COMPUTATIONAL INTELLIGENCE

DEEP LEARNING

Introduction to Jupyter Notebook, Anaconda and Phyton DL Tools

Adrian Horzyk

horzyk@agh.edu.pl

AGH

AGH University of Science and Technology
Krakow, Poland

Scope

- ✓ Python – a modern language often used for AI, CI, KE, and DM computing.
- ✓ Jupyter Notebook – a modern and intuitive programming environment with linked libraries (like Tensorflow, Keras) that allow to effectively process deep learning algorithms and present results quickly.
- ✓ Tensorflow and Keras libraries produced by leading IT companies, like Google, that facilitate and simplify implementation and use of deep learning algorithms and networks.

Jupyter Notebook

The Jupyter Notebook:

- is an open-source web application that allows you to create and share documents that contain live code, equations, visualizations, and narrative text;
- includes data cleaning and transformation, numerical simulation, statistical modeling, data visualization, machine learning, and much more.

We will use it to demonstrate various algorithms, so you are asked to install it.

Jupyter in your browser

Install a Jupyter Notebook

Jupyter Notebook & Anaconda

Install Jupyter using Anaconda with built in Python 3.7+

- It includes many other commonly used packages for scientific computing, data science, machine learning, and computational intelligence libraries.
- It manages libraries, dependencies, and environments with Conda.
- It allows developing and training various machine learning and deep learning models with scikit-learn, TensorFlow, Keras, Theano etc.
- It supplies us with data analysis including scalability and performance with Dask, NumPy, pandas, and Numba.
- It quickly visualizes results with Matplotlib, Bokeh, Datashader, and Holoviews.

And run it at the Terminal (Mac/Linux) or Command Prompt (Windows):

```
jupyter notebook
```

ANACONDA

jupyter | spyder | NumPy | SciPy | Numba
pandas | DASK | Bokeh | HoloViews | Datashader
matplotlib | scikit-learn | H2O.ai | TensorFlow | CONDA

Anaconda Cloud

ANACONDA CLOUD

Search Anaconda Cloud

View Help adrianhorz...

My Anaconda Landscape

Packages View all (0)

Get more information on how to upload a Package.

Notebooks View all (0)

Get more information on how to upload a Notebook.

Environments View all (0)

Get more information on how to upload an Environment.

Projects View all (0)

No projects yet, upload one here.

Favorites View all (0)

Favorite some packages, notebooks, and environments to get started!

Activity Feed View more

Welcome to Anaconda Cloud! 10 months and 22 hours ago

Anaconda Cloud allows you to create or distribute software packages.

Getting started: Installing your first package

Getting started: Distributing your first package

Jupyter Notebook & PyCharm

It is recommended to install PyCharm for Anaconda:

ANACONDA

Anaconda3 2019.03 (64-bit)

Anaconda + JetBrains

Anaconda and JetBrains are working together to bring you Anaconda-powered environments tightly integrated in the PyCharm IDE.

PyCharm for Anaconda is available at:

