



# **Python: Introduction to AI, Python and Colab**

**AAA-Python Edition**



# Plan

- 1- What is AI ?
- 2- AI Branches
- 3- AI Applications
- 4- Introduction to Python
- 5- Jupyter Notebook
- 6- Google Colab



## 1- What is AI ?

- The definition of AI (Artificial Intelligence) depends on how it has been approached by the researchers through history.
- These approaches concern developing intelligent software taking into consideration **2** aspects: “**how do we think**” and “**how do we act**”.
- So in AI, we develop software that let machines be able to:
  - Think like a **human** intelligibly
  - Or Act like a **human** intelligibly
  - Or Think **Rationally**
  - Or Act **Rationally**



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## 1- What is AI ?

- If we want a more formal definition, we can select these 4 definitions :

	Human	Rational
Think	“[The automation of] activities that we associate with human thinking, activities such as decision-making, problem solving, learning ...” (Bellman, 1978)	“The study of the computations that make it possible to perceive, reason, and act.” (Winston, 1992)
Act	“The art of creating machines that perform functions that require intelligence when performed by people.” (Kurzweil, 1990)	“Computational Intelligence is the study of the design of intelligent agents.” (Poole et al., 1998)

Selected from (Stuart J Russell and Peter Norvig. Artificial intelligence: a modern approach. Pearson Education, Inc, 2010.).



## 1- What is AI ?

- For example, we can find these involved techniques:

	Human	Rational
Think	Cognitive Science	Logic Programming
Act	Natural Language Processing	Rational Agents

- It doesn't mean that each technique relate to only one category. For example, agents may need natural language processing skills.
- The categorization means, that the research will focus in a particular aspect related to the category it belongs to.



## 2- AI Branches

- From the AI categories, many branches emerged:

Machine Learning

Learn from data

Logic Based AI

Logic programming paradigm

Search

Select the optimal solution

Knowledge Representation

Efficient formal representation of Knowledge

Planning

Generate the most optimal plan to achieve a goal



## 2- AI Branches

- From the AI categories, many field emerged:

### Heuristics

Making estimations from the knowledge of a specific problem

### Genetic Programming

Use biological processes in software to find answers to a large problem





### 3- AI Applications

- We can use AI in:

Expert Systems

Speech recognition

Games

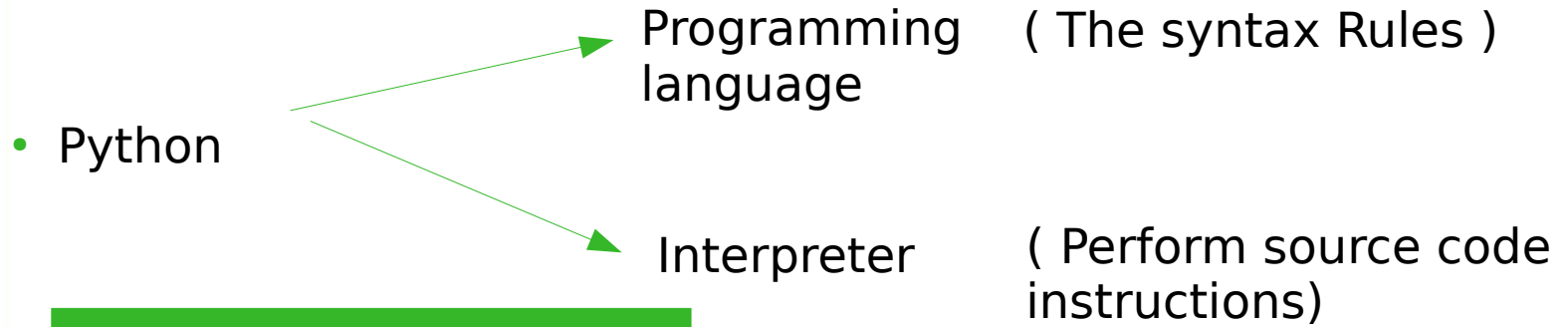
Robotics

Computer vision

Natural Language Processing



## 4- Introduction To Python



### The programming language

- Is easy to learn and powerful
- It has efficient high-level data structures
- It has a simple approach to object-oriented programming.
- It is ideal for scripting and rapid application development in many areas on most platforms.

