Artificial Intelligence for Text Analytics

Python for Natural Language Processing

1102AITA03
MBA, IM, NTPU (M5026) (Spring 2022)
Tue 2, 3, 4 (9:10-12:00) (B8F40)

https://meet.google.com/paj-zhhj-mya

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https://web.ntpu.edu.tw/~myday

2022-03-08

Syllabus

Week	Date	Subject/Topics
1	2022/02/22	Introduction to Artificial Intelligence for Text Analytics
2	2022/03/01	Foundations of Text Analytics: Natural Language Processing (NLP)
3	2022/03/08	Python for Natural Language Processing
4	2022/03/15	Natural Language Processing with Transformers
5	2022/03/22	Case Study on Artificial Intelligence for Text Analytics I
6	2022/03/29	Text Classification and Sentiment Analysis

Syllabus

Week	Date	Subject/Topics
7	2022/04/05	Tomb-Sweeping Day (Holiday, No Classes)
8	2022/04/12	Midterm Project Report
9	2022/04/19	Multilingual Named Entity Recognition (NER), Text Similarity and Clustering
10	2022/04/26	Text Summarization and Topic Models
11	2022/05/03	Text Generation
12	2022/05/10	Case Study on Artificial Intelligence for Text Analytics II

Syllabus

Week	Date	Subject/Topics
13	2022/05/17	Question Answering and Dialogue Systems
14	2022/05/24	Deep Learning, Transfer Learning, Zero-Shot, and Few-Shot Learning for Text Analytics
15	2022/05/31	Final Project Report I
16	2022/06/07	Final Project Report II
17	2022/06/14	Self-learning
18	2022/06/21	Self-learning

Python for Natural Language Processing

Outline

- **Python for Natural Language Processing**
  - **Python Ecosystem for Data Science**
  - **Python**
    - Programming language
  - **Numpy**
    - Scientific computing
  - **SpaCy**
    - Natural Language Processing

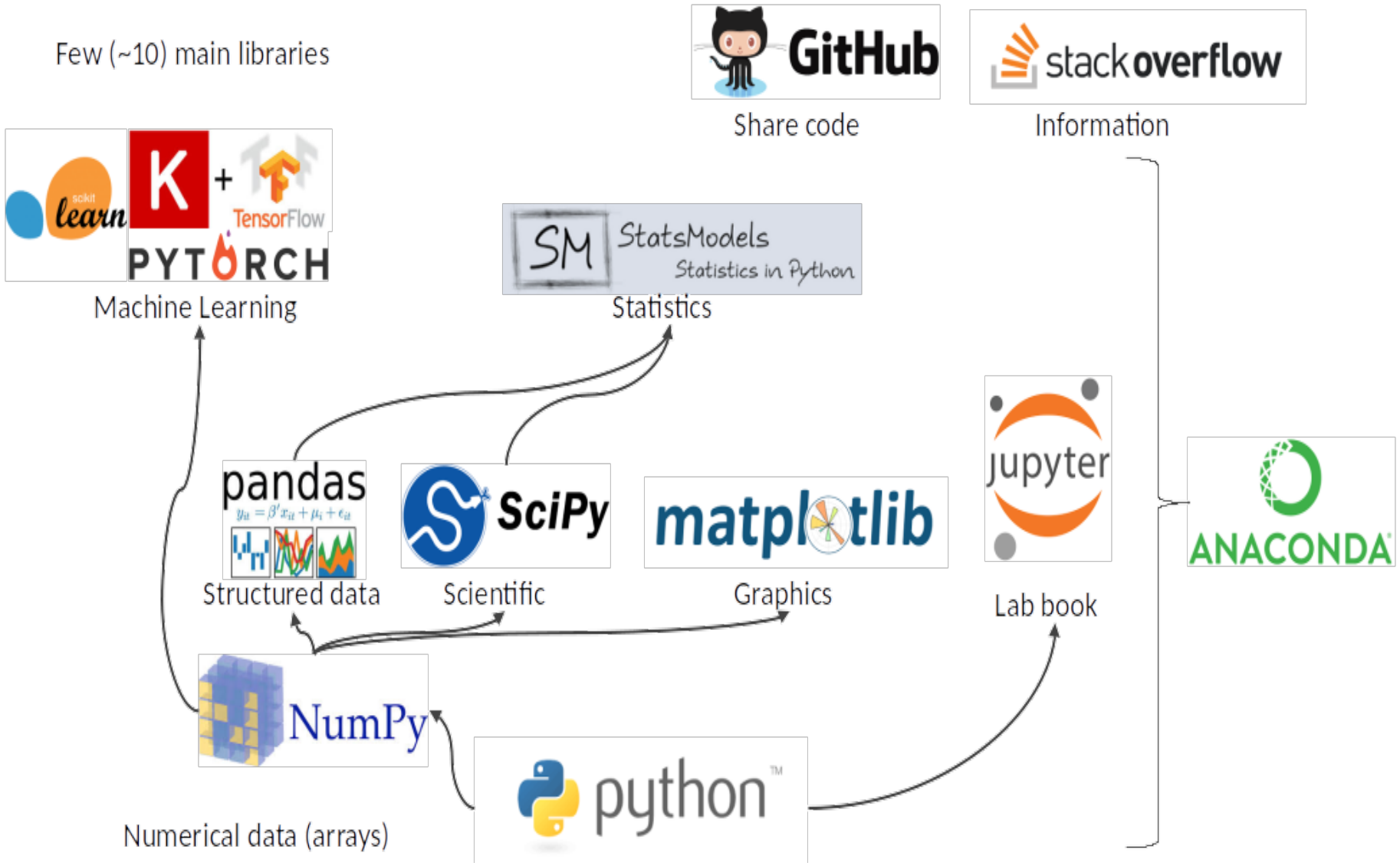
Python

python™

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics.