https://www.anaconda.com/pycharm

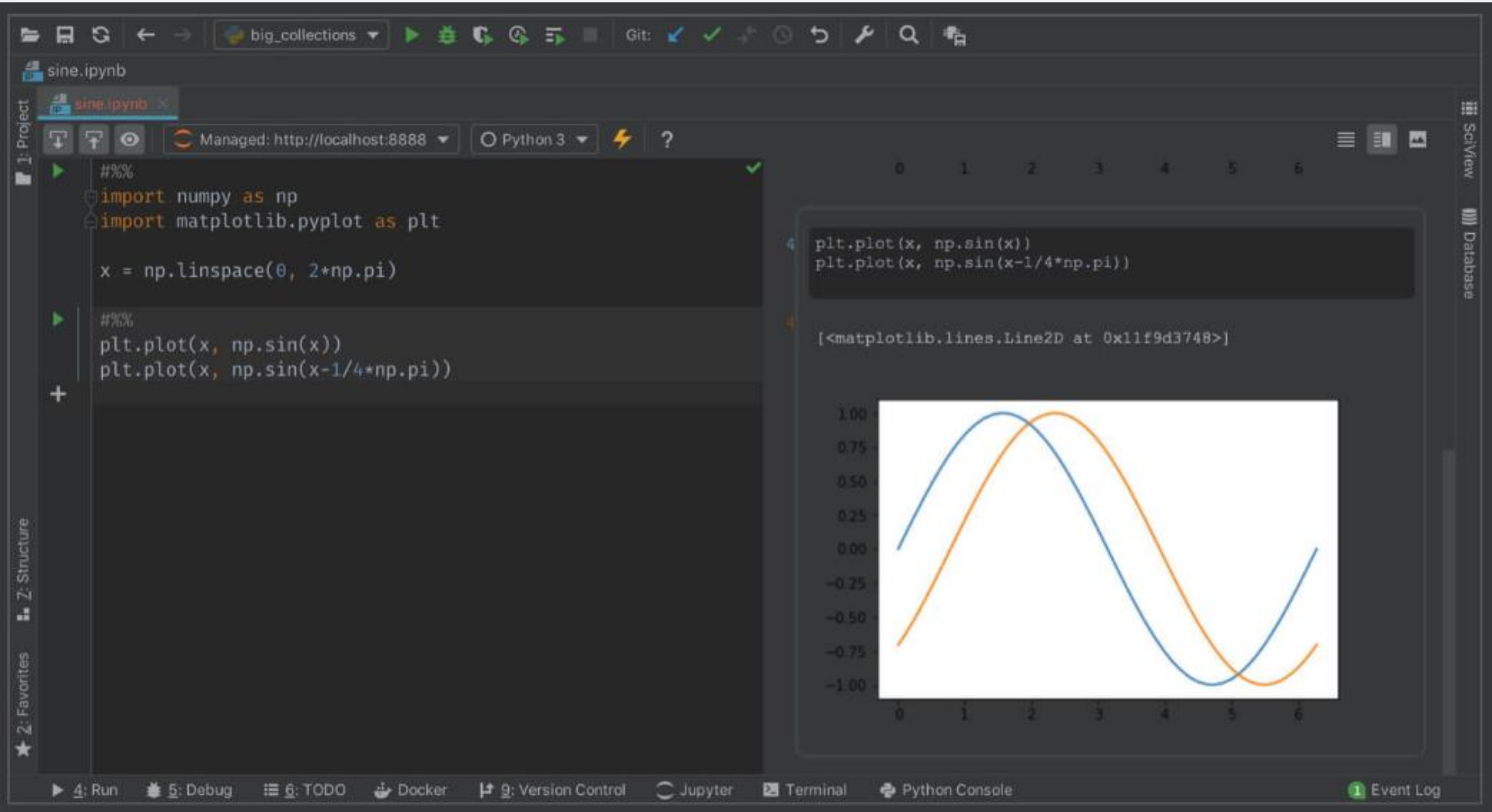
ANACONDA.

