



**HKUST**  
VISLAB

# **COMP 4462**

## **Data Visualization Tutorial**

Qian ZHU  
Xiaofu JIN

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<https://bit.ly/vis-t04>

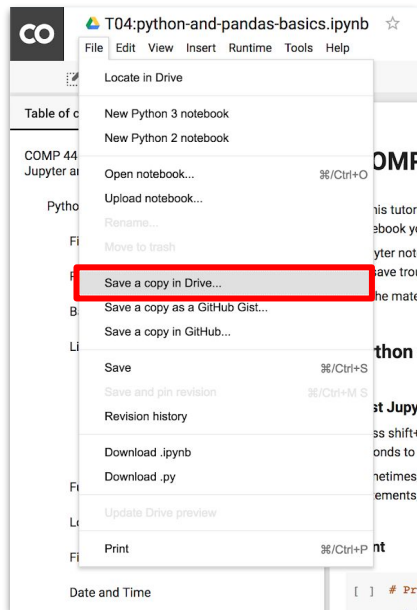
# Python, Jupyter Notebook and Google Colab

- Python
  - Interpret language (i.e. run line by line, no compilation)
  - Dynamic typing (i.e. do not need to declare types like int, float, char\*, etc.)
  - Easy to pick up, widely used, a lot of learning resources online
  - A lot of libraries, fast and powerful
    - Pandas, scikit-learn, matplotlib, altair and a lot of machine learning related libraries
- Jupyter Notebook
  - Interactive environment (i.e. you know exactly what it does)
  - Design for experimentation
    - Just like a notebook in laboratory, recoding every steps of experiment and results
    - Form hypothesis (setup code) => experiment (run code) => see results (code output) => refine hypothesis (change code) => experiment again (run code again) => results => loop
- Google Colab
  - A hosted version of Jupyter Notebook
  - Provided by Google, free!

