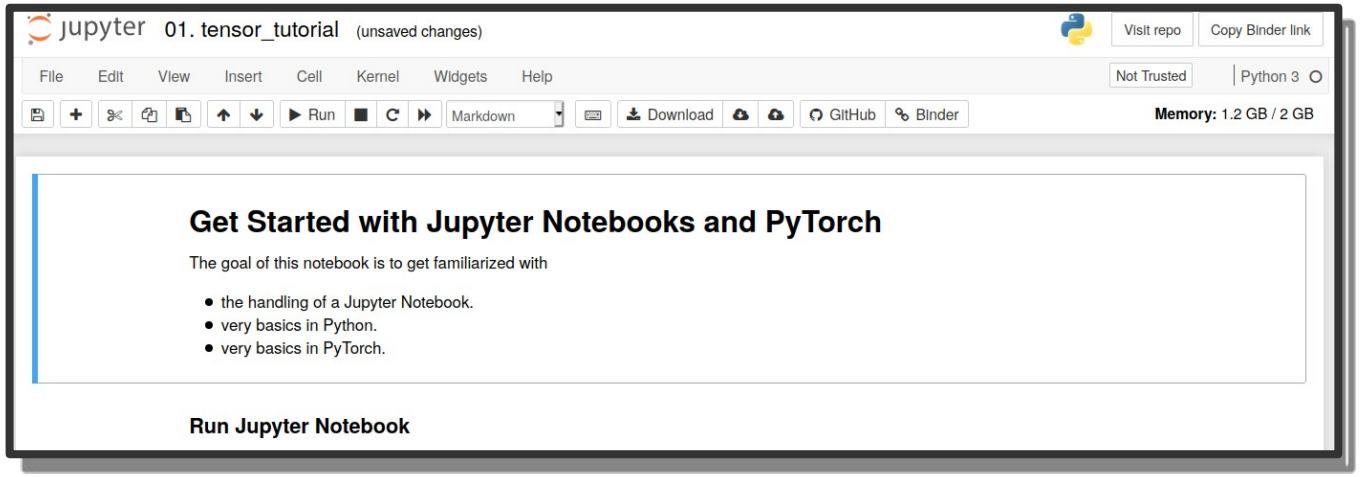
https://tinyurl.com/dlbasics-dlr

Practical Part: Basics

Time: ~10 Minutes: Presentation
~10 Minutes: Self-study

Content: Simple definitions and operations using Python and the PyTorch Package

Goal: Get familiar with the setup
Learn to run a Jupyter Notebook on Binder
Learn very first steps with PyTorch

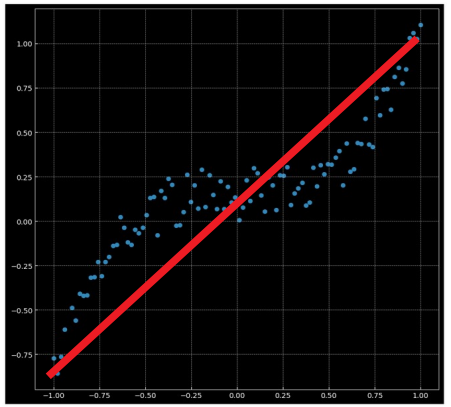


Practical Part: Regression

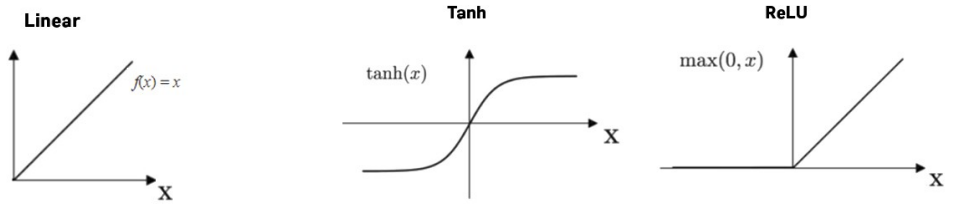
Time: ~15 Minutes: Presentation
~25 Minutes: Self-study
~10 Minutes: Wrap-Up