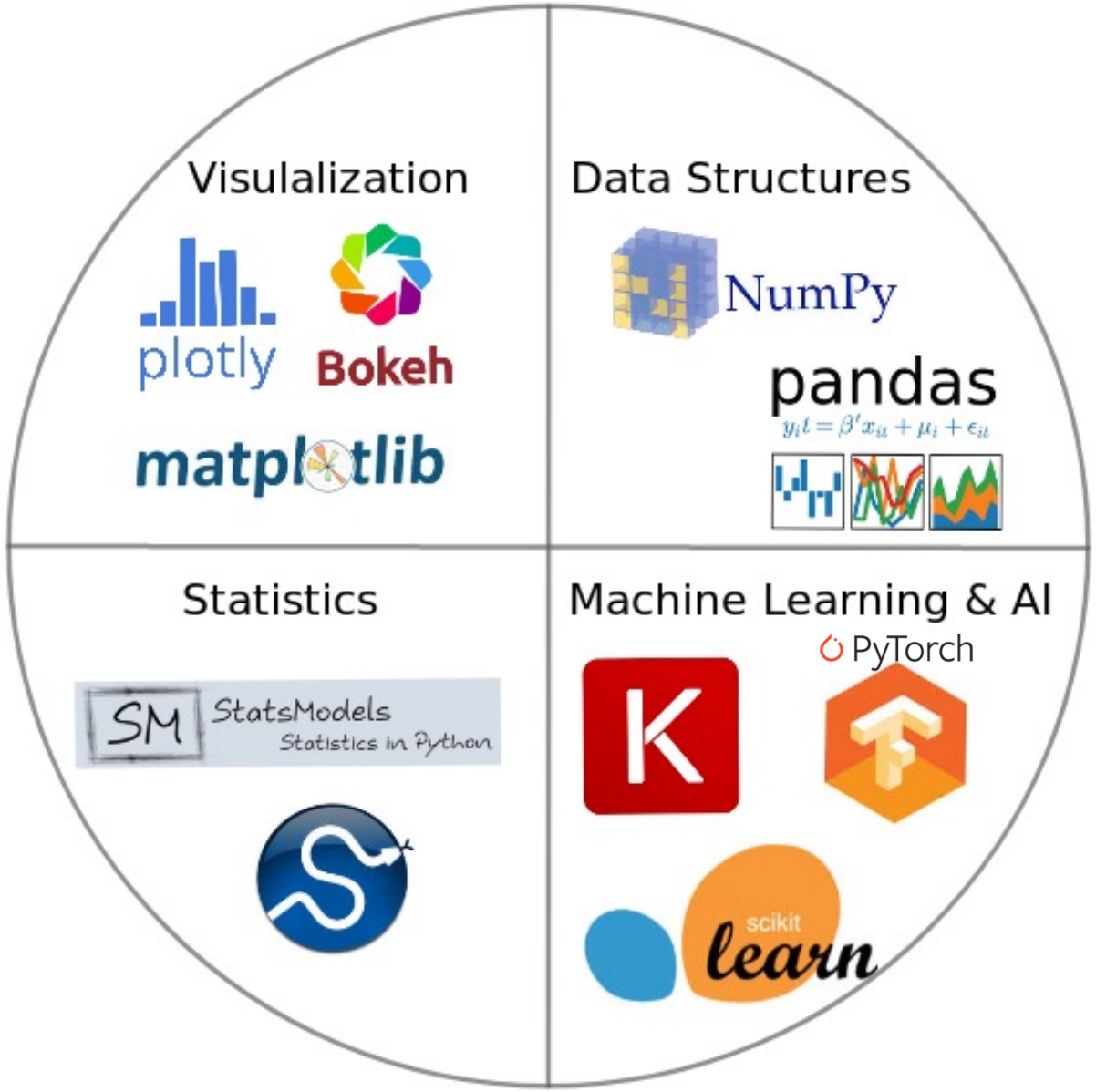
Source: https://www.python.org/doc/essays/blurb/