PC

Jupyter Notebook

PyCharm is a python IDE for Professional Developers

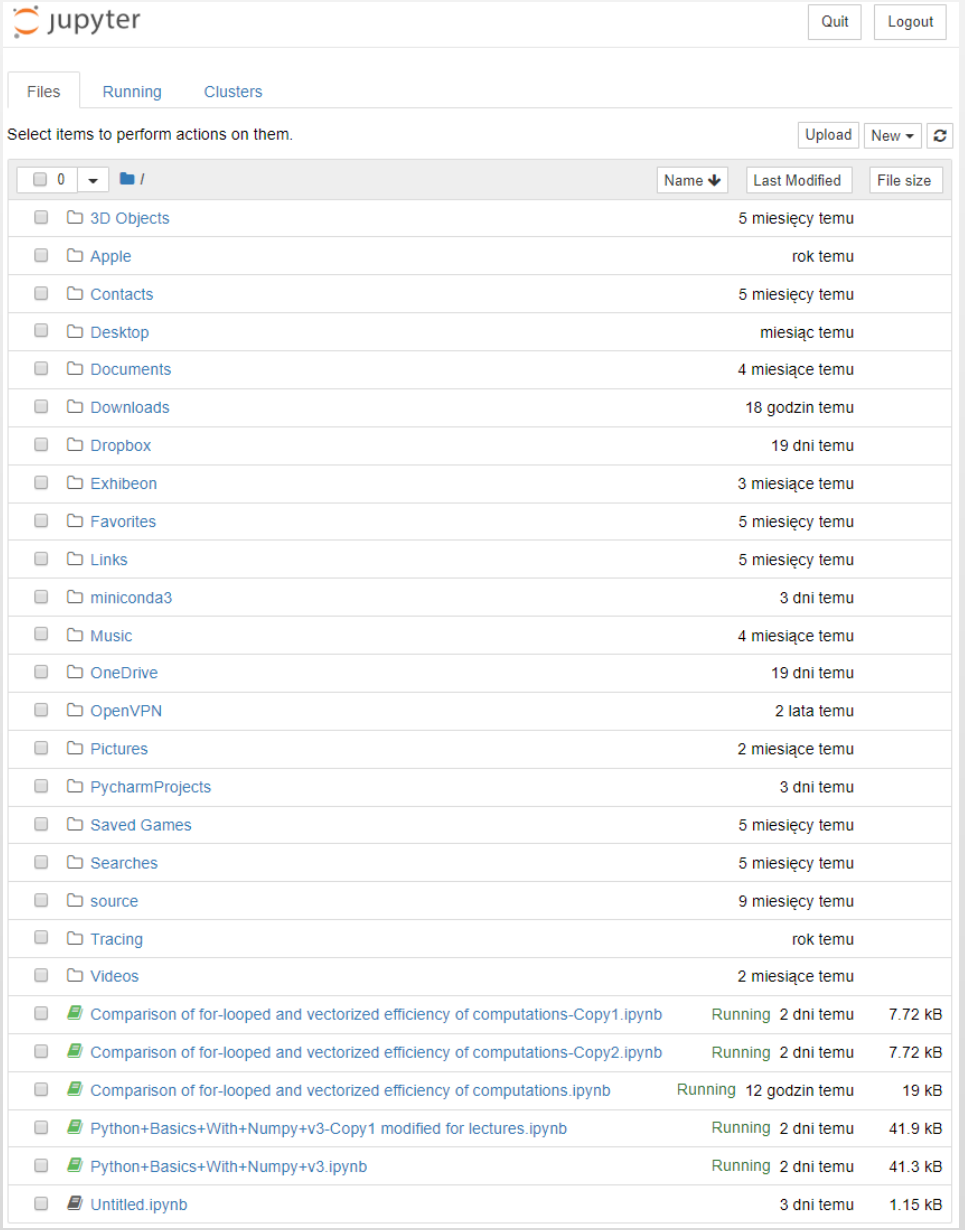
- It includes scientific mode to interactively analyze your data.



Jupyter Notebook Dashboard

Running a Jupyter Notebook in your browser:

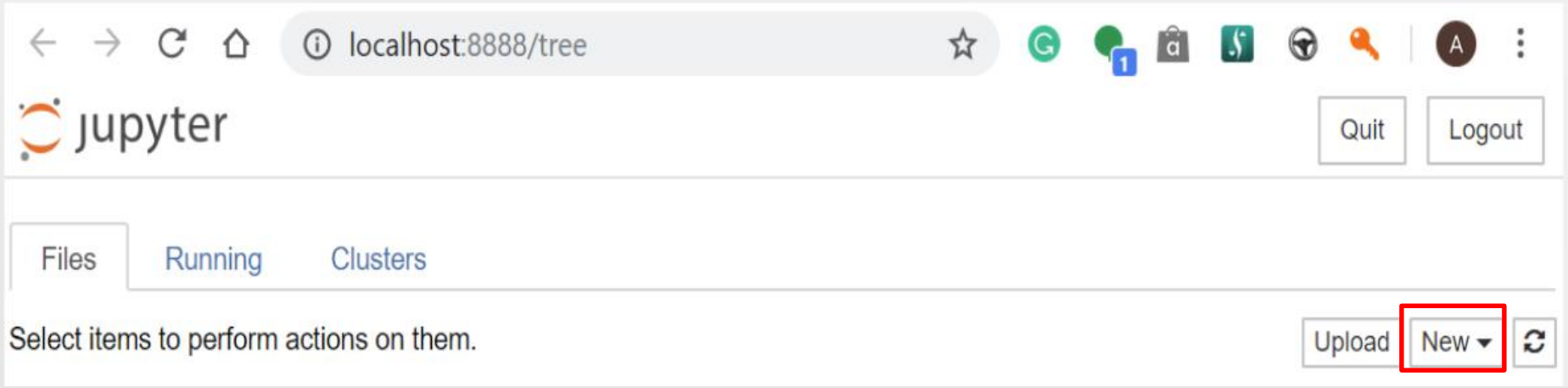
- When the Jupyter Notebook opens in your browser, you will see the Jupyter Notebook Dashboard, which will show you a list of the notebooks, files, and subdirectories in the directory where the notebook server was started by the command line „jupyter notebook”.
- Most of the time, you will wish to start a notebook server in the highest level directory containing notebooks. Often this will be your home directory.