### The interpreter

- Is freely available in source or in binary form.
- It is available for all major platforms



## 4- Introduction To Python

- Major versions
  - 2.\* (many project compatibles only with python2)
  - 3.\* (not backward compatible with python 2)
- In major of our code we will use **Python 3** (unless we specify an other version)
- Right now, (the time we are writing this course), the latest version is **3.7.2**



## 5- Jupyter Notebook

- It is :
  - An “Open-Source” web application
  - Allows you to create and share documents that contain :
    - Live code
    - Equations
    - Visualizations
    - Narrative Text
- It runs code in many programming languages
- For installation, it requires: python  $\geq 3.3$  ,  $\geq 2.7$
- To run with additional languages, you have to install additional Kernels
- The list of all available Kernels can be found in Jupyter website (<https://github.com/jupyter/jupyter/wiki/Jupyter-kernels>)



## 5- Jupyter Notebook

A screenshot of the Jupyter Notebook web interface. At the top, the 'jupyter' logo is on the left and a 'Logout' button is on the right. Below the logo, there are tabs for 'Files', 'Running', and 'Clusters'. A message says 'Select items to perform actions on them.' Below this is a file browser showing the 'Desktop' directory with a '..' icon. A 'Notebook list empty.' message is displayed. On the right, there are 'Upload', 'New', and a refresh icon. The 'New' dropdown menu is open, showing options: 'Notebook: Python 3' (highlighted with a green arrow), 'Other: Text File', 'Folder', and 'Terminal'. A green box with the text 'To write code, you have to create a new Notebook' has an arrow pointing to the 'Python 3' option in the 'New' menu.

jupyter

Logout

Files Running Clusters

Select items to perform actions on them.

Upload New ↕ ↻

Desktop

..

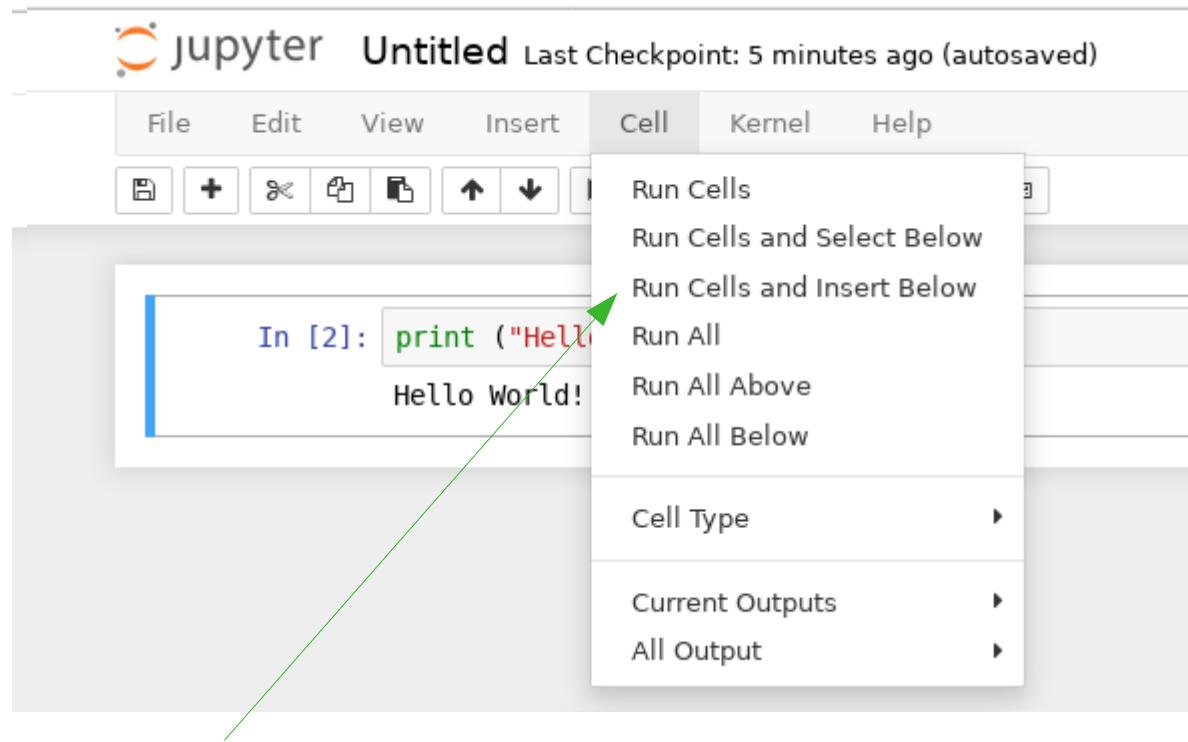
Notebook list empty.

