Useful_libraries

September 17, 2023

```python
# The following is to know when this notebook has been run and with which
 ↪python version.
import time, sys
print(time.ctime())
print(sys.version.split('|')[0])
```

```
Sun Sep 17 08:55:07 2023
3.9.16 (main, Jan 11 2023, 10:02:19)
[Clang 14.0.6 ]
```

```python
import numpy as np
```

1 F Some useful libraries that make life easier

This is part of the Python lecture given by Christophe Morisset at IA-UNAM.

This lecture will give some insights to the most useful python libraries. It is NOT exhaustive, you have to read the corresponding manual pages to find the best use you can have of them. The list of all python-included libraries is here: https://docs.python.org/3/library/

1.0.1 time, datetime and timeit

- https://docs.python.org/3/library/time.html
- https://docs.python.org/3/library/datetime.html

```python
import time
import datetime
```

```python
print(time.ctime()) # current time, in a string format
```

```
Sun Sep 17 08:55:15 2023
```

```python
lt = time.localtime()
print(lt)
```

```
time.struct_time(tm_year=2023, tm_mon=9, tm_mday=17, tm_hour=8, tm_min=55,
tm_sec=16, tm_wday=6, tm_yday=260, tm_isdst=1)
```

```python
time.strftime("%a, %d %b %Y %H:%M:%S",lt)
```

```
'Sun, 17 Sep 2023 08:55:16'
```

```python
print(datetime.datetime.today())
```

```
2023-09-17 08:55:19.262472
```

```python
today = datetime.date.today()
eclipse_total = datetime.date(2024, 4, 8)
```

```python
time_to_eclipse = eclipse_total - today
```

```python
if eclipse_total > today:
    print('Eclipse in {} days.'.format(time_to_eclipse.days))
else:
    print('Eclipse {} days ago.'.format(-time_to_eclipse.days))
```

```
Eclipse in 204 days.
```

```python
start = time.time()
for i in np.arange(1000):
    t = np.math.factorial(i)
end = time.time()
print('1000 factorials done in {0:.3f} secs.'.format(end-start))
```

```
1000 factorials done in 0.017 secs.
```

```python
from timeit import Timer
command = """\
for i in np.arange(1000):
    t = np.math.factorial(i)
"""
t = Timer(command, setup='import numpy as np')
print(t.timeit(number=10))
```

```
0.1620658339999963
```

in ipython, one can use the magic timeit function:

```python
%timeit np.math.factorial(50)
```

```
459 ns ± 28.1 ns per loop (mean ± std. dev. of 7 runs, 1,000,000 loops each)
```

or for the whole cell:

```python
%%timeit
for i in np.arange(1000):
    t = np.math.factorial(i)
```

```
12 ms ± 652 µs per loop (mean ± std. dev. of 7 runs, 100 loops each)
```

1.0.2 os

https://docs.python.org/3/library/os.html This module provides a portable way of using operating system dependent functionality. If you just want to read or write a file see open(), if you want to manipulate paths, see the os.path module, and if you want to read all the lines in all the files on the command line see the fileinput module. For creating temporary files and directories see the tempfile module, and for high-level file and directory handling see the shutil module.

```python
import os
```

```python
# os.environ is a dictionnary containing the environment variables and values
if 'HOME' in os.environ:
    print(os.environ['HOME'])
else:
    print('This OS is too limited to understand HOME')
```

```
/Users/christophemorisset
```

```python
# if variable doesn't exists, getenv returns None
print(os.getenv('HOMMMMMME'))
```

```
None
```

```python
# get current working directory
cwd = os.getcwd()
print(cwd)
print(cwd.split('/')[-1])
```

```
/Users/christophemorisset/Google Drive/Pro/Python-MySQL/Notebooks/Notebooks
Notebooks
```

```python
new_dir = '/tmp/test3457'
if not os.path.exists(new_dir):
    os.mkdir(new_dir)
    print('Dir {} created'.format(new_dir))
else:
    print('Dir {} exists'.format(new_dir))
```

```
Dir /tmp/test3457 created
```

```python
# list all the files from a directory
os.listdir(new_dir)
```

```
[]
```

```python
os.chdir(new_dir)
os.getcwd()
```

```
[ ]: '/private/tmp/test3457'
```

```
[ ]: # Renaming files in a directory
     os.chdir('/tmp')
     for filename in os.listdir('./'):
         #print(filename)
         base_file, ext = os.path.splitext(filename)
         #print(base_file, ext)
         if ext == '.txt':
             newname = base_file + '.exe'
             try:
                 os.rename(filename, newname)
                 print('file {0} renamed to {1}'.format(filename, newname))
             except:
                 print('file {0} NOT renamed'.format(filename))
     os.chdir(cwd)
```

1.0.3 glob

https://docs.python.org/3/library/glob.html

No tilde expansion is done, but *, ?, and character ranges expressed with [] will be correctly matched.

```
[ ]: from glob import glob
```

```
[ ]: os.chdir(cwd)
```

```
[ ]: cwd
```

```
[ ]: '/Users/christophemorisset/Google Drive/Pro/Python-MySQL/Notebooks/Notebooks'
```

```
[ ]: ipynb_files = glob('*.ipynb')
     print(ipynb_files)
```

```
    ['Calling Fortran.ipynb', 'Galaxies_classification.ipynb', 'Test-Install.ipynb',
    'intro_Scipy.ipynb', 'ANN.ipynb', 'Ex1_with_res.ipynb', 'Parallel.ipynb',
    'OOP.ipynb', 'Using_astropy.ipynb', 'Tarea_1.ipynb', 'Interact with
    files.ipynb', 'Useful_libraries.ipynb', 'intro_numpy.ipynb',
    'intro_Python.ipynb', 'Redshifts_ai4neb.ipynb', 'Ex1_done.ipynb', 'Ex1.ipynb',
    'intro_Matplotlib.ipynb', 'Optimization.ipynb', 'Redshifts.ipynb',
    'Using_PyMySQL.ipynb', 'Using_astroquery.ipynb']
```

1.0.4 pathlib

```
[ ]: from pathlib import Path
```

```python
new_dir = Path('/tmp/test1236')
print(new_dir)
print(new_dir.name)
print(new_dir.parent)
```

```
/tmp/test1236
test1236
/tmp
```

```python
new_dir = Path('/tmp') / Path('test1236')
print(new_dir)
print(new_dir.name)
print(new_dir.parent)
```

```
/tmp/test1236
test1236
/tmp
```

```python
if not new_dir.exists():
    new_dir.mkdir() # may use exist_ok=True
    print('Dir {} created'.format(new_dir))
else:
    print('Dir {} exists'.format(new_dir))
```

```
Dir /tmp/test1236 created
```

```python
current = Path('.')
for f in current.glob('*.ipynb'):
    print(f, f.stem, f.suffix)
```

```
Calling Fortran.ipynb Calling Fortran .ipynb
Galaxies_classification.ipynb Galaxies_classification .ipynb
Test-Install.ipynb Test-Install .ipynb
intro_Scipy.ipynb intro_Scipy .ipynb
ANN.ipynb ANN .ipynb
Ex1_with_res.ipynb Ex1_with_res .ipynb
Parallel.ipynb Parallel .ipynb
OOP.ipynb OOP .ipynb
Using_astropy.ipynb Using_astropy .ipynb
Tarea_1.ipynb Tarea_1 .ipynb
Interact with files.ipynb Interact with files .ipynb
Useful_libraries.ipynb Useful_libraries .ipynb
intro_numpy.ipynb intro_numpy .ipynb
intro_Python.ipynb intro_Python .ipynb
Redshifts_ai4neb.ipynb Redshifts_ai4neb .ipynb
Ex1_done.ipynb Ex1_done .ipynb
Ex1.ipynb Ex1 .ipynb
intro_Matplotlib.ipynb intro_Matplotlib .ipynb
```

```
Optimization.ipynb Optimization .ipynb
Redshifts.ipynb Redshifts .ipynb
Using_PyMySQL.ipynb Using_PyMySQL .ipynb
Using_astroquery.ipynb Using_astroquery .ipynb
```

```python
new_dir = Path('/tmp') / Path('test1236')
for f in new_dir.glob('test*.txt*'):
    f.unlink()

f = new_dir / Path('test1234.txt')
f.touch()
f = new_dir / Path('test5678.txt')
f.touch()
print(list(new_dir.glob('test*.txt*')))

for f in new_dir.glob('test*.txt'):
    new_f = f.with_suffix('.txt2')
    if not new_f.exists():
        f.rename(new_f)
    else:
        print('{} exists'.format(new_f))

print(list(new_dir.glob('test*.txt*')))
```

```
[PosixPath('/tmp/test1236/test5678.txt'),
PosixPath('/tmp/test1236/test1234.txt')]
[PosixPath('/tmp/test1236/test1234.txt2'),
PosixPath('/tmp/test1236/test5678.txt2')]
```

1.0.5 sys

https://docs.python.org/3/library/sys.html This module provides access to some variables used or maintained by the interpreter and to functions that interact strongly with the interpreter. It is always available.

The sys.argv list contains the arguments passed to the script, when the interpreter was started. The first item contains the name of the script itself.

```python
%%writefile sys_text.py
import sys
for arg in sys.argv:
    print(arg)
```

```
Overwriting sys_text.py
```

```
!cat sys_text.py
```

```
import sys
for arg in sys.argv:
```

```
        print(arg)
```

[ ]: `! python sys_text.py tralala trololo`

```
sys_text.py
tralala
trololo
```

[ ]:
```python
%%writefile fact.py
import sys
import numpy as np
print(np.math.factorial(int(sys.argv[1])))
```

```
Overwriting fact.py
```

[ ]: `! python fact.py 60`

```
83209871127413901442763411832233643807541726063612459524492776964096000000000000
00
```

A more complete managment of the argument (especially those like –v) is available using the argparse library. https://docs.python.org/3/library/argparse.html

1.0.6 Talking to the OS subprocess

The os.popen method is deprecated, subprocess is prefered. A good tutorial is here: http://pymotw.com/3/subprocess/