Python Ecosystem for Data Science



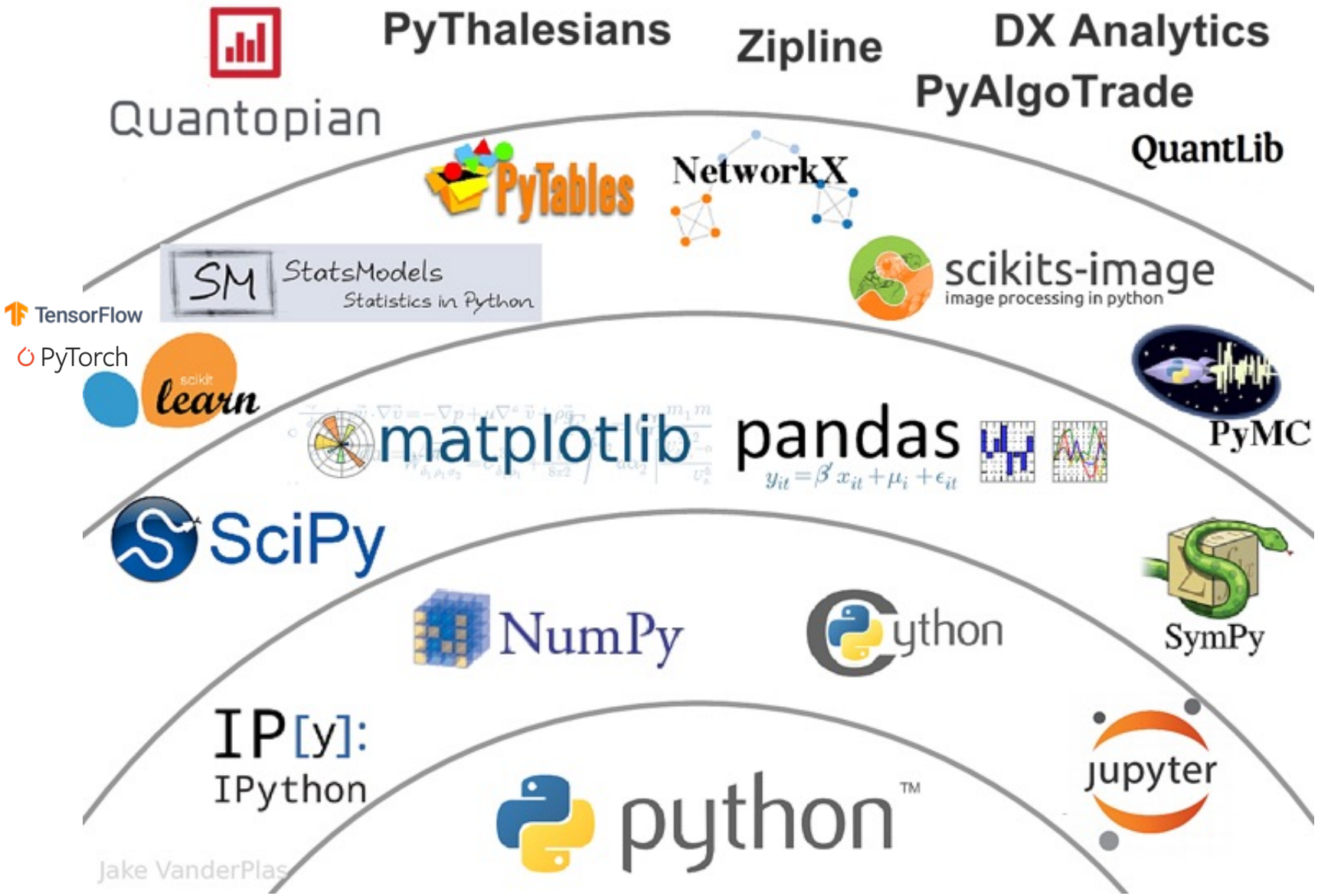
Source: https://medium.com/pyfinance/why-python-is-best-choice-for-financial-data-modeling-in-2019-c0d0d1858c45

Python Ecosystem for Data Science



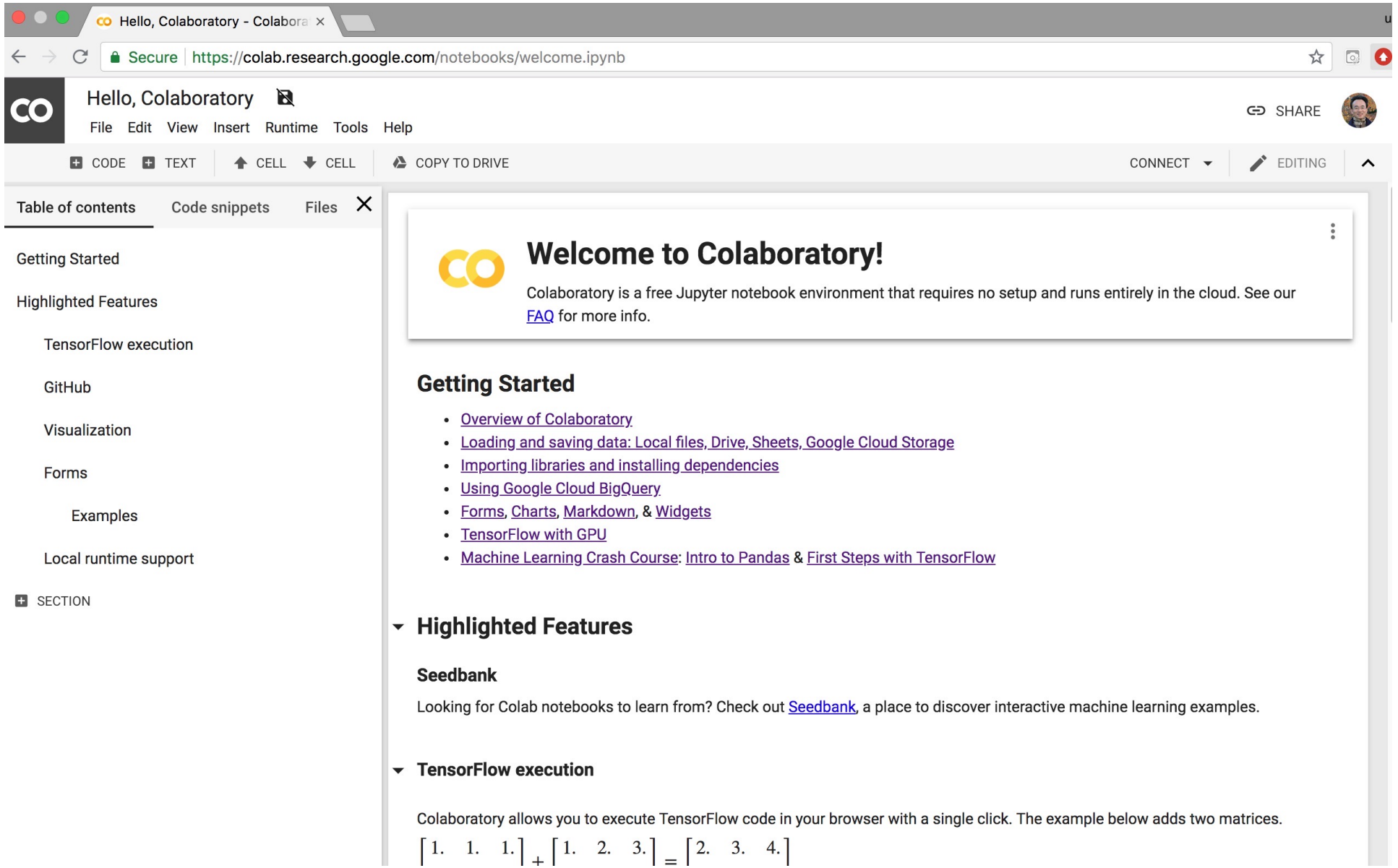
Source:https://duchesnay.github.io/pystatsml/introduction/python_ecosystem.html