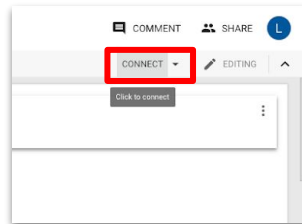
# Google Colab

1. Sign in your Google account
2. Go to the [notebook of this tutorial](#)

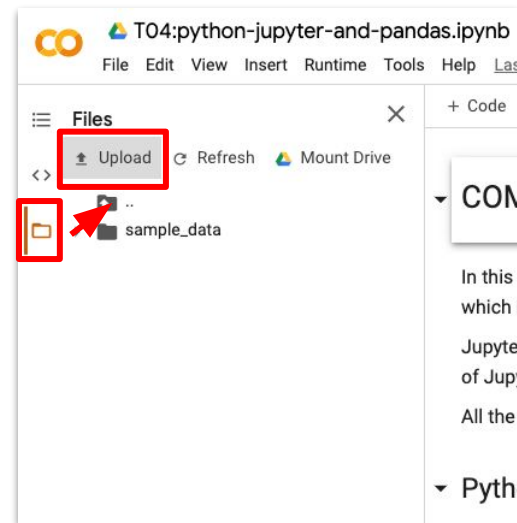
## 3. Make a copy



## 4. Connect



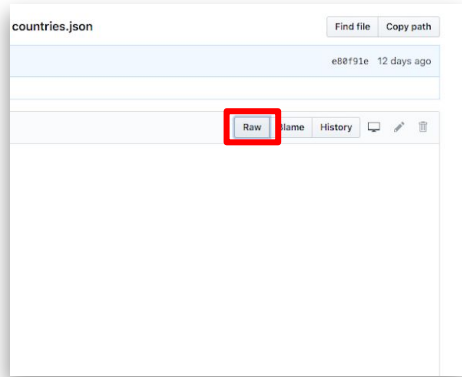
## 5. Upload dataset



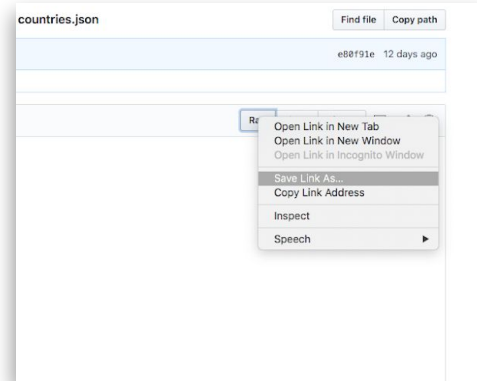
# Download dataset from GitHub

1. Go to the [tutorial repository](#)
2. Go to the dataset file you want download, e.g. [pokemon.csv](#)

## 3. Right click “Raw”

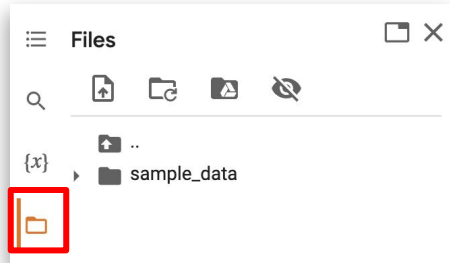


## 4. Save as file

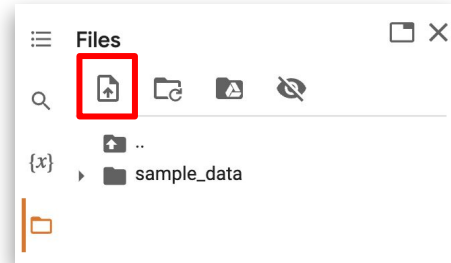


# Upload dataset to Colab

1. Switch to “Files”



2. Click the “Upload” button



3. Select the dataset file you want to upload, e.g. [pokemon.csv](#).
4. You may load the dataset with Pandas using `pd.read_csv()`.

# Python / Jupyter Notebook Basics

- See the [Jupyter notebook on Google Colab](#)
- Topics:
  - Print statement / comments / shift-enter / Tab completion
  - Data type / string / numeric / booleans / string to int / None
  - List (retrieve / add / remove / combine / sort) / dict / set / tuple / unpack
  - List / set / dict comprehensions
  - Logic flow / loop / range
  - Define function / call function / named arguments / return value(s)
  - Module loading
  - File read / write
  - Dates and times
  - Basic pandas usage
  - Plotting with pandas
  - Scikit-learn with pandas

# Lab exercise

- Tasks

- Open [this Google Colab notebook](#), make a copy and connect
- Read through “Python and Jupyter Basics” and fill in the “TODO” cells
- Download Pokemon dataset (pokemon.csv) from [GitHub](#)
- Upload the dataset to Google Colab workspace
- Read dataset using pandas
- Print the loaded dataframe to output
- Sort the dataframe by “base\_total” and print to output
- Plot with “.plot()” function of pandas dataframe
- How to submit: **print the whole web page as .pdf and upload to Canvas**
  - Mac: cmd+p
  - Windows: ctrl+p

- Optional

- If you like this tutorial so far, star [our GitHub repository](#) ★★ ★ Thank you! ❤️
- Explore the Pokemon dataset, we will revisit it again in later tutorials

# More topics on Python / Jupyter / Pandas

- **A lot** more Python language features
  - Lambda, partial argument, spread operator, zip, dict  $\Leftrightarrow$  lists, nested comprehensions, namespaces, class and inheritance, variable scope, positional arguments, keyword arguments, generator, iterator
  - Standard libraries
    - Regular Expressions, urllib, itertools, functools
  - Common libraries
    - Joblib, scikit-learn, numpy
  - And **a lot** more...
- More Jupyter features
  - JupyterLab, shortcuts, magic commands, extensions
- More Pandas features
  - Next Tutorial: Pandas and Python visualizations



# Next tutorial

Pandas and Python  
visualizations

- We will use [Google Colab](#) again
- Learn more about Pandas
- Visualization libraries
  - Matplotlib / Seaborn
  - Altair