

# **Introduction to Deep Learning** **Part III - Hands-On**

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Knowledge for Tomorrow



# Practical Part

Load Tutorials on Binder:

<https://mybinder.org/v2/gh/aulyafitri/Intro-to-Deep-Learning-Seminar/HEAD>

or

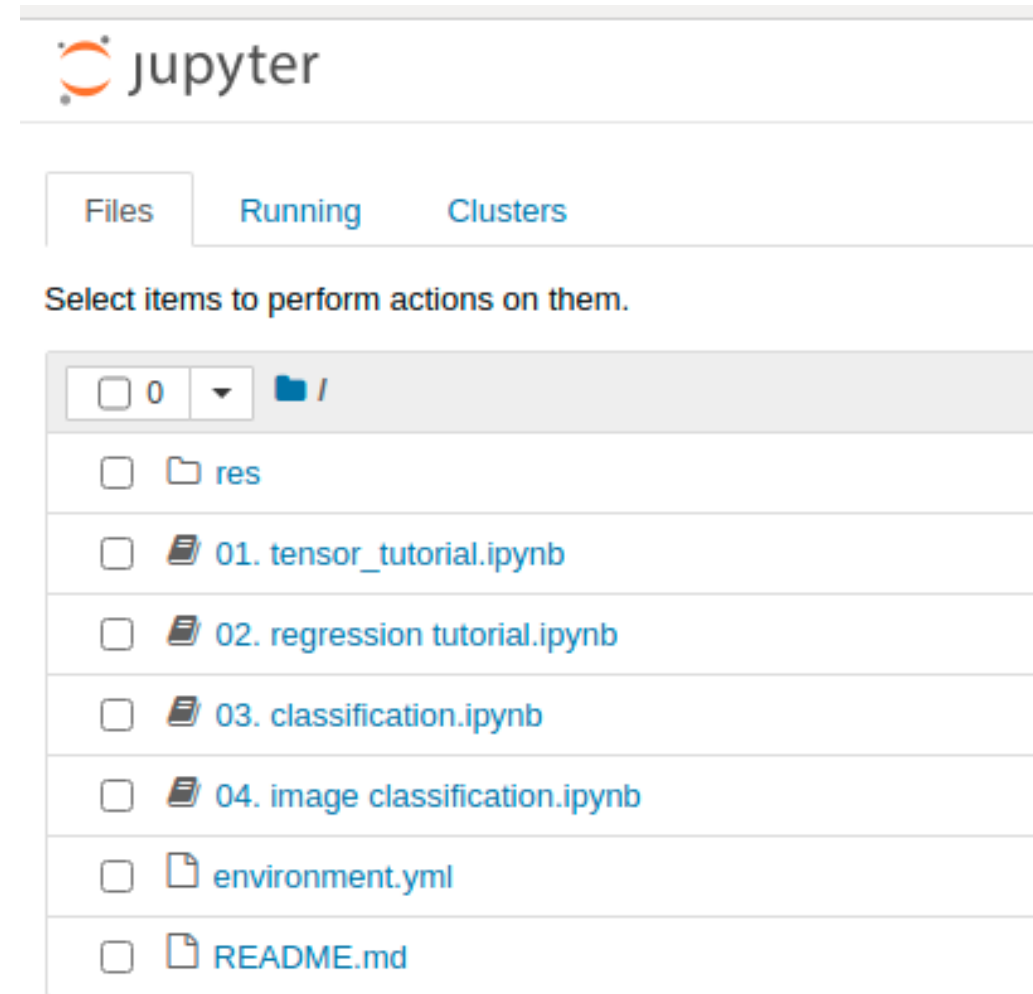
<https://tinyurl.com/dldlr>



# 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

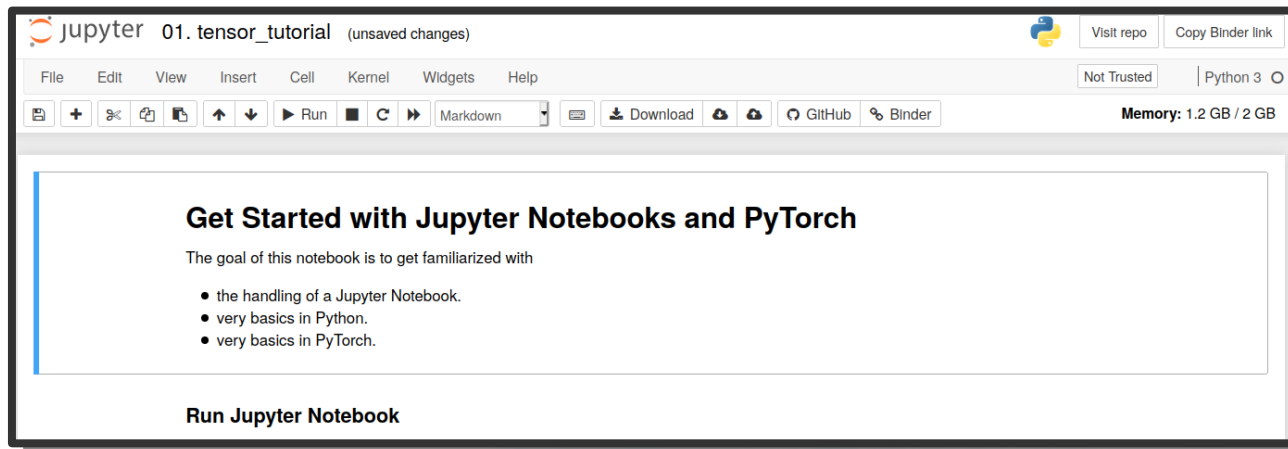


# Practical Part: Basics

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

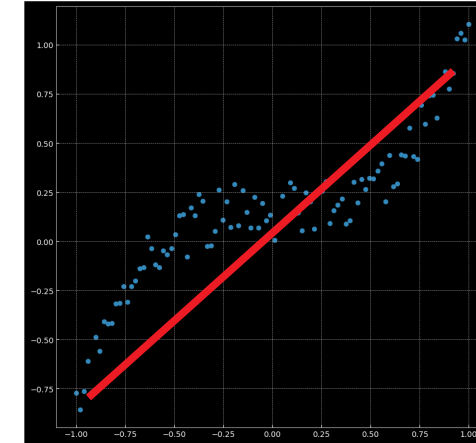


# Practical Part: Regression

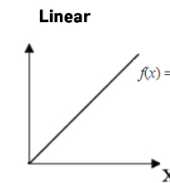
Time:           ~15 Minutes:   Presentation  
                  ~25 Minutes:   Self-study  
                  ~10 Minutes:   Wrap-Up

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