The Quant Finance PyData Stack



Source: http://nbviewer.jupyter.org/format/slides/github/quantopian/pyfolio/blob/master/pyfolio/examples/overview_slides.ipynb#/5

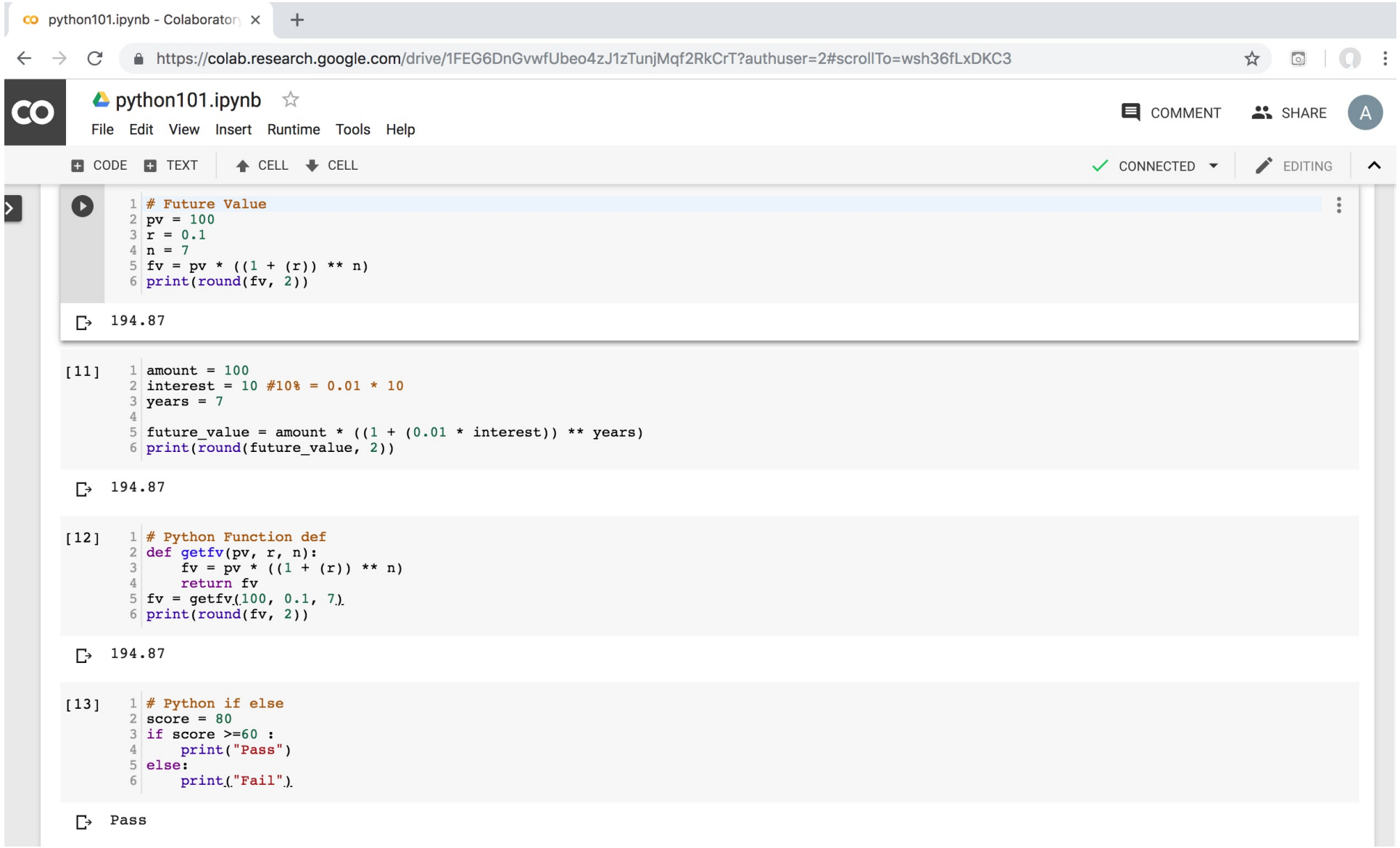
Google Colab



https://colab.research.google.com/notebooks/welcome.ipynb

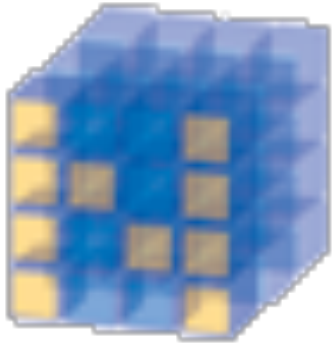
Python in Google Colab (Python101)