[ ]:
```python
import subprocess
```

[ ]:
```
ls -l
```

```
total 143248
-rw-r--r--  1 christophemorisset  staff     89353 Dec  1  2020
0040000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff     89971 Dec  1  2020
0090000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff     90544 Dec  7  2020
0100000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff     89170 Dec  1  2020
0140000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff     88591 Dec  1  2020
0190000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff    648519 Sep 15 16:56 ANN.ipynb
-rw-------  1 christophemorisset  staff   4229587 May 31  2016 CALIFA_ah7.dat.gz
-rw-------  1 christophemorisset  staff     20137 Oct 31  2018 Calling
Fortran.ipynb
-rw-------  1 christophemorisset  staff     86815 Jun  1  2016 Calling
Fortran.pdf
```

```
-rw-r--r--@ 1 christophemorisset   staff    3600128 Jan 18   2021 DR9_photo-z-
small.npy
-rw-r--r--  1 christophemorisset   staff        216 Sep 15 16:56 Demo.pickle
-rw-r--r--  1 christophemorisset   staff        193 Sep 15 16:56 Demo.pklz
-rw-------  1 christophemorisset   staff       7717 Oct 20   2022 Ex1.ipynb
-rw-------  1 christophemorisset   staff     381664 Oct 20   2022 Ex1_done.ipynb
-rw-------  1 christophemorisset   staff     315341 Oct 20   2022
Ex1_with_res.ipynb
-rw-r--r--  1 christophemorisset   staff      93801 Sep 15 16:56 Fig1.jpg
-rw-r--r--  1 christophemorisset   staff     127026 Sep 15 16:56 Fig1.pdf
-rw-r--r--  1 christophemorisset   staff     123182 Sep 15 16:56 Fig1.png
-rw-r--r--@ 1 christophemorisset   staff      23342 Jan 27   2021
Galaxies_classification.ipynb
-rw-r--r--@ 1 christophemorisset   staff    1177040 Sep 15 17:38 HII.dat
-rw-------@ 1 christophemorisset   staff     860517 Sep 21   2020 InstallPython.key
-rw-r--r--  1 christophemorisset   staff      67550 Sep 15 16:56 Interact with
files.ipynb
-rw-r--r--@ 1 christophemorisset   staff     432747 Jan 10   2021 Interact with
files.pdf
-rw-------  1 christophemorisset   staff     131497 May 31   2016 Intro_1.odp
-rw-------  1 christophemorisset   staff     174202 May 31   2016 Intro_1.pdf
-rw-------  1 christophemorisset   staff     130234 May 31   2016 Intro_2014.odp
-rw-r--r--  1 christophemorisset   staff    1370634 Jan 12   2021 Machine
Learning.pdf
-rw-r--r--  1 christophemorisset   staff    1698962 Sep 15 16:56 MySQL 2.pdf
-rw-------  1 christophemorisset   staff     108782 Jan  2   2021 MySQL.pdf
-rw-------@ 1 christophemorisset   staff    1270918 May 31   2016 MySQL.pdf.gz
-rw-r--r--  1 christophemorisset   staff     732435 Sep 15 16:56 OOP.ipynb
-rw-r--r--@ 1 christophemorisset   staff     536767 Jan 10   2021 OOP.pdf
-rw-r--r--  1 christophemorisset   staff      85548 Sep 15 16:56
Optimization.ipynb
-rw-------  1 christophemorisset   staff     481656 Jun  2   2016 Optimization.pdf
-rw-------  1 christophemorisset   staff       2537 Nov  9   2016 Parallel.ipynb
-rw-r--r--@ 1 christophemorisset   staff     158652 Jan 22   2021 Redshifts.ipynb
-rw-------  1 christophemorisset   staff     939003 Oct 20   2022
Redshifts_ai4neb.ipynb
-rw-r--r--  1 christophemorisset   staff       6120 Sep 15 16:56 Tarea_1.ipynb
-rw-r--r--  1 christophemorisset   staff       1434 Sep 22   2020 Test-
Install.ipynb
-rw-------  2 christophemorisset   staff     164139 Sep 17 08:59
Useful_libraries.ipynb
-rw-r--r--@ 1 christophemorisset   staff     139456 Jan 10   2021
Useful_libraries.pdf
-rw-r--r--  1 christophemorisset   staff     275723 Sep 15 16:56
Using_PyMySQL.ipynb
-rw-r--r--@ 1 christophemorisset   staff     237218 Jan  4   2021 Using_PyMySQL.pdf
-rw-r--r--  1 christophemorisset   staff     252205 Sep 15 18:09
Using_astropy.ipynb
```

```
-rw-r--r--@ 1 christophemorisset  staff    156095 Jan 10  2021 Using_astropy.pdf
-rw-r--r--  1 christophemorisset  staff     64503 Sep 15 16:56
Using_astroquery.ipynb
-rw-r--r--@ 1 christophemorisset  staff     70028 Jan  4  2021
Using_astroquery.pdf
drwxr-xr-x  5 christophemorisset  staff       160 Aug 26  2022
__pycache__/
-rw-r--r--@ 1 christophemorisset  staff  14794880 Jan 18  2021 cosmo-early.npy
-rw-r--r--@ 1 christophemorisset  staff  14794880 Jan 18  2021 cosmo-late.npy
-rw-r--r--  1 christophemorisset  staff        65 Sep 15 16:56 data1.dat
-rw-r--r--  1 christophemorisset  staff        14 Sep 15 16:56 data10.dat
-rw-r--r--  1 christophemorisset  staff        32 Sep 15 16:56 data11.dat
-rw-r--r--  1 christophemorisset  staff       154 Sep 15 16:56 data12.dat
-rw-r--r--  1 christophemorisset  staff       148 Sep 15 16:56 data2.dat
-rw-r--r--  1 christophemorisset  staff       170 Sep 15 16:56 data3.dat
-rw-r--r--  1 christophemorisset  staff      1190 Sep 15 16:56 data4.dat
-rw-r--r--  1 christophemorisset  staff      1186 Sep 15 16:56 data5.dat
-rw-r--r--  1 christophemorisset  staff      1187 Sep 15 16:59 data6.dat
-rw-------  1 christophemorisset  staff       298 May 31  2016 dcumsum.f
-rw-------  1 christophemorisset  staff     30716 Nov  9  2016 dcumsum.so
-rw-------  1 christophemorisset  staff      1379 Oct 20  2022 ex1.html
-rw-------  1 christophemorisset  staff       154 Oct 20  2022 ex1.py
-rw-------  1 christophemorisset  staff       288 Jun 29  2017 ex1.pyc
-rw-------  1 christophemorisset  staff         8 May 31  2016 ex1.txt
-rw-------  1 christophemorisset  staff        73 Sep 17 08:59 fact.py
-rw-------  1 christophemorisset  staff      4214 May 31  2016 grep.py
-rw-------  1 christophemorisset  staff      4995 May 31  2016 grep2.py
-rw-------  1 christophemorisset  staff      6319 May 31  2016 grep3.py
-rw-------  1 christophemorisset  staff      5575 Dec  9  2016 grep3.pyc
-rw-------  1 christophemorisset  staff        49 May 31  2016 hello.py
-rw-------  1 christophemorisset  staff      1090 May 31  2016 hellofortran.c
-rw-------  1 christophemorisset  staff       178 May 31  2016 hellofortran.f
-rw-------  1 christophemorisset  staff     33976 May 31  2016 hellofortran.so
-rw-------  1 christophemorisset  staff       150 May 31  2016 index.html
-rw-------  1 christophemorisset  staff   2380267 Sep 24  2022
intro_Matplotlib.ipynb
-rw-r--r--@ 1 christophemorisset  staff   1677612 Jan 10  2021
intro_Matplotlib.pdf
-rw-------  1 christophemorisset  staff    326924 May 31  2016 intro_Python.html
-rw-------  1 christophemorisset  staff    110737 Sep  2  2022
intro_Python.ipynb
-rw-r--r--@ 1 christophemorisset  staff    119242 Jan 10  2021 intro_Python.pdf
-rw-------  1 christophemorisset  staff    179449 May 31  2016
intro_Python_2.pdf
-rw-------  1 christophemorisset  staff    103229 May 31  2016
intro_Python_3.pdf
-rw-------  1 christophemorisset  staff   1116128 Sep 15 16:47 intro_Scipy.ipynb
-rw-r--r--@ 1 christophemorisset  staff    626599 Jan 10  2021 intro_Scipy.pdf
```

```
-rw-r--r--  1 christophemorisset  staff   118116 Sep 15 16:56 intro_numpy.ipynb
-rw-r--r--@ 1 christophemorisset  staff   128064 Jan 10  2021 intro_numpy.pdf
drwxr-xr-x  3 christophemorisset  staff       96 Jan  2  2021
mastDownload/
-rw-------  1 christophemorisset  staff  8830080 May 31  2016 n10017o.fits
-rw-r--r--  1 christophemorisset  staff     5760 Sep 22  2022 new.fits
-rw-------  1 christophemorisset  staff   435801 May 31  2016 query_res.dat
-rw-------  1 christophemorisset  staff  1059840 May 31  2016 swp04345.mxhi
-rw-------  1 christophemorisset  staff       47 Sep 17 08:59 sys_text.py
-rw-------  1 christophemorisset  staff      354 Sep 15 16:59 tab1.dat
-rw-------  1 christophemorisset  staff      668 Sep 15 16:59 tab_cds1.ascii
-rw-------  1 christophemorisset  staff    43200 May 31  2016 tab_cds1.fits
-rw-------  1 christophemorisset  staff     1334 Sep 15 16:59 tab_cds1.tex
-rw-------  1 christophemorisset  staff     1617 Sep 15 16:59 tab_cds2.ascii
-rw-r--r--  1 christophemorisset  staff   313445 Sep 15 16:56 test_1_prof.prof
-rw-r--r--  1 christophemorisset  staff     6824 Sep 15 16:56 test_1_prof.py
-rw-r--r--  1 christophemorisset  staff     6872 Sep 15 16:56 test_2_prof.py
-rw-r--r--  1 christophemorisset  staff      453 Sep 15 16:56
test_2_prof.py.lprof
-rw-r--r--  1 christophemorisset  staff     6581 Sep 15 16:56 test_3_prof.py
-rw-r--r--  1 christophemorisset  staff     6588 Sep 15 16:56 test_5_pdb.py
-rwxr-xr-x  1 christophemorisset  staff      447 Sep 15 16:56
test_8_prof.py*
drwxr-xr-x  4 christophemorisset  staff      128 Sep 21  2020 tt/
```

```python
var1 = subprocess.call(['ls -l'], shell=True)
# The results is not visible in Notebook. In command line, the files are listed
```

```
total 143248
-rw-r--r--  1 christophemorisset  staff    89353 Dec  1  2020
0040000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff    89971 Dec  1  2020
0090000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff    90544 Dec  7  2020
0100000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff    89170 Dec  1  2020
0140000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff    88591 Dec  1  2020
0190000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff   648519 Sep 15 16:56 ANN.ipynb
-rw-------  1 christophemorisset  staff  4229587 May 31  2016 CALIFA_ah7.dat.gz
-rw-------  1 christophemorisset  staff    20137 Oct 31  2018 Calling
Fortran.ipynb
-rw-------  1 christophemorisset  staff    86815 Jun  1  2016 Calling
Fortran.pdf
-rw-r--r--@ 1 christophemorisset  staff  3600128 Jan 18  2021 DR9_photo-z-
small.npy
-rw-r--r--  1 christophemorisset  staff      216 Sep 15 16:56 Demo.pickle
```

```
-rw-r--r--  1 christophemorisset  staff        193 Sep 15 16:56 Demo.pklz
-rw-------  1 christophemorisset  staff       7717 Oct 20  2022 Ex1.ipynb
-rw-------  1 christophemorisset  staff     381664 Oct 20  2022 Ex1_done.ipynb
-rw-------  1 christophemorisset  staff     315341 Oct 20  2022
Ex1_with_res.ipynb
-rw-r--r--  1 christophemorisset  staff      93801 Sep 15 16:56 Fig1.jpg
-rw-r--r--  1 christophemorisset  staff     127026 Sep 15 16:56 Fig1.pdf
-rw-r--r--  1 christophemorisset  staff     123182 Sep 15 16:56 Fig1.png
-rw-r--r--@ 1 christophemorisset  staff      23342 Jan 27  2021
Galaxies_classification.ipynb
-rw-r--r--@ 1 christophemorisset  staff    1177040 Sep 15 17:38 HII.dat
-rw-------@ 1 christophemorisset  staff     860517 Sep 21  2020 InstallPython.key
-rw-r--r--  1 christophemorisset  staff      67550 Sep 15 16:56 Interact with
files.ipynb
-rw-r--r--@ 1 christophemorisset  staff     432747 Jan 10  2021 Interact with
files.pdf
-rw-------  1 christophemorisset  staff     131497 May 31  2016 Intro_1.odp
-rw-------  1 christophemorisset  staff     174202 May 31  2016 Intro_1.pdf
-rw-------  1 christophemorisset  staff     130234 May 31  2016 Intro_2014.odp
-rw-r--r--  1 christophemorisset  staff    1370634 Jan 12  2021 Machine
Learning.pdf
-rw-r--r--  1 christophemorisset  staff    1698962 Sep 15 16:56 MySQL 2.pdf
-rw-------  1 christophemorisset  staff     108782 Jan  2  2021 MySQL.pdf
-rw-------@ 1 christophemorisset  staff    1270918 May 31  2016 MySQL.pdf.gz
-rw-r--r--  1 christophemorisset  staff     732435 Sep 15 16:56 OOP.ipynb
-rw-r--r--@ 1 christophemorisset  staff     536767 Jan 10  2021 OOP.pdf
-rw-r--r--  1 christophemorisset  staff      85548 Sep 15 16:56
Optimization.ipynb
-rw-------  1 christophemorisset  staff     481656 Jun  2  2016 Optimization.pdf
-rw-------  1 christophemorisset  staff       2537 Nov  9  2016 Parallel.ipynb
-rw-r--r--@ 1 christophemorisset  staff     158652 Jan 22  2021 Redshifts.ipynb
-rw-------  1 christophemorisset  staff     939003 Oct 20  2022
Redshifts_ai4neb.ipynb
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-rw-r--r--  1 christophemorisset  staff       1434 Sep 22  2020 Test-
Install.ipynb
-rw-------  2 christophemorisset  staff     164139 Sep 17 08:59
Useful_libraries.ipynb