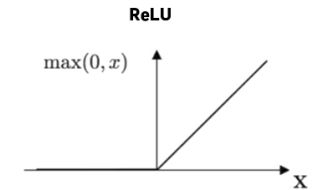
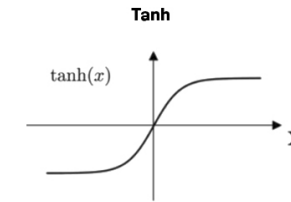
Goal:           Learn regression analysis  
                  Figure out the differences  
                  between nonlinearities



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



linear

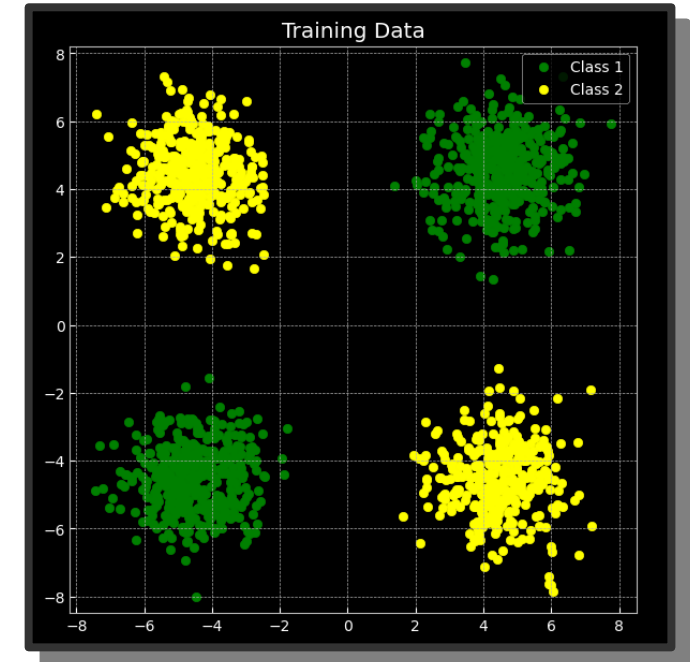


non-linear



# Practical Part: Classification

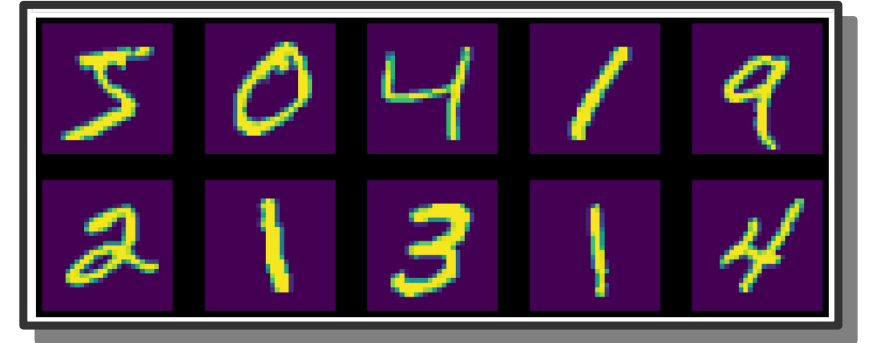
Time:	~15 Minutes:	Presentation
	~25 Minutes:	Self-study
	~10 Minutes:	Wrap-Up
Content:	Train a classifier for a binary classification task	
	Data based on XOR function	
	Train with „overlapping classes“	
Goal:	Learn how classification tasks are defined	
	Figure out necessity of non-linearities	
	Get 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