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT



https://tinyurl.com/aintpupython101

Numpy



NumPy

Base

N-dimensional array

package

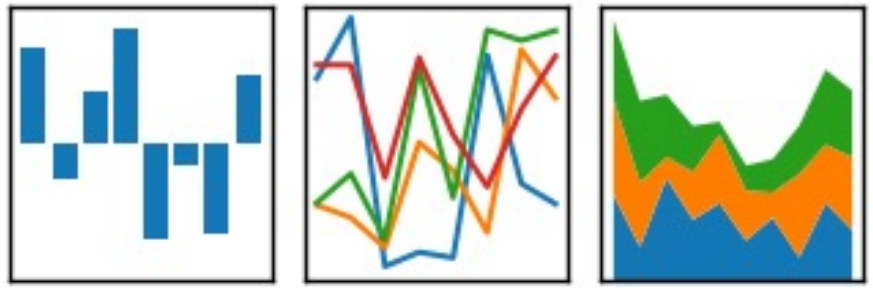
Python matplotlib

Source: https://matplotlib.org/

Python Pandas

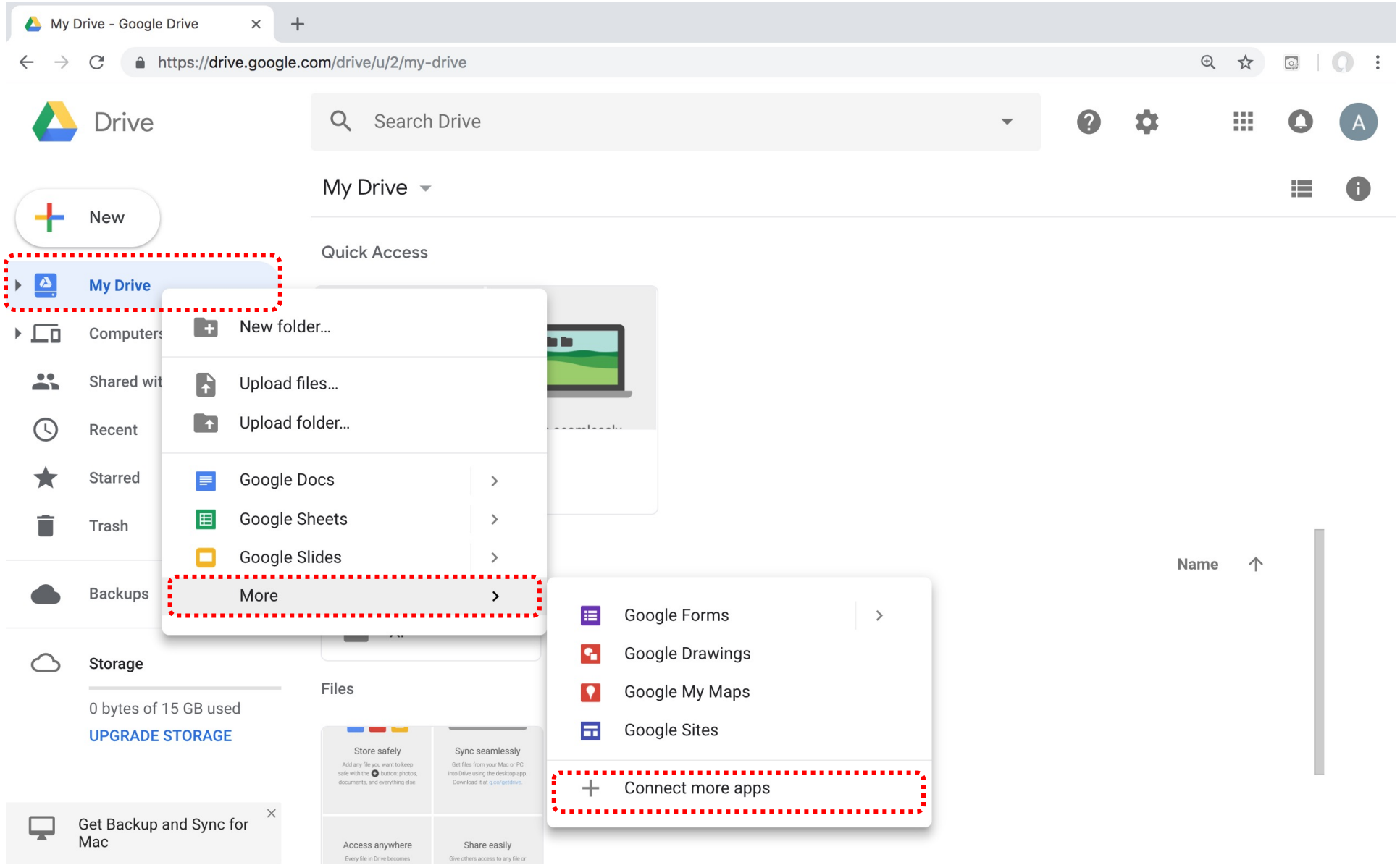
pandas