Content: Solve a regression task with linear and non-linear mode

Goal: Learn regression analysis
Figure out the differences between nonlinearities



100 data points around the line $y = x^3 + 0.3$



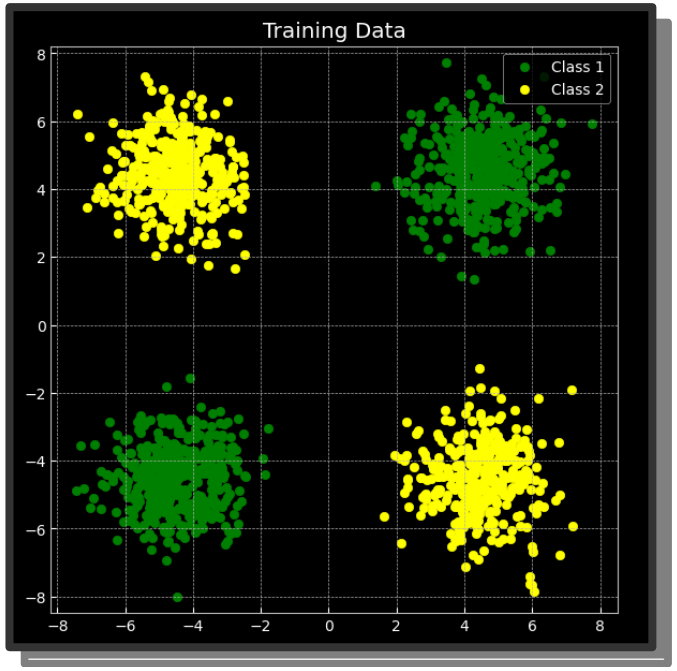
linear **non-linear**

Practical Part: Classification

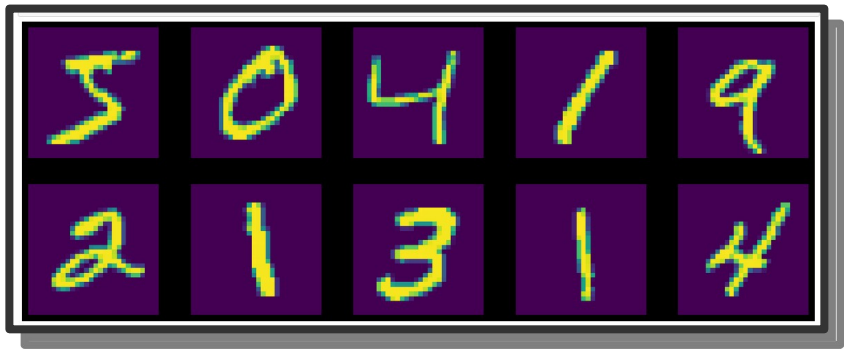
Time:	~15 Minutes:	Presentation
	~25 Minutes:	Self-study
	~10 Minutes:	Wrap-Up

Content:
Train a classifier for a binary classification task
Data based on XOR function
Train with „overlapping classes “

Goal:
Learn how classification tasks are defined
Figure out necessety of non-linearities
Get an idea of certain and uncertain predictions



Practical Part: Image Classification



Time:
~15 Minutes: Presentation
~25 Minutes: Self-study
~10 Minutes: Wrap-Up

Content:
Train a classifier for a image classification task based on the MNIST dataset
Compare a fully connected and a convolutional neural network
Bonus: evaluate the performance on rotated images (=> Out-of-distribution)

Goal:
Learn classification of image data
Figure out the efficiency of Concolutional Neural Networks
Bonus: Learn the limitations of neural networks regarding out-of-distribution samples

Feedback Session and Goodbye

Special Thanks to **Simon Meininger!**

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