-rw-r--r--@ 1 christophemorisset  staff     139456 Jan 10  2021
Useful_libraries.pdf
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Using_PyMySQL.ipynb
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-rw-r--r--  1 christophemorisset  staff     252205 Sep 15 18:09
Using_astropy.ipynb
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-rw-r--r--  1 christophemorisset  staff      64503 Sep 15 16:56
Using_astroquery.ipynb
```

```
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Using_astroquery.pdf
drwxr-xr-x  5 christophemorisset  staff       160 Aug 26  2022
__pycache__
-rw-r--r--@ 1 christophemorisset  staff  14794880 Jan 18  2021 cosmo-early.npy
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-rw-r--r--  1 christophemorisset  staff        65 Sep 15 16:56 data1.dat
-rw-r--r--  1 christophemorisset  staff        14 Sep 15 16:56 data10.dat
-rw-r--r--  1 christophemorisset  staff        32 Sep 15 16:56 data11.dat
-rw-r--r--  1 christophemorisset  staff       154 Sep 15 16:56 data12.dat
-rw-r--r--  1 christophemorisset  staff       148 Sep 15 16:56 data2.dat
-rw-r--r--  1 christophemorisset  staff       170 Sep 15 16:56 data3.dat
-rw-r--r--  1 christophemorisset  staff      1190 Sep 15 16:56 data4.dat
-rw-r--r--  1 christophemorisset  staff      1186 Sep 15 16:56 data5.dat
-rw-r--r--  1 christophemorisset  staff      1187 Sep 15 16:59 data6.dat
-rw-------  1 christophemorisset  staff       298 May 31  2016 dcumsum.f
-rw-------  1 christophemorisset  staff     30716 Nov  9  2016 dcumsum.so
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-rw-------  1 christophemorisset  staff       178 May 31  2016 hellofortran.f
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intro_Matplotlib.ipynb
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intro_Matplotlib.pdf
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intro_Python.ipynb
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-rw-------  1 christophemorisset  staff    179449 May 31  2016
intro_Python_2.pdf
-rw-------  1 christophemorisset  staff    103229 May 31  2016
intro_Python_3.pdf
-rw-------  1 christophemorisset  staff   1116128 Sep 15 16:47 intro_Scipy.ipynb
-rw-r--r--@ 1 christophemorisset  staff    626599 Jan 10  2021 intro_Scipy.pdf
-rw-r--r--  1 christophemorisset  staff    118116 Sep 15 16:56 intro_numpy.ipynb
-rw-r--r--@ 1 christophemorisset  staff    128064 Jan 10  2021 intro_numpy.pdf
drwxr-xr-x  3 christophemorisset  staff        96 Jan  2  2021
```

```
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-rw-------   1 christophemorisset   staff      435801 May 31   2016 query_res.dat
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-rw-------   1 christophemorisset   staff          47 Sep 17 08:59 sys_text.py
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-rw-------   1 christophemorisset   staff         668 Sep 15 16:59 tab_cds1.ascii
-rw-------   1 christophemorisset   staff       43200 May 31   2016 tab_cds1.fits
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-rw-------   1 christophemorisset   staff        1617 Sep 15 16:59 tab_cds2.ascii
-rw-r--r--   1 christophemorisset   staff      313445 Sep 15 16:56 test_1_prof.prof
-rw-r--r--   1 christophemorisset   staff        6824 Sep 15 16:56 test_1_prof.py
-rw-r--r--   1 christophemorisset   staff        6872 Sep 15 16:56 test_2_prof.py
-rw-r--r--   1 christophemorisset   staff         453 Sep 15 16:56
test_2_prof.py.lprof
-rw-r--r--   1 christophemorisset   staff        6581 Sep 15 16:56 test_3_prof.py
-rw-r--r--   1 christophemorisset   staff        6588 Sep 15 16:56 test_5_pdb.py
-rwxr-xr-x  1 christophemorisset   staff         447 Sep 15 16:56
test_8_prof.py
drwxr-xr-x  4 christophemorisset   staff         128 Sep 21   2020 tt
   1 christophemorisset   staff         193 Sep 15 16:56 Demo.pklz
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Ex1_with_res.ipynb
-rw-r--r--   1 christophemorisset   staff       93801 Sep 15 16:56 Fig1.jpg
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-rw-r--r--   1 christophemorisset   staff      123182 Sep 15 16:56 Fig1.png
-rw-r--r--@ 1 christophemorisset   staff       23342 Jan 27   2021
Galaxies_classification.ipynb
-rw-r--r--@ 1 christophemorisset   staff     1177040 Sep 15 17:38 HII.dat
-rw-------@ 1 christophemorisset   staff      860517 Sep 21   2020 InstallPython.key
-rw-r--r--   1 christophemorisset   staff       67550 Sep 15 16:56 Interact with
files.ipynb
-rw-r--r--@ 1 christophemorisset   staff      432747 Jan 10   2021 Interact with
files.pdf
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-rw-------   1 christophemorisset   staff      130234 May 31   2016 Intro_2014.odp
-rw-r--r--   1 christophemorisset   staff     1370634 Jan 12   2021 Machine
Learning.pdf
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```

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-rw-r--r--@ 1 christophemorisset  staff    158652 Jan 22  2021 Redshifts.ipynb
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Redshifts_ai4neb.ipynb
-rw-r--r--  1 christophemorisset  staff      6120 Sep 15 16:56 Tarea_1.ipynb
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Install.ipynb
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Useful_libraries.ipynb
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Using_PyMySQL.ipynb
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Using_astropy.ipynb
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Using_astroquery.ipynb
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Using_astroquery.pdf
drwxr-xr-x  5 christophemorisset  staff       160 Aug 26  2022
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-rw-r--r--@ 1 christophemorisset  staff  14794880 Jan 18  2021 cosmo-late.npy
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-rw-r--r--  1 christophemorisset  staff       154 Sep 15 16:56 data12.dat
-rw-r--r--  1 christophemorisset  staff       148 Sep 15 16:56 data2.dat
-rw-r--r--  1 christophemorisset  staff       170 Sep 15 16:56 data3.dat
-rw-r--r--  1 christophemorisset  staff      1190 Sep 15 16:56 data4.dat
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-rw-r--r--  1 christophemorisset  staff      1187 Sep 15 16:59 data6.dat
-rw-------  1 christophemorisset  staff       298 May 31  2016 dcumsum.f
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-rw-------  1 christophemorisset  staff      4214 May 31  2016 grep.py
-rw-------  1 christophemorisset  staff      4995 May 31  2016 grep2.py
-rw-------  1 christophemorisset  staff      6319 May 31  2016 grep3.py
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-rw-------  1 christophemorisset  staff        49 May 31  2016 hello.py
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intro_Matplotlib.ipynb
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intro_Matplotlib.pdf
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-rw-------  1 christophemorisset  staff    110737 Sep  2  2022
intro_Python.ipynb
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intro_Python_2.pdf
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intro_Python_3.pdf
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-rw-r--r--@ 1 christophemorisset  staff    128064 Jan 10  2021 intro_numpy.pdf
drwxr-xr-x  3 christophemorisset  staff        96 Jan  2  2021
mastDownload
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-rw-------  1 christophemorisset  staff       668 Sep 15 16:59 tab_cds1.ascii
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-rw-r--r--  1 christophemorisset  staff    313445 Sep 15 16:56 test_1_prof.prof
-rw-r--r--  1 christophemorisset  staff      6824 Sep 15 16:56 test_1_prof.py
-rw-r--r--  1 christophemorisset  staff      6872 Sep 15 16:56 test_2_prof.py
-rw-r--r--  1 christophemorisset  staff       453 Sep 15 16:56
test_2_prof.py.lprof
-rw-r--r--  1 christophemorisset  staff      6581 Sep 15 16:56 test_3_prof.py
-rw-r--r--  1 christophemorisset  staff      6588 Sep 15 16:56 test_5_pdb.py
-rwxr-xr-x  1 christophemorisset  staff       447 Sep 15 16:56
test_8_prof.py
drwxr-xr-x  4 christophemorisset  staff       128 Sep 21  2020 tt
```

```python
output = subprocess.check_output(['ls', '-l'])
print(type(output))
print(output)
print(output.decode())
```

```
<class 'bytes'>
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0040000_6.00_33_50_02_15.bin_0.1.gz\n-rw-r--r--  1 christophemorisset  staff
89971 Dec  1  2020 0090000_6.00_33_50_02_15.bin_0.1.gz\n-rw-r--r--  1
christophemorisset  staff      90544 Dec  7  2020
0100000_6.00_33_50_02_15.bin_0.1.gz\n-rw-r--r--  1 christophemorisset  staff
89170 Dec  1  2020 0140000_6.00_33_50_02_15.bin_0.1.gz\n-rw-r--r--  1
christophemorisset  staff      88591 Dec  1  2020
0190000_6.00_33_50_02_15.bin_0.1.gz\n-rw-r--r--  1 christophemorisset  staff
648519 Sep 15 16:56 ANN.ipynb\n-rw-------  1 christophemorisset  staff   4229587
May 31  2016 CALIFA_ah7.dat.gz\n-rw-------  1 christophemorisset  staff
20137 Oct 31  2018 Calling Fortran.ipynb\n-rw-------  1 christophemorisset
staff      86815 Jun  1  2016 Calling Fortran.pdf\n-rw-r--r--@ 1
christophemorisset  staff   3600128 Jan 18  2021 DR9_photo-z-small.npy\n-rw-r--
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1 christophemorisset  staff        193 Sep 15 16:56 Demo.pklz\n-rw-------  1
christophemorisset  staff       7717 Oct 20  2022 Ex1.ipynb\n-rw-------  1
christophemorisset  staff     381664 Oct 20  2022 Ex1_done.ipynb\n-rw-------  1
christophemorisset  staff     315341 Oct 20  2022 Ex1_with_res.ipynb\n-rw-r--r--
1 christophemorisset  staff      93801 Sep 15 16:56 Fig1.jpg\n-rw-r--r--  1
christophemorisset  staff     127026 Sep 15 16:56 Fig1.pdf\n-rw-r--r--  1
christophemorisset  staff     123182 Sep 15 16:56 Fig1.png\n-rw-r--r--@ 1
christophemorisset  staff      23342 Jan 27  2021
Galaxies_classification.ipynb\n-rw-r--r--@ 1 christophemorisset  staff   1177040
Sep 15 17:38 HII.dat\n-rw-------@ 1 christophemorisset  staff     860517 Sep 21
2020 InstallPython.key\n-rw-r--r--  1 christophemorisset  staff      67550 Sep 15
16:56 Interact with files.ipynb\n-rw-r--r--@ 1 christophemorisset  staff
432747 Jan 10  2021 Interact with files.pdf\n-rw-------  1 christophemorisset
staff     131497 May 31  2016 Intro_1.odp\n-rw-------  1 christophemorisset
staff     174202 May 31  2016 Intro_1.pdf\n-rw-------  1 christophemorisset
staff     130234 May 31  2016 Intro_2014.odp\n-rw-r--r--  1 christophemorisset
staff    1370634 Jan 12  2021 Machine Learning.pdf\n-rw-r--r--  1
christophemorisset  staff    1698962 Sep 15 16:56 MySQL 2.pdf\n-rw-------  1
christophemorisset  staff     108782 Jan  2  2021 MySQL.pdf\n-rw-------@ 1
christophemorisset  staff    1270918 May 31  2016 MySQL.pdf.gz\n-rw-r--r--  1
christophemorisset  staff     732435 Sep 15 16:56 OOP.ipynb\n-rw-r--r--@ 1
christophemorisset  staff     536767 Jan 10  2021 OOP.pdf\n-rw-r--r--  1
christophemorisset  staff      85548 Sep 15 16:56 Optimization.ipynb\n-rw-------
1 christophemorisset  staff     481656 Jun  2  2016 Optimization.pdf\n-rw-------
1 christophemorisset  staff       2537 Nov  9  2016 Parallel.ipynb\n-rw-r--r--@ 1
christophemorisset  staff     158652 Jan 22  2021 Redshifts.ipynb\n-rw-------  1
christophemorisset  staff     939003 Oct 20  2022 Redshifts_ai4neb.ipynb\n-rw-r--
r--  1 christophemorisset  staff       6120 Sep 15 16:56 Tarea_1.ipynb\n-rw-r--
r--  1 christophemorisset  staff       1434 Sep 22  2020 Test-
Install.ipynb\n-rw-------  2 christophemorisset  staff     171945 Sep 17 09:00
Useful_libraries.ipynb\n-rw-r--r--@ 1 christophemorisset  staff     139456 Jan 10
2021 Useful_libraries.pdf\n-rw-r--r--  1 christophemorisset  staff     275723 Sep
15 16:56 Using_PyMySQL.ipynb\n-rw-r--r--@ 1 christophemorisset  staff     237218
```