$$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$$

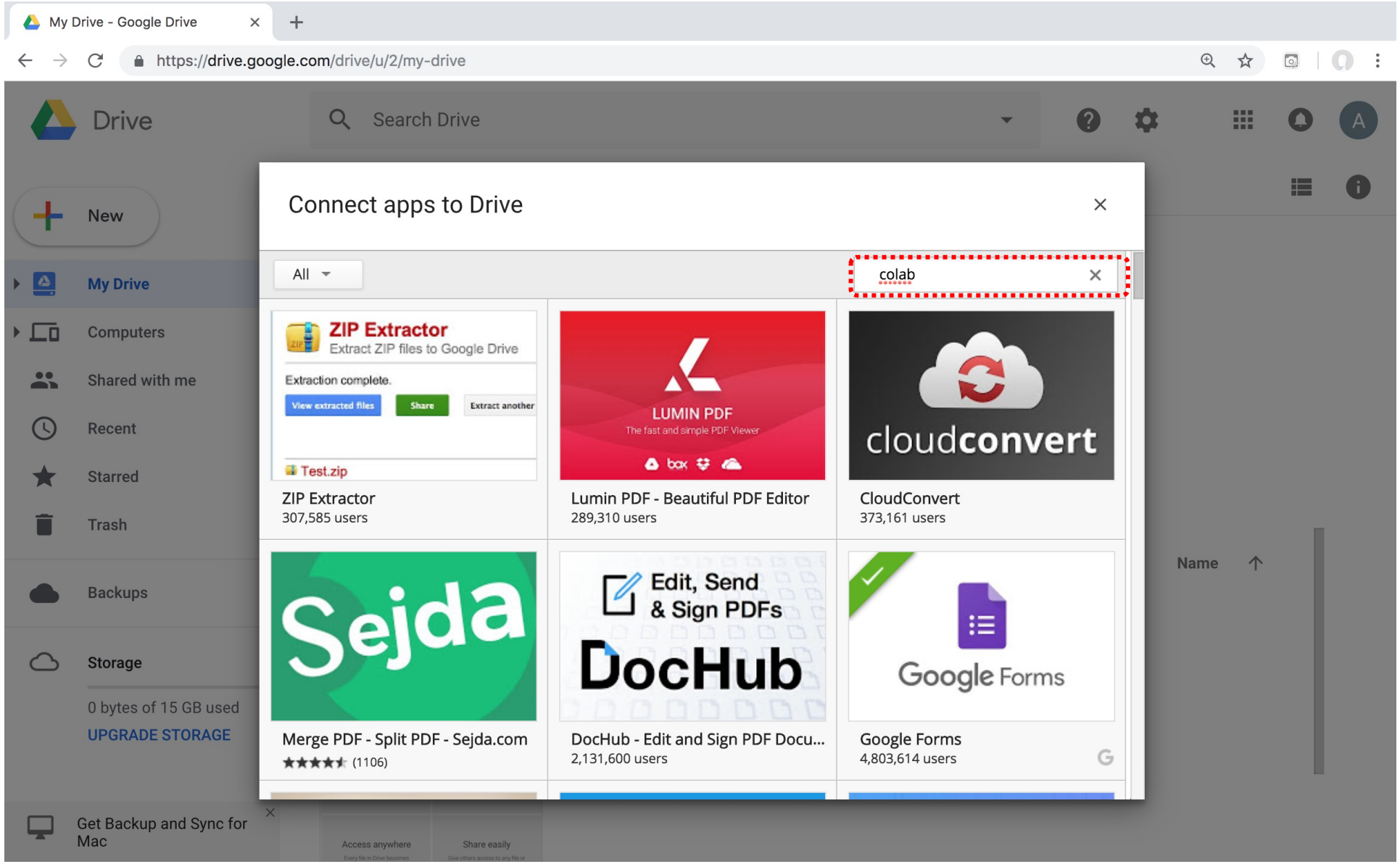


http://pandas.pydata.org/

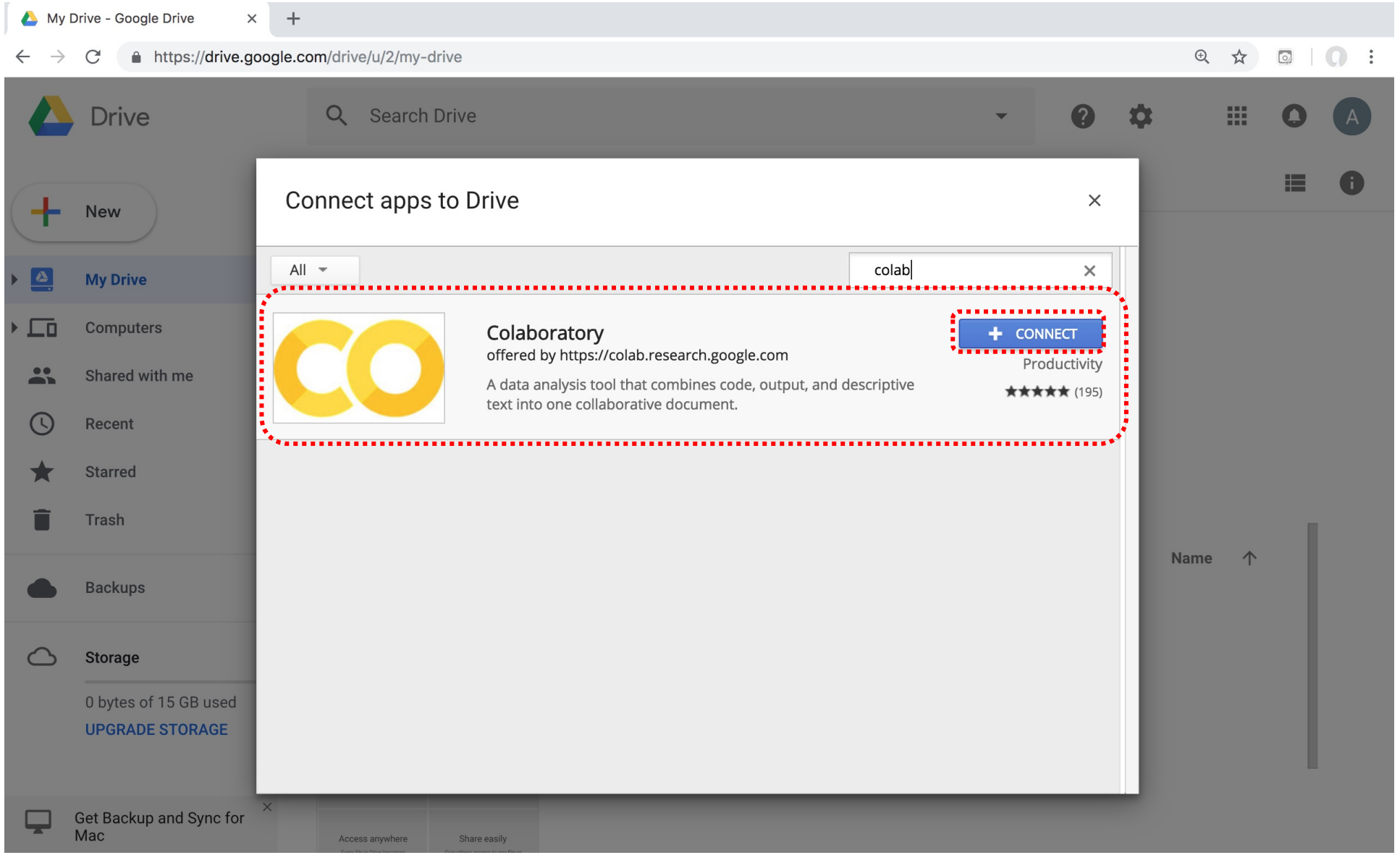