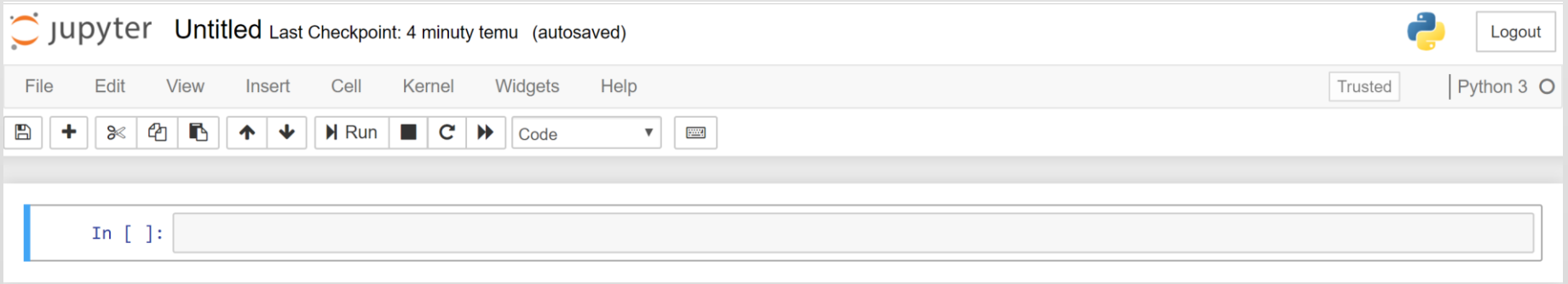
Starting a new Python notebook

Start a new Python notebook:

- **Clicking New → Python 3**



- **And a new Python project in the Jupyter Notebook will be started:**



Useful Packages and Libraries

In the next assignments and examples, we well use the following packages:

- **numpy is the fundamental package for scientific computing with Python.**
- **h5py is a common package to interact with a dataset that is stored on an H5 file.**
- **matplotlib is a famous library to plot graphs in Python.**
- **PIL and scipy are used here to test your model with your own picture at the end.**

They must be imported:

In [2]:
```
import numpy as np
import matplotlib.pyplot as plt
import h5py
import scipy
from PIL import Image
from scipy import ndimage
from lr_utils import load_dataset

%matplotlib inline
```

Let's start with powerful computations!

- ✓ Questions?
- ✓ Remarks?
- ✓ Suggestions?
- ✓ Wishes?

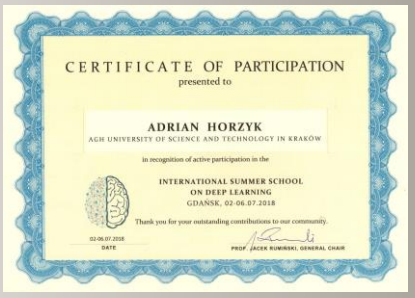
Bibliography and Literature

1. Nikola K. Kasabov, *Time-Space, Spiking Neural Networks and Brain-Inspired Artificial Intelligence*, In Springer Series on Bio- and Neurosystems, Vol 7., Springer, 2019.
2. Ian Goodfellow, Yoshua Bengio, Aaron Courville, *Deep Learning*, MIT Press, 2016, ISBN 978-1-59327-741-3 or PWN 2018.
3. Holk Cruse, *Neural Networks as Cybernetic Systems*, 2nd and revised edition
4. R. Rojas, *Neural Networks*, Springer-Verlag, Berlin, 1996.
5. *Convolutional Neural Network* (Stanford)
6. *Visualizing and Understanding Convolutional Networks*, Zeiler, Fergus, ECCV 2014
7. IBM: https://www.ibm.com/developerworks/library/ba-data-becomes-knowledge-1/index.html
8. NVIDIA: https://developer.nvidia.com/discover/convolutional-neural-network
9. JUPYTER: https://jupyter.org/

Adrian Horzyk

horzyk@agh.edu.pl

Google: Horzyk



AGH

University of Science and Technology in Krakow, Poland