Jan 4 2021 Using_PyMySQL.pdf\n-rw-r--r-- 1 christophemorisset staff
252205 Sep 15 18:09 Using_astropy.ipynb\n-rw-r--r--@ 1 christophemorisset staff
156095 Jan 10 2021 Using_astropy.pdf\n-rw-r--r-- 1 christophemorisset staff
64503 Sep 15 16:56 Using_astroquery.ipynb\n-rw-r--r--@ 1 christophemorisset
staff   70028 Jan 4 2021 Using_astroquery.pdf\ndrwxr-xr-x 5
christophemorisset staff   160 Aug 26 2022
\x1b[34m__pycache__\x1b[m\x1b[m\n-rw-r--r--@ 1 christophemorisset staff
14794880 Jan 18 2021 cosmo-early.npy\n-rw-r--r--@ 1 christophemorisset staff
14794880 Jan 18 2021 cosmo-late.npy\n-rw-r--r-- 1 christophemorisset staff
65 Sep 15 16:56 data1.dat\n-rw-r--r-- 1 christophemorisset staff   14 Sep
15 16:56 data10.dat\n-rw-r--r-- 1 christophemorisset staff   32 Sep 15
16:56 data11.dat\n-rw-r--r-- 1 christophemorisset staff   154 Sep 15 16:56
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data4.dat\n-rw-r--r-- 1 christophemorisset staff   1186 Sep 15 16:56
data5.dat\n-rw-r--r-- 1 christophemorisset staff   1187 Sep 15 16:59
data6.dat\n-rw------- 1 christophemorisset staff   298 May 31 2016
dcumsum.f\n-rw------- 1 christophemorisset staff   30716 Nov 9 2016
dcumsum.so\n-rw------- 1 christophemorisset staff   1379 Oct 20 2022
ex1.html\n-rw------- 1 christophemorisset staff   154 Oct 20 2022
ex1.py\n-rw------- 1 christophemorisset staff   288 Jun 29 2017
ex1.pyc\n-rw------- 1 christophemorisset staff   8 May 31 2016
ex1.txt\n-rw------- 1 christophemorisset staff   73 Sep 17 08:59
fact.py\n-rw------- 1 christophemorisset staff   4214 May 31 2016
grep.py\n-rw------- 1 christophemorisset staff   4995 May 31 2016
grep2.py\n-rw------- 1 christophemorisset staff   6319 May 31 2016
grep3.py\n-rw------- 1 christophemorisset staff   5575 Dec 9 2016
grep3.pyc\n-rw------- 1 christophemorisset staff   49 May 31 2016
hello.py\n-rw------- 1 christophemorisset staff   1090 May 31 2016
hellofortran.c\n-rw------- 1 christophemorisset staff   178 May 31 2016
hellofortran.f\n-rw------- 1 christophemorisset staff   33976 May 31 2016
hellofortran.so\n-rw------- 1 christophemorisset staff   150 May 31 2016
index.html\n-rw------- 1 christophemorisset staff   2380267 Sep 24 2022
intro_Matplotlib.ipynb\n-rw-r--r--@ 1 christophemorisset staff   1677612 Jan 10
2021 intro_Matplotlib.pdf\n-rw------- 1 christophemorisset staff   326924 May
31 2016 intro_Python.html\n-rw------- 1 christophemorisset staff   110737
Sep 2 2022 intro_Python.ipynb\n-rw-r--r--@ 1 christophemorisset staff
119242 Jan 10 2021 intro_Python.pdf\n-rw------- 1 christophemorisset staff
179449 May 31 2016 intro_Python_2.pdf\n-rw------- 1 christophemorisset staff
103229 May 31 2016 intro_Python_3.pdf\n-rw------- 1 christophemorisset staff
1116128 Sep 15 16:47 intro_Scipy.ipynb\n-rw-r--r--@ 1 christophemorisset staff
626599 Jan 10 2021 intro_Scipy.pdf\n-rw-r--r-- 1 christophemorisset staff
118116 Sep 15 16:56 intro_numpy.ipynb\n-rw-r--r--@ 1 christophemorisset staff
128064 Jan 10 2021 intro_numpy.pdf\ndrwxr-xr-x 3 christophemorisset staff
96 Jan 2 2021 \x1b[34mmastDownload\x1b[m\x1b[m\n-rw------- 1
christophemorisset staff   8830080 May 31 2016 n10017o.fits\n-rw-r--r-- 1
christophemorisset staff   5760 Sep 22 2022 new.fits\n-rw------- 1

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christophemorisset   staff       435801 May 31   2016 query_res.dat\n-rw-------   1
christophemorisset   staff      1059840 May 31   2016 swp04345.mxhi\n-rw-------   1
christophemorisset   staff           47 Sep 17 08:59 sys_text.py\n-rw-------   1
christophemorisset   staff          354 Sep 15 16:59 tab1.dat\n-rw-------   1
christophemorisset   staff          668 Sep 15 16:59 tab_cds1.ascii\n-rw-------   1
christophemorisset   staff        43200 May 31   2016 tab_cds1.fits\n-rw-------   1
christophemorisset   staff         1334 Sep 15 16:59 tab_cds1.tex\n-rw-------   1
christophemorisset   staff         1617 Sep 15 16:59 tab_cds2.ascii\n-rw-r--r--   1
christophemorisset   staff       313445 Sep 15 16:56 test_1_prof.prof\n-rw-r--r--   1
christophemorisset   staff         6824 Sep 15 16:56 test_1_prof.py\n-rw-r--r--   1
christophemorisset   staff         6872 Sep 15 16:56 test_2_prof.py\n-rw-r--r--   1
christophemorisset   staff          453 Sep 15 16:56 test_2_prof.py.lprof\n-rw-r--
r--   1 christophemorisset   staff       6581 Sep 15 16:56 test_3_prof.py\n-rw-r--
r--   1 christophemorisset   staff       6588 Sep 15 16:56 test_5_pdb.py\n-rwxr-
xr-x   1 christophemorisset   staff        447 Sep 15 16:56
\x1b[31mtest_8_prof.py\x1b[m\x1b[m\ndrwxr-xr-x   4 christophemorisset   staff
128 Sep 21   2020 \x1b[34mtt\x1b[m\x1b[m\n'
total 143256
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0040000_6.00_33_50_02_15.bin_0.1.gz
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0090000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--   1 christophemorisset   staff      90544 Dec  7   2020
0100000_6.00_33_50_02_15.bin_0.1.gz
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0140000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--   1 christophemorisset   staff      88591 Dec  1   2020
0190000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--   1 christophemorisset   staff     648519 Sep 15 16:56 ANN.ipynb
-rw-------   1 christophemorisset   staff    4229587 May 31   2016 CALIFA_ah7.dat.gz
-rw-------   1 christophemorisset   staff      20137 Oct 31   2018 Calling
Fortran.ipynb
-rw-------   1 christophemorisset   staff      86815 Jun  1   2016 Calling
Fortran.pdf
-rw-r--r--@ 1 christophemorisset   staff    3600128 Jan 18   2021 DR9_photo-z-
small.npy
-rw-r--r--   1 christophemorisset   staff        216 Sep 15 16:56 Demo.pickle
-rw-r--r--   1 christophemorisset   staff        193 Sep 15 16:56 Demo.pklz
-rw-------   1 christophemorisset   staff       7717 Oct 20   2022 Ex1.ipynb
-rw-------   1 christophemorisset   staff     381664 Oct 20   2022 Ex1_done.ipynb
-rw-------   1 christophemorisset   staff     315341 Oct 20   2022
Ex1_with_res.ipynb
-rw-r--r--   1 christophemorisset   staff      93801 Sep 15 16:56 Fig1.jpg
-rw-r--r--   1 christophemorisset   staff     127026 Sep 15 16:56 Fig1.pdf
-rw-r--r--   1 christophemorisset   staff     123182 Sep 15 16:56 Fig1.png
-rw-r--r--@ 1 christophemorisset   staff      23342 Jan 27   2021
Galaxies_classification.ipynb
-rw-r--r--@ 1 christophemorisset   staff    1177040 Sep 15 17:38 HII.dat
```