Notebook:  
Python 3  
Other:  
Text File  
Folder  
Terminal

To write code, you have to create a new Notebook



## 5- Jupyter Notebook



To run the code, you have to Run the Cells



## 5- Jupyter Notebook

jupyter Untitled Last Checkpoint: 10 minutes ago (autosaved)

File Edit View Insert Cell Kernel Help

New Notebook  
Open...

Make a Copy...  
Rename...  
Save and Checkpoint

Revert to Checkpoint

Print Preview

Download as

Trusted Notebook

Close and Halt

Notebook (.ipynb)  
Python (.py)  
HTML (.html)  
Markdown (.md)  
reST (.rst)  
LaTeX (.tex)  
PDF via LaTeX (.pdf)

Code

Your Notebook can be converted in any of these formats

But some formats require certain preinstalled libraries



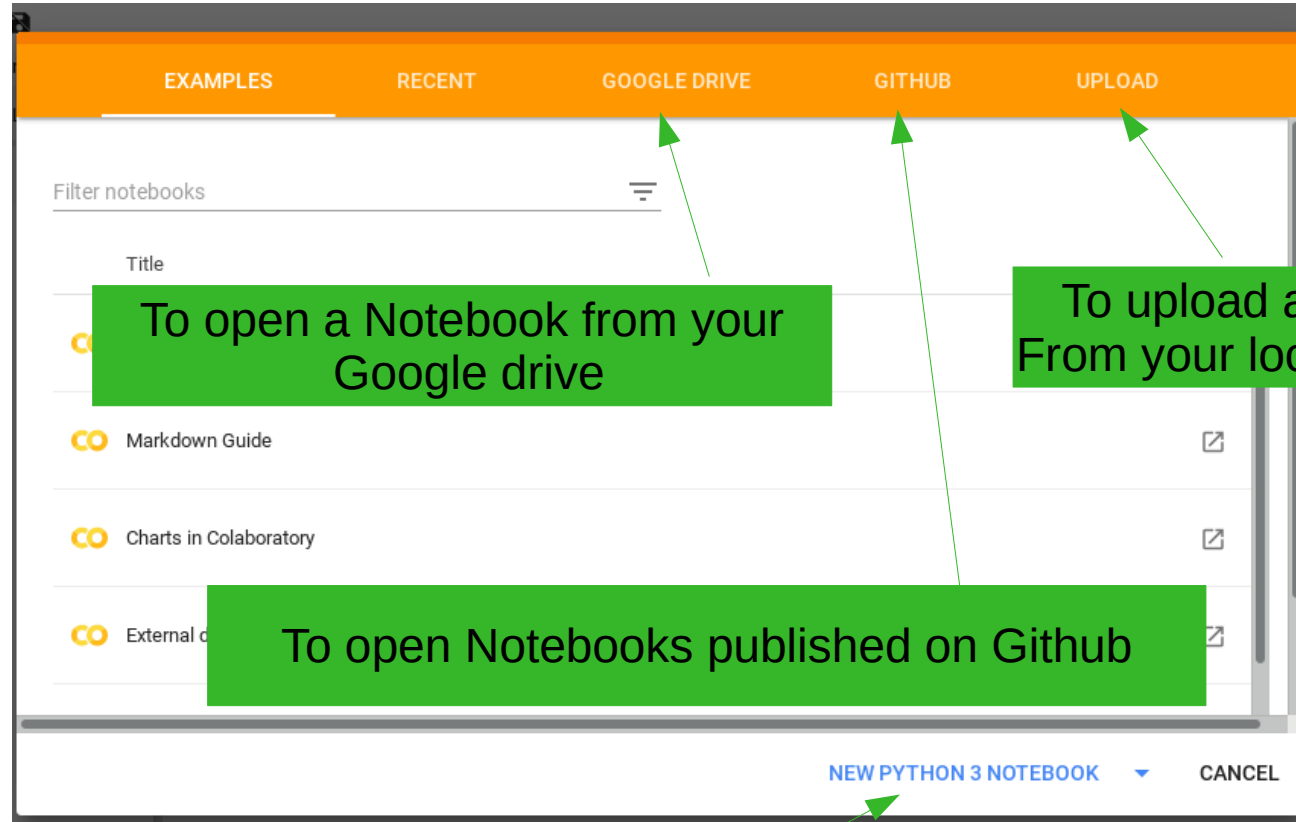
## 6- Google Colab

- Google Colaboratory is :
  - A **Jupyter notebook** environment that requires no setup to use.
  - It is a **free tool** for machine learning education and research
  - The Notebooks are stored in **Google Drive**
  - It supports **Python 2.7** and **Python 3.6**
  - It **doesn't support** other kernels (for now)
  - The code is executed in a **virtual machine** dedicated to a user account.
  - To use it, go to(<https://colab.research.google.com>)





## 6- Google Colab



To create a new Notebook

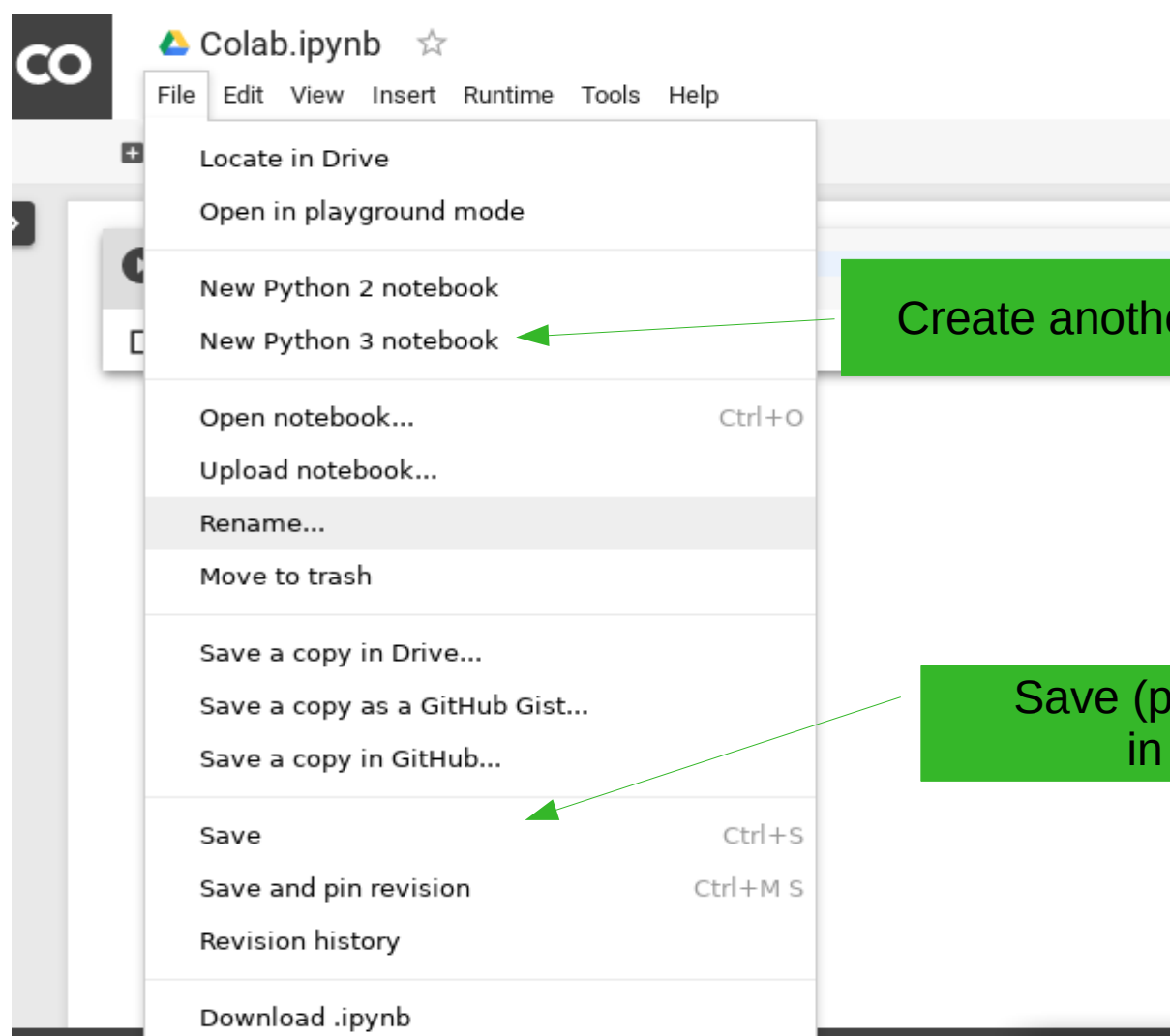
To open a Notebook from your Google drive