```
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-rw-r--r--  1 christophemorisset  staff     67550 Sep 15 16:56 Interact with
files.ipynb
-rw-r--r--@ 1 christophemorisset  staff    432747 Jan 10  2021 Interact with
files.pdf
-rw-------  1 christophemorisset  staff    131497 May 31  2016 Intro_1.odp
-rw-------  1 christophemorisset  staff    174202 May 31  2016 Intro_1.pdf
-rw-------  1 christophemorisset  staff    130234 May 31  2016 Intro_2014.odp
-rw-r--r--  1 christophemorisset  staff   1370634 Jan 12  2021 Machine
Learning.pdf
-rw-r--r--  1 christophemorisset  staff   1698962 Sep 15 16:56 MySQL 2.pdf
-rw-------  1 christophemorisset  staff    108782 Jan  2  2021 MySQL.pdf
-rw-------@ 1 christophemorisset  staff   1270918 May 31  2016 MySQL.pdf.gz
-rw-r--r--  1 christophemorisset  staff    732435 Sep 15 16:56 OOP.ipynb
-rw-r--r--@ 1 christophemorisset  staff    536767 Jan 10  2021 OOP.pdf
-rw-r--r--  1 christophemorisset  staff     85548 Sep 15 16:56
Optimization.ipynb
-rw-------  1 christophemorisset  staff    481656 Jun  2  2016 Optimization.pdf
-rw-------  1 christophemorisset  staff      2537 Nov  9  2016 Parallel.ipynb
-rw-r--r--@ 1 christophemorisset  staff    158652 Jan 22  2021 Redshifts.ipynb
-rw-------  1 christophemorisset  staff    939003 Oct 20  2022
Redshifts_ai4neb.ipynb
-rw-r--r--  1 christophemorisset  staff      6120 Sep 15 16:56 Tarea_1.ipynb
-rw-r--r--  1 christophemorisset  staff      1434 Sep 22  2020 Test-
Install.ipynb
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Useful_libraries.ipynb
-rw-r--r--@ 1 christophemorisset  staff    139456 Jan 10  2021
Useful_libraries.pdf
-rw-r--r--  1 christophemorisset  staff    275723 Sep 15 16:56
Using_PyMySQL.ipynb
-rw-r--r--@ 1 christophemorisset  staff    237218 Jan  4  2021 Using_PyMySQL.pdf
-rw-r--r--  1 christophemorisset  staff    252205 Sep 15 18:09
Using_astropy.ipynb
-rw-r--r--@ 1 christophemorisset  staff    156095 Jan 10  2021 Using_astropy.pdf
-rw-r--r--  1 christophemorisset  staff     64503 Sep 15 16:56
Using_astroquery.ipynb
-rw-r--r--@ 1 christophemorisset  staff     70028 Jan  4  2021
Using_astroquery.pdf
drwxr-xr-x  5 christophemorisset  staff       160 Aug 26  2022
__pycache__
-rw-r--r--@ 1 christophemorisset  staff  14794880 Jan 18  2021 cosmo-early.npy
-rw-r--r--@ 1 christophemorisset  staff  14794880 Jan 18  2021 cosmo-late.npy
-rw-r--r--  1 christophemorisset  staff        65 Sep 15 16:56 data1.dat
-rw-r--r--  1 christophemorisset  staff        14 Sep 15 16:56 data10.dat
-rw-r--r--  1 christophemorisset  staff        32 Sep 15 16:56 data11.dat
-rw-r--r--  1 christophemorisset  staff       154 Sep 15 16:56 data12.dat
-rw-r--r--  1 christophemorisset  staff       148 Sep 15 16:56 data2.dat
```

```
-rw-r--r--  1 christophemorisset  staff        170 Sep 15 16:56 data3.dat
-rw-r--r--  1 christophemorisset  staff       1190 Sep 15 16:56 data4.dat
-rw-r--r--  1 christophemorisset  staff       1186 Sep 15 16:56 data5.dat
-rw-r--r--  1 christophemorisset  staff       1187 Sep 15 16:59 data6.dat
-rw-------  1 christophemorisset  staff        298 May 31  2016 dcumsum.f
-rw-------  1 christophemorisset  staff      30716 Nov  9  2016 dcumsum.so
-rw-------  1 christophemorisset  staff       1379 Oct 20  2022 ex1.html
-rw-------  1 christophemorisset  staff        154 Oct 20  2022 ex1.py
-rw-------  1 christophemorisset  staff        288 Jun 29  2017 ex1.pyc
-rw-------  1 christophemorisset  staff          8 May 31  2016 ex1.txt
-rw-------  1 christophemorisset  staff         73 Sep 17 08:59 fact.py
-rw-------  1 christophemorisset  staff       4214 May 31  2016 grep.py
-rw-------  1 christophemorisset  staff       4995 May 31  2016 grep2.py
-rw-------  1 christophemorisset  staff       6319 May 31  2016 grep3.py
-rw-------  1 christophemorisset  staff       5575 Dec  9  2016 grep3.pyc
-rw-------  1 christophemorisset  staff         49 May 31  2016 hello.py
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-rw-------  1 christophemorisset  staff        178 May 31  2016 hellofortran.f
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-rw-------  1 christophemorisset  staff        150 May 31  2016 index.html
-rw-------  1 christophemorisset  staff    2380267 Sep 24  2022
intro_Matplotlib.ipynb
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intro_Matplotlib.pdf
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intro_Python.ipynb
-rw-r--r--@ 1 christophemorisset  staff     119242 Jan 10  2021 intro_Python.pdf
-rw-------  1 christophemorisset  staff     179449 May 31  2016
intro_Python_2.pdf
-rw-------  1 christophemorisset  staff     103229 May 31  2016
intro_Python_3.pdf
-rw-------  1 christophemorisset  staff    1116128 Sep 15 16:47 intro_Scipy.ipynb
-rw-r--r--@ 1 christophemorisset  staff     626599 Jan 10  2021 intro_Scipy.pdf
-rw-r--r--  1 christophemorisset  staff     118116 Sep 15 16:56 intro_numpy.ipynb
-rw-r--r--@ 1 christophemorisset  staff     128064 Jan 10  2021 intro_numpy.pdf
drwxr-xr-x  3 christophemorisset  staff         96 Jan  2  2021
mastDownload
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-rw-r--r--  1 christophemorisset  staff       5760 Sep 22  2022 new.fits
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-rw-------  1 christophemorisset  staff         47 Sep 17 08:59 sys_text.py
-rw-------  1 christophemorisset  staff        354 Sep 15 16:59 tab1.dat
-rw-------  1 christophemorisset  staff        668 Sep 15 16:59 tab_cds1.ascii
-rw-------  1 christophemorisset  staff      43200 May 31  2016 tab_cds1.fits
-rw-------  1 christophemorisset  staff       1334 Sep 15 16:59 tab_cds1.tex
-rw-------  1 christophemorisset  staff       1617 Sep 15 16:59 tab_cds2.ascii
```

```
-rw-r--r--  1 christophemorisset  staff     313445 Sep 15 16:56 test_1_prof.prof
-rw-r--r--  1 christophemorisset  staff       6824 Sep 15 16:56 test_1_prof.py
-rw-r--r--  1 christophemorisset  staff       6872 Sep 15 16:56 test_2_prof.py
-rw-r--r--  1 christophemorisset  staff        453 Sep 15 16:56
test_2_prof.py.lprof
-rw-r--r--  1 christophemorisset  staff       6581 Sep 15 16:56 test_3_prof.py
-rw-r--r--  1 christophemorisset  staff       6588 Sep 15 16:56 test_5_pdb.py
-rwxr-xr-x  1 christophemorisset  staff        447 Sep 15 16:56
test_8_prof.py
drwxr-xr-x  4 christophemorisset  staff        128 Sep 21  2020 tt
```

```python
command = 'ls -l'
popen = subprocess.Popen(command, shell=True)
# The same apply here, no output in Notebook
print(popen)
```

```
<Popen: returncode: None args: 'ls -l'>
total 143272
-rw-r--r--  1 christophemorisset  staff      89353 Dec  1  2020
0040000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff      89971 Dec  1  2020
0090000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff      90544 Dec  7  2020
0100000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff      89170 Dec  1  2020
0140000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff      88591 Dec  1  2020
0190000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff     648519 Sep 15 16:56 ANN.ipynb
-rw-------  1 christophemorisset  staff    4229587 May 31  2016 CALIFA_ah7.dat.gz
-rw-------  1 christophemorisset  staff      20137 Oct 31  2018 Calling
Fortran.ipynb
-rw-------  1 christophemorisset  staff      86815 Jun  1  2016 Calling
Fortran.pdf
-rw-r--r--@ 1 christophemorisset  staff    3600128 Jan 18  2021 DR9_photo-z-
small.npy
-rw-r--r--  1 christophemorisset  staff        216 Sep 15 16:56 Demo.pickle
-rw-r--r--  1 christophemorisset  staff        193 Sep 15 16:56 Demo.pklz
-rw-------  1 christophemorisset  staff       7717 Oct 20  2022 Ex1.ipynb
-rw-------  1 christophemorisset  staff     381664 Oct 20  2022 Ex1_done.ipynb
-rw-------  1 christophemorisset  staff     315341 Oct 20  2022
Ex1_with_res.ipynb
-rw-r--r--  1 christophemorisset  staff      93801 Sep 15 16:56 Fig1.jpg
-rw-r--r--  1 christophemorisset  staff     127026 Sep 15 16:56 Fig1.pdf
-rw-r--r--  1 christophemorisset  staff     123182 Sep 15 16:56 Fig1.png
-rw-r--r--@ 1 christophemorisset  staff      23342 Jan 27  2021
Galaxies_classification.ipynb
```

```
-rw-r--r--@ 1 christophemorisset  staff   1177040 Sep 15 17:38 HII.dat
-rw-------@ 1 christophemorisset  staff    860517 Sep 21  2020 InstallPython.key
-rw-r--r--  1 christophemorisset  staff     67550 Sep 15 16:56 Interact with
files.ipynb
-rw-r--r--@ 1 christophemorisset  staff    432747 Jan 10  2021 Interact with
files.pdf
-rw-------  1 christophemorisset  staff    131497 May 31  2016 Intro_1.odp
-rw-------  1 christophemorisset  staff    174202 May 31  2016 Intro_1.pdf
-rw-------  1 christophemorisset  staff    130234 May 31  2016 Intro_2014.odp
-rw-r--r--  1 christophemorisset  staff   1370634 Jan 12  2021 Machine
Learning.pdf
-rw-r--r--  1 christophemorisset  staff   1698962 Sep 15 16:56 MySQL 2.pdf
-rw-------  1 christophemorisset  staff    108782 Jan  2  2021 MySQL.pdf
-rw-------@ 1 christophemorisset  staff   1270918 May 31  2016 MySQL.pdf.gz
-rw-r--r--  1 christophemorisset  staff    732435 Sep 15 16:56 OOP.ipynb
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Optimization.ipynb
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-rw-------  1 christophemorisset  staff      2537 Nov  9  2016 Parallel.ipynb
-rw-r--r--@ 1 christophemorisset  staff    158652 Jan 22  2021 Redshifts.ipynb
-rw-------  1 christophemorisset  staff    939003 Oct 20  2022
Redshifts_ai4neb.ipynb
-rw-r--r--  1 christophemorisset  staff      6120 Sep 15 16:56 Tarea_1.ipynb
-rw-r--r--  1 christophemorisset  staff      1434 Sep 22  2020 Test-
Install.ipynb
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Useful_libraries.ipynb
-rw-r--r--@ 1 christophemorisset  staff    139456 Jan 10  2021
Useful_libraries.pdf
-rw-r--r--  1 christophemorisset  staff    275723 Sep 15 16:56
Using_PyMySQL.ipynb
-rw-r--r--@ 1 christophemorisset  staff    237218 Jan  4  2021 Using_PyMySQL.pdf
-rw-r--r--  1 christophemorisset  staff    252205 Sep 15 18:09
Using_astropy.ipynb
-rw-r--r--@ 1 christophemorisset  staff    156095 Jan 10  2021 Using_astropy.pdf
-rw-r--r--  1 christophemorisset  staff     64503 Sep 15 16:56
Using_astroquery.ipynb
-rw-r--r--@ 1 christophemorisset  staff     70028 Jan  4  2021
Using_astroquery.pdf
drwxr-xr-x  5 christophemorisset  staff       160 Aug 26  2022
__pycache__
-rw-r--r--@ 1 christophemorisset  staff  14794880 Jan 18  2021 cosmo-early.npy
-rw-r--r--@ 1 christophemorisset  staff  14794880 Jan 18  2021 cosmo-late.npy
-rw-r--r--  1 christophemorisset  staff        65 Sep 15 16:56 data1.dat
-rw-r--r--  1 christophemorisset  staff        14 Sep 15 16:56 data10.dat
-rw-r--r--  1 christophemorisset  staff        32 Sep 15 16:56 data11.dat
-rw-r--r--  1 christophemorisset  staff       154 Sep 15 16:56 data12.dat
```

```
-rw-r--r--  1 christophemorisset  staff        148 Sep 15 16:56 data2.dat
-rw-r--r--  1 christophemorisset  staff        170 Sep 15 16:56 data3.dat
-rw-r--r--  1 christophemorisset  staff       1190 Sep 15 16:56 data4.dat
-rw-r--r--  1 christophemorisset  staff       1186 Sep 15 16:56 data5.dat
-rw-r--r--  1 christophemorisset  staff       1187 Sep 15 16:59 data6.dat
-rw-------  1 christophemorisset  staff        298 May 31  2016 dcumsum.f
-rw-------  1 christophemorisset  staff      30716 Nov  9  2016 dcumsum.so
-rw-------  1 christophemorisset  staff       1379 Oct 20  2022 ex1.html
-rw-------  1 christophemorisset  staff        154 Oct 20  2022 ex1.py
-rw-------  1 christophemorisset  staff        288 Jun 29  2017 ex1.pyc
-rw-------  1 christophemorisset  staff          8 May 31  2016 ex1.txt
-rw-------  1 christophemorisset  staff         73 Sep 17 08:59 fact.py
-rw-------  1 christophemorisset  staff       4214 May 31  2016 grep.py
-rw-------  1 christophemorisset  staff       4995 May 31  2016 grep2.py
-rw-------  1 christophemorisset  staff       6319 May 31  2016 grep3.py
-rw-------  1 christophemorisset  staff       5575 Dec  9  2016 grep3.pyc
-rw-------  1 christophemorisset  staff         49 May 31  2016 hello.py
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-rw-------  1 christophemorisset  staff        178 May 31  2016 hellofortran.f
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intro_Matplotlib.ipynb
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intro_Matplotlib.pdf
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intro_Python.ipynb
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-rw-------  1 christophemorisset  staff     179449 May 31  2016
intro_Python_2.pdf
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intro_Python_3.pdf
-rw-------  1 christophemorisset  staff    1116128 Sep 15 16:47 intro_Scipy.ipynb
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-rw-r--r--  1 christophemorisset  staff     118116 Sep 15 16:56 intro_numpy.ipynb
-rw-r--r--@ 1 christophemorisset  staff     128064 Jan 10  2021 intro_numpy.pdf
drwxr-xr-x  3 christophemorisset  staff         96 Jan  2  2021
mastDownload
-rw-------  1 christophemorisset  staff    8830080 May 31  2016 n10017o.fits
-rw-r--r--  1 christophemorisset  staff       5760 Sep 22  2022 new.fits
-rw-------  1 christophemorisset  staff     435801 May 31  2016 query_res.dat
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-rw-------  1 christophemorisset  staff         47 Sep 17 08:59 sys_text.py
-rw-------  1 christophemorisset  staff        354 Sep 15 16:59 tab1.dat
-rw-------  1 christophemorisset  staff        668 Sep 15 16:59 tab_cds1.ascii
-rw-------  1 christophemorisset  staff      43200 May 31  2016 tab_cds1.fits
-rw-------  1 christophemorisset  staff       1334 Sep 15 16:59 tab_cds1.tex
```

```
-rw-------  1 christophemorisset  staff       1617 Sep 15 16:59 tab_cds2.ascii
-rw-r--r--  1 christophemorisset  staff     313445 Sep 15 16:56 test_1_prof.prof
-rw-r--r--  1 christophemorisset  staff       6824 Sep 15 16:56 test_1_prof.py
-rw-r--r--  1 christophemorisset  staff       6872 Sep 15 16:56 test_2_prof.py
-rw-r--r--  1 christophemorisset  staff        453 Sep 15 16:56
test_2_prof.py.lprof
-rw-r--r--  1 christophemorisset  staff       6581 Sep 15 16:56 test_3_prof.py
-rw-r--r--  1 christophemorisset  staff       6588 Sep 15 16:56 test_5_pdb.py
-rwxr-xr-x  1 christophemorisset  staff        447 Sep 15 16:56
test_8_prof.py
drwxr-xr-x  4 christophemorisset  staff        128 Sep 21  2020 tt
```

```python
popen = subprocess.Popen(command, stdout=subprocess.PIPE, shell=True)
res = popen.communicate()[0]
print(type(res))
print(res.decode())
```

```
<class 'bytes'>
total 143280
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0040000_6.00_33_50_02_15.bin_0.1.gz
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0090000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff      90544 Dec  7  2020
0100000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff      89170 Dec  1  2020
0140000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff      88591 Dec  1  2020
0190000_6.00_33_50_02_15.bin_0.1.gz
-rw-r--r--  1 christophemorisset  staff     648519 Sep 15 16:56 ANN.ipynb
-rw-------  1 christophemorisset  staff    4229587 May 31  2016 CALIFA_ah7.dat.gz
-rw-------  1 christophemorisset  staff      20137 Oct 31  2018 Calling
Fortran.ipynb
-rw-------  1 christophemorisset  staff      86815 Jun  1  2016 Calling
Fortran.pdf
-rw-r--r--@ 1 christophemorisset  staff    3600128 Jan 18  2021 DR9_photo-z-
small.npy
-rw-r--r--  1 christophemorisset  staff        216 Sep 15 16:56 Demo.pickle
-rw-r--r--  1 christophemorisset  staff        193 Sep 15 16:56 Demo.pklz
-rw-------  1 christophemorisset  staff       7717 Oct 20  2022 Ex1.ipynb
-rw-------  1 christophemorisset  staff     381664 Oct 20  2022 Ex1_done.ipynb
-rw-------  1 christophemorisset  staff     315341 Oct 20  2022
Ex1_with_res.ipynb
-rw-r--r--  1 christophemorisset  staff      93801 Sep 15 16:56 Fig1.jpg
-rw-r--r--  1 christophemorisset  staff     127026 Sep 15 16:56 Fig1.pdf
-rw-r--r--  1 christophemorisset  staff     123182 Sep 15 16:56 Fig1.png
-rw-r--r--@ 1 christophemorisset  staff      23342 Jan 27  2021
Galaxies_classification.ipynb
```

```
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-rw-r--r--  1 christophemorisset  staff     67550 Sep 15 16:56 Interact with
files.ipynb
-rw-r--r--@ 1 christophemorisset  staff    432747 Jan 10  2021 Interact with
files.pdf
-rw-------  1 christophemorisset  staff    131497 May 31  2016 Intro_1.odp
-rw-------  1 christophemorisset  staff    174202 May 31  2016 Intro_1.pdf
-rw-------  1 christophemorisset  staff    130234 May 31  2016 Intro_2014.odp
-rw-r--r--  1 christophemorisset  staff   1370634 Jan 12  2021 Machine
Learning.pdf
-rw-r--r--  1 christophemorisset  staff   1698962 Sep 15 16:56 MySQL 2.pdf
-rw-------  1 christophemorisset  staff    108782 Jan  2  2021 MySQL.pdf
-rw-------@ 1 christophemorisset  staff   1270918 May 31  2016 MySQL.pdf.gz
-rw-r--r--  1 christophemorisset  staff    732435 Sep 15 16:56 OOP.ipynb
-rw-r--r--@ 1 christophemorisset  staff    536767 Jan 10  2021 OOP.pdf
-rw-r--r--  1 christophemorisset  staff     85548 Sep 15 16:56
Optimization.ipynb
-rw-------  1 christophemorisset  staff    481656 Jun  2  2016 Optimization.pdf
-rw-------  1 christophemorisset  staff      2537 Nov  9  2016 Parallel.ipynb
-rw-r--r--@ 1 christophemorisset  staff    158652 Jan 22  2021 Redshifts.ipynb
-rw-------  1 christophemorisset  staff    939003 Oct 20  2022
Redshifts_ai4neb.ipynb
-rw-r--r--  1 christophemorisset  staff      6120 Sep 15 16:56 Tarea_1.ipynb
-rw-r--r--  1 christophemorisset  staff      1434 Sep 22  2020 Test-
Install.ipynb
-rw-------  2 christophemorisset  staff    183510 Sep 17 09:00
Useful_libraries.ipynb
-rw-r--r--@ 1 christophemorisset  staff    139456 Jan 10  2021
Useful_libraries.pdf
-rw-r--r--  1 christophemorisset  staff    275723 Sep 15 16:56
Using_PyMySQL.ipynb
-rw-r--r--@ 1 christophemorisset  staff    237218 Jan  4  2021 Using_PyMySQL.pdf
-rw-r--r--  1 christophemorisset  staff    252205 Sep 15 18:09
Using_astropy.ipynb
-rw-r--r--@ 1 christophemorisset  staff    156095 Jan 10  2021 Using_astropy.pdf
-rw-r--r--  1 christophemorisset  staff     64503 Sep 15 16:56
Using_astroquery.ipynb
-rw-r--r--@ 1 christophemorisset  staff     70028 Jan  4  2021
Using_astroquery.pdf
drwxr-xr-x  5 christophemorisset  staff       160 Aug 26  2022
__pycache__
-rw-r--r--@ 1 christophemorisset  staff  14794880 Jan 18  2021 cosmo-early.npy
-rw-r--r--@ 1 christophemorisset  staff  14794880 Jan 18  2021 cosmo-late.npy
-rw-r--r--  1 christophemorisset  staff        65 Sep 15 16:56 data1.dat
-rw-r--r--  1 christophemorisset  staff        14 Sep 15 16:56 data10.dat
-rw-r--r--  1 christophemorisset  staff        32 Sep 15 16:56 data11.dat
-rw-r--r--  1 christophemorisset  staff       154 Sep 15 16:56 data12.dat
```