To open Notebooks published on Github

To upload a Notebook From your local file system



## 6- Google Colab



Create another Notebook

Save (publish) a copy  
in a GitHub



## 6- Google Colab

The screenshot shows the Google Colab interface. At the top, there's a 'CO' logo and the text 'Colab.ipynb'. Below that is a menu bar with 'File', 'Edit', 'View', 'Insert', 'Runtime', 'Tools', and 'Help'. A toolbar contains buttons for '+ CODE', '+ TEXT', and 'CELL' (with up and down arrows). The 'Code snippets' panel is open, showing a 'Table of contents' tab and a 'Code snippets' tab. Under 'Code snippets', there's a 'Filter code snippets' input field and a list of Altair chart templates, each with a right-pointing arrow:

- Altair: Bar Plot
- Altair: Histogram
- Altair: Interactive Brushing
- Altair: Interactive Scatter Plot
- Altair: Linked Brushing
- Altair: Linked Scatter-Plot and Histogram
- Altair: Scatter Plot with Rolling Mean

Two green callout boxes with arrows point to the interface. The first points to the 'Code snippets' tab and contains the text: 'A lot of sample codes ready to use'. The second points to the right arrow of the 'Altair: Bar Plot' item and contains the text: 'Just Click in, and a new cell will be created with the corresponding code'.



# This is the code

This is the results after running the Cell



## 6- Google Colab

- Another interesting feature about Google Colab, is that we can install new **libraries** (we will talk about this later).

```
1 !pip install gym

Collecting gym
  Downloading https://files.pythonhosted.org/packages/9b/50/ed4a03d2be47ffd043b
    100% |████████████████████████████████████████| 1.5MB 7.0MB/s
Requirement already satisfied: numpy>=1.10.4 in /usr/local/lib/python3.6/dist-p
Requirement already satisfied: requests>=2.0 in /usr/local/lib/python3.6/dist-p
Requirement already satisfied: six in /usr/local/lib/python3.6/dist-packages (f
Collecting pygame>=1.2.0 (from gym)
  Downloading https://files.pythonhosted.org/packages/1c/fc/dad5eaaab68f0c21e2f
    100% |████████████████████████████████████████| 1.0MB 1.2MB/s
Requirement already satisfied: urllib3<1.23,>=1.21.1 in /usr/local/lib/python3.
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.6/d
Requirement already satisfied: chardet<3.1.0,>=3.0.2 in /usr/local/lib/python3.
Requirement already satisfied: idna<2.7,>=2.5 in /usr/local/lib/python3.6/dist-
Requirement already satisfied: future in /usr/local/lib/python3.6/dist-packages
```

- In this course, we will use Google Colab to run our Programs
- Since we program in Python 3, we will use **Python 3 Notebook**, unless we specify the other version



# References

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- Python Software Foundation. Python. On-line at <https://www.python.org/>. Accessed on 22-09-2018.
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- Stuart J Russell and Peter Norvig. Artificial intelligence: a modern approach. Pearson Education, Inc, 2010.
- Al Sweigart. Automate the boring stuff with Python: practical programming for total beginners. No Starch Press, 2015.



# Thank you!

FOR ALL YOUR TIME