```
-rw-r--r--  1 christophemorisset  staff       148 Sep 15 16:56 data2.dat
-rw-r--r--  1 christophemorisset  staff       170 Sep 15 16:56 data3.dat
-rw-r--r--  1 christophemorisset  staff      1190 Sep 15 16:56 data4.dat
-rw-r--r--  1 christophemorisset  staff      1186 Sep 15 16:56 data5.dat
-rw-r--r--  1 christophemorisset  staff      1187 Sep 15 16:59 data6.dat
-rw-------  1 christophemorisset  staff       298 May 31  2016 dcumsum.f
-rw-------  1 christophemorisset  staff     30716 Nov  9  2016 dcumsum.so
-rw-------  1 christophemorisset  staff      1379 Oct 20  2022 ex1.html
-rw-------  1 christophemorisset  staff       154 Oct 20  2022 ex1.py
-rw-------  1 christophemorisset  staff       288 Jun 29  2017 ex1.pyc
-rw-------  1 christophemorisset  staff         8 May 31  2016 ex1.txt
-rw-------  1 christophemorisset  staff        73 Sep 17 08:59 fact.py
-rw-------  1 christophemorisset  staff      4214 May 31  2016 grep.py
-rw-------  1 christophemorisset  staff      4995 May 31  2016 grep2.py
-rw-------  1 christophemorisset  staff      6319 May 31  2016 grep3.py
-rw-------  1 christophemorisset  staff      5575 Dec  9  2016 grep3.pyc
-rw-------  1 christophemorisset  staff        49 May 31  2016 hello.py
-rw-------  1 christophemorisset  staff      1090 May 31  2016 hellofortran.c
-rw-------  1 christophemorisset  staff       178 May 31  2016 hellofortran.f
-rw-------  1 christophemorisset  staff     33976 May 31  2016 hellofortran.so
-rw-------  1 christophemorisset  staff       150 May 31  2016 index.html
-rw-------  1 christophemorisset  staff   2380267 Sep 24  2022
intro_Matplotlib.ipynb
-rw-r--r--@ 1 christophemorisset  staff   1677612 Jan 10  2021
intro_Matplotlib.pdf
-rw-------  1 christophemorisset  staff    326924 May 31  2016 intro_Python.html
-rw-------  1 christophemorisset  staff    110737 Sep  2  2022
intro_Python.ipynb
-rw-r--r--@ 1 christophemorisset  staff    119242 Jan 10  2021 intro_Python.pdf
-rw-------  1 christophemorisset  staff    179449 May 31  2016
intro_Python_2.pdf
-rw-------  1 christophemorisset  staff    103229 May 31  2016
intro_Python_3.pdf
-rw-------  1 christophemorisset  staff   1116128 Sep 15 16:47 intro_Scipy.ipynb
-rw-r--r--@ 1 christophemorisset  staff    626599 Jan 10  2021 intro_Scipy.pdf
-rw-r--r--  1 christophemorisset  staff    118116 Sep 15 16:56 intro_numpy.ipynb
-rw-r--r--@ 1 christophemorisset  staff    128064 Jan 10  2021 intro_numpy.pdf
drwxr-xr-x  3 christophemorisset  staff        96 Jan  2  2021
mastDownload
-rw-------  1 christophemorisset  staff   8830080 May 31  2016 n10017o.fits
-rw-r--r--  1 christophemorisset  staff      5760 Sep 22  2022 new.fits
-rw-------  1 christophemorisset  staff    435801 May 31  2016 query_res.dat
-rw-------  1 christophemorisset  staff   1059840 May 31  2016 swp04345.mxhi
-rw-------  1 christophemorisset  staff        47 Sep 17 08:59 sys_text.py
-rw-------  1 christophemorisset  staff       354 Sep 15 16:59 tab1.dat
-rw-------  1 christophemorisset  staff       668 Sep 15 16:59 tab_cds1.ascii
-rw-------  1 christophemorisset  staff     43200 May 31  2016 tab_cds1.fits
-rw-------  1 christophemorisset  staff      1334 Sep 15 16:59 tab_cds1.tex
```

```
-rw-------   1 christophemorisset  staff       1617 Sep 15 16:59 tab_cds2.ascii
-rw-r--r--   1 christophemorisset  staff     313445 Sep 15 16:56 test_1_prof.prof
-rw-r--r--   1 christophemorisset  staff       6824 Sep 15 16:56 test_1_prof.py
-rw-r--r--   1 christophemorisset  staff       6872 Sep 15 16:56 test_2_prof.py
-rw-r--r--   1 christophemorisset  staff        453 Sep 15 16:56
test_2_prof.py.lprof
-rw-r--r--   1 christophemorisset  staff       6581 Sep 15 16:56 test_3_prof.py
-rw-r--r--   1 christophemorisset  staff       6588 Sep 15 16:56 test_5_pdb.py
-rwxr-xr-x   1 christophemorisset  staff        447 Sep 15 16:56
test_8_prof.py
drwxr-xr-x   4 christophemorisset  staff        128 Sep 21  2020 tt
```

```python
popen = subprocess.Popen(command, stdout=subprocess.PIPE, shell=True)
res = popen.communicate()[0]
for line in res.decode().split('\n'):
    lspl = line.split()
    if len(lspl)> 4:
        if int(lspl[4]) > 1000000:
            print(lspl[8])
```

```
CALIFA_ah7.dat.gz
DR9_photo-z-small.npy
HII.dat
Machine
MySQL
MySQL.pdf.gz
cosmo-early.npy
cosmo-late.npy
intro_Matplotlib.ipynb
intro_Matplotlib.pdf
intro_Scipy.ipynb
n10017o.fits
swp04345.mxhi
```

1.0.7 re

The re module provides regular expression tools for advanced string processing. For complex matching and manipulation, regular expressions offer succinct, optimized solutions:

```python
import re
# Search the words starting with "f"
re.findall(r'\bf[a-z]*', 'whifch foOt or hand fell f fastest')
```

```python
['fo', 'fell', 'f', 'fastest']
```

```python
# Remove duplicate words
re.sub(r'(\b[a-z]+) \1', r'\1', 'cat in the the hat')
```

```
[ ]: 'cat in the hat'
```

More in https://docs.python.org/3/library/re.html

1.0.8 urllib

```
[ ]: from urllib.request import urlopen
```

```
[ ]: for line in urlopen('http://dev.on-rev.com/myip.irev'):
         print(line)
         if 'IP' in str(line):
             IP = str(line).split(':')[1][:-7]
     print('-------')
     print(IP)
```

```
b'<html>\n'
b'<body>\n'
b'<p>\n'
b'Remote IP Address:187.188.59.178</p>\n'
b'</body>\n'
b'</html>'
-------
187.188.59.178
```

1.0.9 Tables with power: pandas at https://pandas.pydata.org/

Tutorials: * https://pandas.pydata.org/docs/user_guide/10min.html * https://www.w3schools.com/python/pandas/default. * https://www.learndatasci.com/tutorials/python-pandas-tutorial-complete-introduction-for-beginners/

```
[ ]: import pandas as pd
```

```
[ ]: %%writefile data2.dat
     # The following data are for test purpose
     N    f    x    y type
     1    2.3  6    8 star
     2    3.5  7    9 galaxy
     3   -4.2  5    7 cluster
     #4  -10.5  5   7 test
```

```
Overwriting data2.dat
```

```
[ ]: df = pd.read_csv('data2.dat', comment='#', delim_whitespace=True)
```

```
[ ]: df
```

```
[ ]:    N    f  x  y      type
     0  1  2.3  6  8      star
```

```
    1  2   3.5  7  9    galaxy
    2  3  -4.2  5  7    cluster
```

[ ]: `df.info()`

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3 entries, 0 to 2
Data columns (total 5 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   N       3 non-null      int64
 1   f       3 non-null      float64
 2   x       3 non-null      int64
 3   y       3 non-null      int64
 4   type    3 non-null      object
dtypes: float64(1), int64(3), object(1)
memory usage: 248.0+ bytes
```
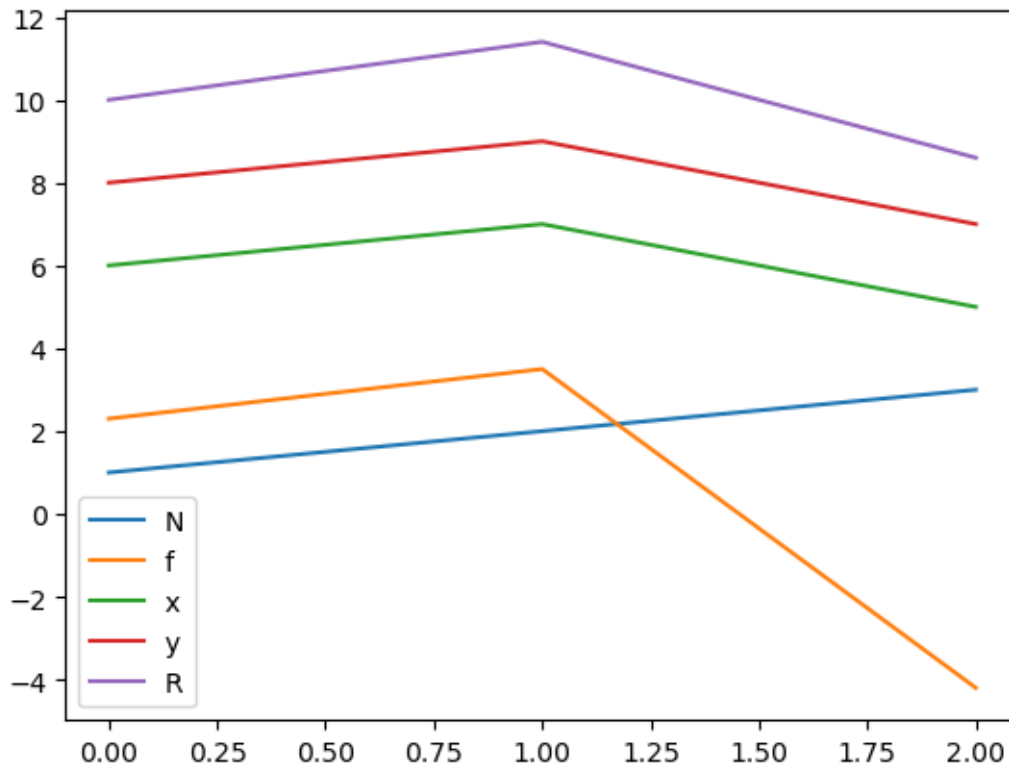
[ ]: `df.describe()`

[ ]:
```
         N          f    x    y
count  3.0   3.000000  3.0  3.0
mean   2.0   0.533333  6.0  8.0
std    1.0   4.142865  1.0  1.0
min    1.0  -4.200000  5.0  7.0
25%    1.5  -0.950000  5.5  7.5
50%    2.0   2.300000  6.0  8.0
75%    2.5   2.900000  6.5  8.5
max    3.0   3.500000  7.0  9.0
```

[ ]: `df['R'] = np.sqrt(df['x']**2 + df.y**2)`

[ ]: `df.plot()`

[ ]: `<AxesSubplot: >`

1.0.10 Plotting with alternative style: seaborn at https://seaborn.pydata.org/

```
import seaborn as sns
```

```
fmri = sns.load_dataset("fmri") # medical data from https://github.com/mwaskom/
 ↪Waskom_CerebCortex_2017
print(type(fmri))
fmri
```
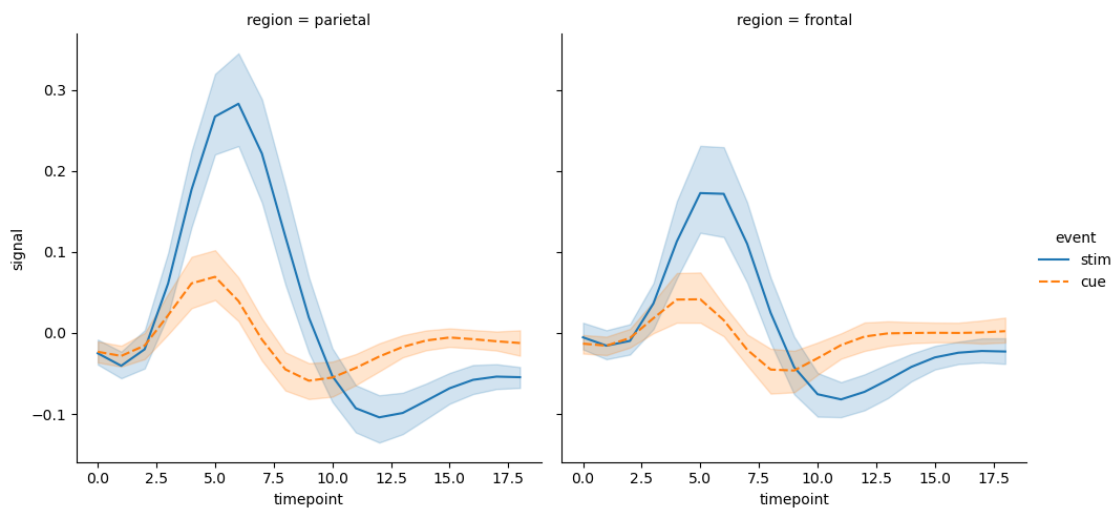
```
<class 'pandas.core.frame.DataFrame'>
```

```
        subject  timepoint event      region     signal
0           s13         18  stim    parietal  -0.017552
1            s5         14  stim    parietal  -0.080883
2           s12         18  stim    parietal  -0.081033
3           s11         18  stim    parietal  -0.046134
4           s10         18  stim    parietal  -0.037970
...         ...        ...   ...         ...        ...
1059         s0          8   cue     frontal   0.018165
1060        s13          7   cue     frontal  -0.029130
1061        s12          7   cue     frontal  -0.004939
1062        s11          7   cue     frontal  -0.025367
```

```
1063      s0          0   cue  parietal -0.006899
```

```
[1064 rows x 5 columns]
```

Using kind="line" offers the same flexibility for semantic mappings as kind="scatter", but lineplot() transforms the data more before plotting. Observations are sorted by their x value, and repeated observations are aggregated. By default, the resulting plot shows the mean and 95% CI for each unit.

```
[ ]: sns.relplot(data=fmri, kind="line",
                 x="timepoint", y="signal", col="region",
                 hue="event", style="event");
```
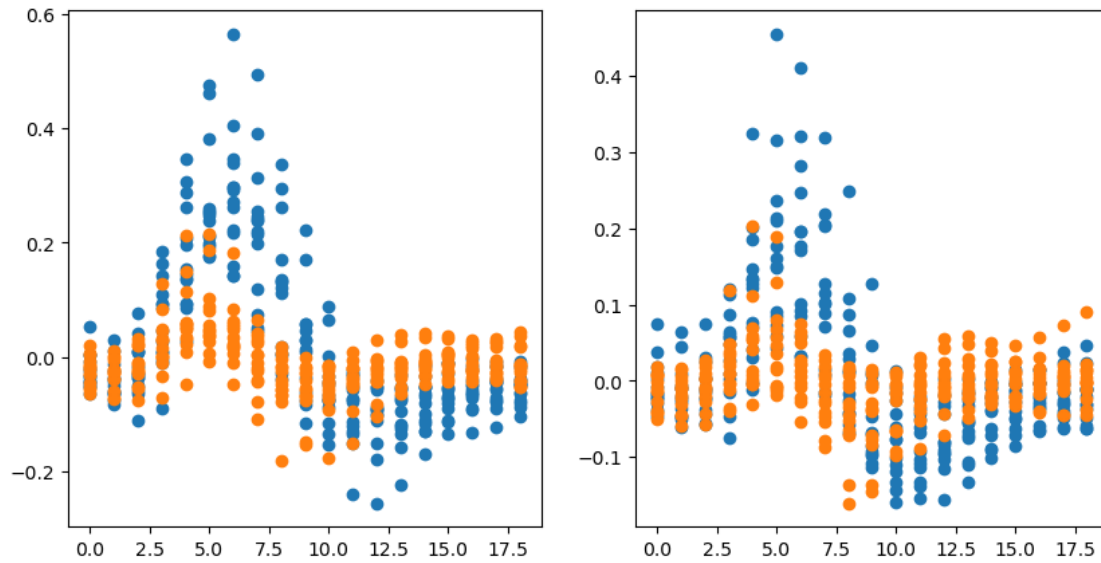


```
[ ]: import matplotlib.pyplot as plt
```

```
[ ]: f, (ax1, ax2) = plt.subplots(1, 2, figsize=(10,5))
     mask1 = fmri['region'] == 'parietal'
     mask2 = fmri['event'] == 'stim'

     ax1.scatter(fmri[mask1 & mask2]['timepoint'], fmri[mask1 & mask2]['signal'])
     ax1.scatter(fmri[mask1 & ~mask2]['timepoint'], fmri[mask1 & ~mask2]['signal'])

     ax2.scatter(fmri[~mask1 & mask2]['timepoint'], fmri[~mask1 & mask2]['signal'])
     ax2.scatter(fmri[~mask1 & ~mask2]['timepoint'], fmri[~mask1 &␣
      ↪~mask2]['signal']);
```
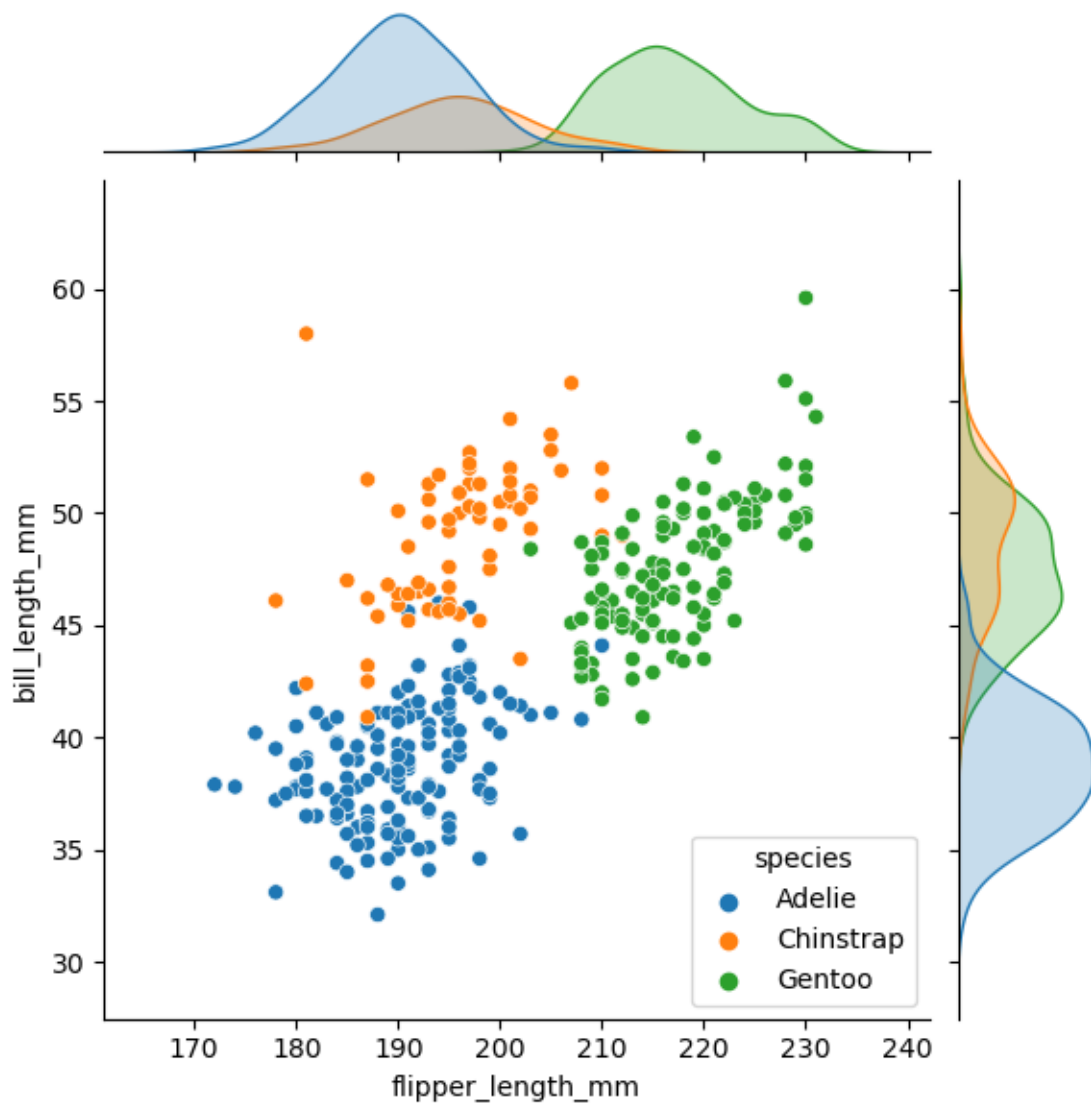
31

```
[ ]: # From tutorial introduction on the seaborn web page:
     penguins = sns.load_dataset("penguins")
     sns.jointplot(data=penguins, x="flipper_length_mm", y="bill_length_mm",␣
      ↪hue="species")
```

```
[ ]: <seaborn.axisgrid.JointGrid at 0x7fd60eae5ac0>
```

```
g = sns.PairGrid(penguins, hue="species", corner=True)
g.map_lower(sns.kdeplot, hue=None, levels=5, color=".2")
g.map_lower(sns.scatterplot, marker="+")
g.map_diag(sns.histplot, element="step", linewidth=0, kde=True)
g.add_legend(frameon=True)
g.legend.set_bbox_to_anchor((.61, .6))
```