Connect Google Colab in Google Drive



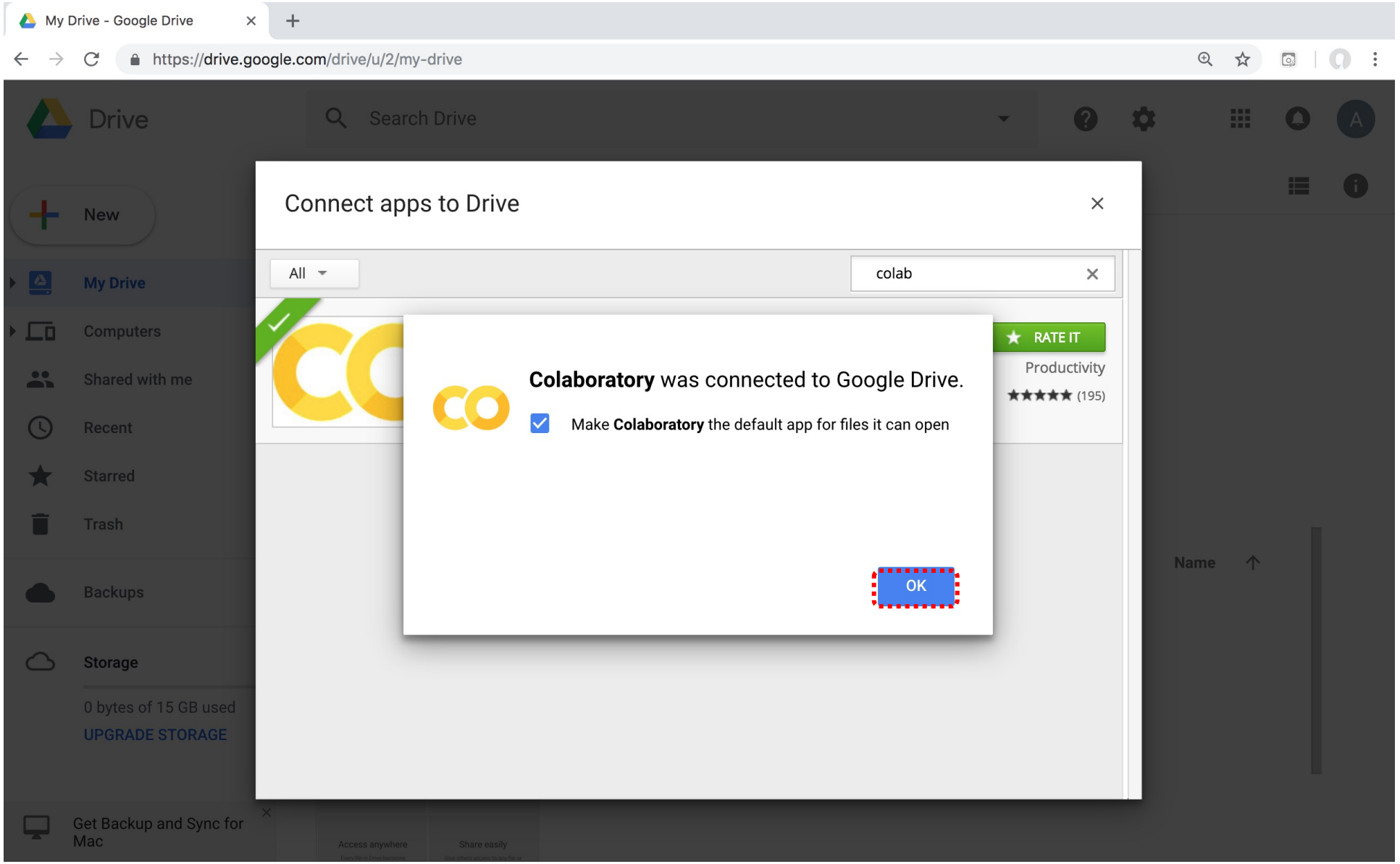
Google Colab



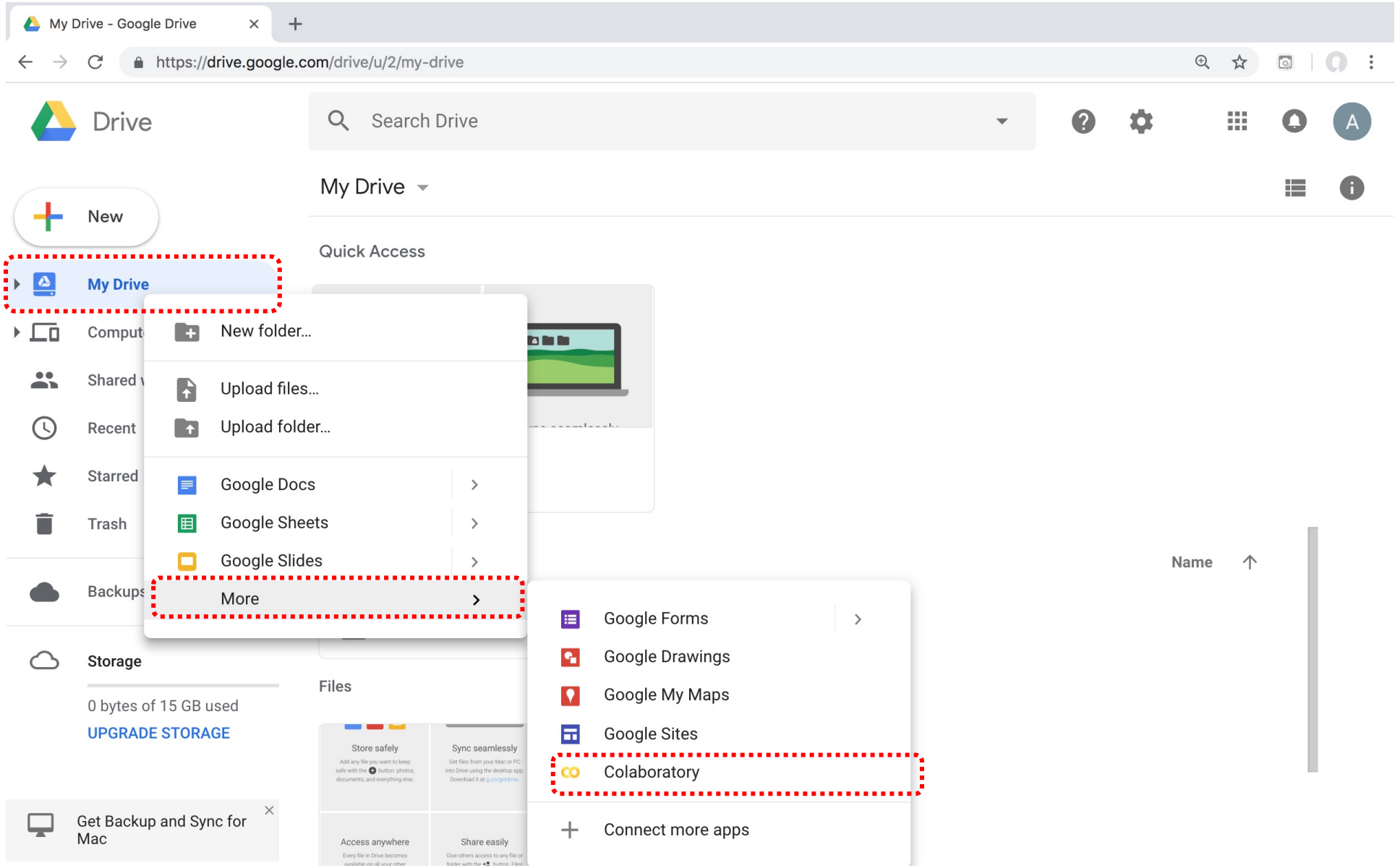
Google Colab



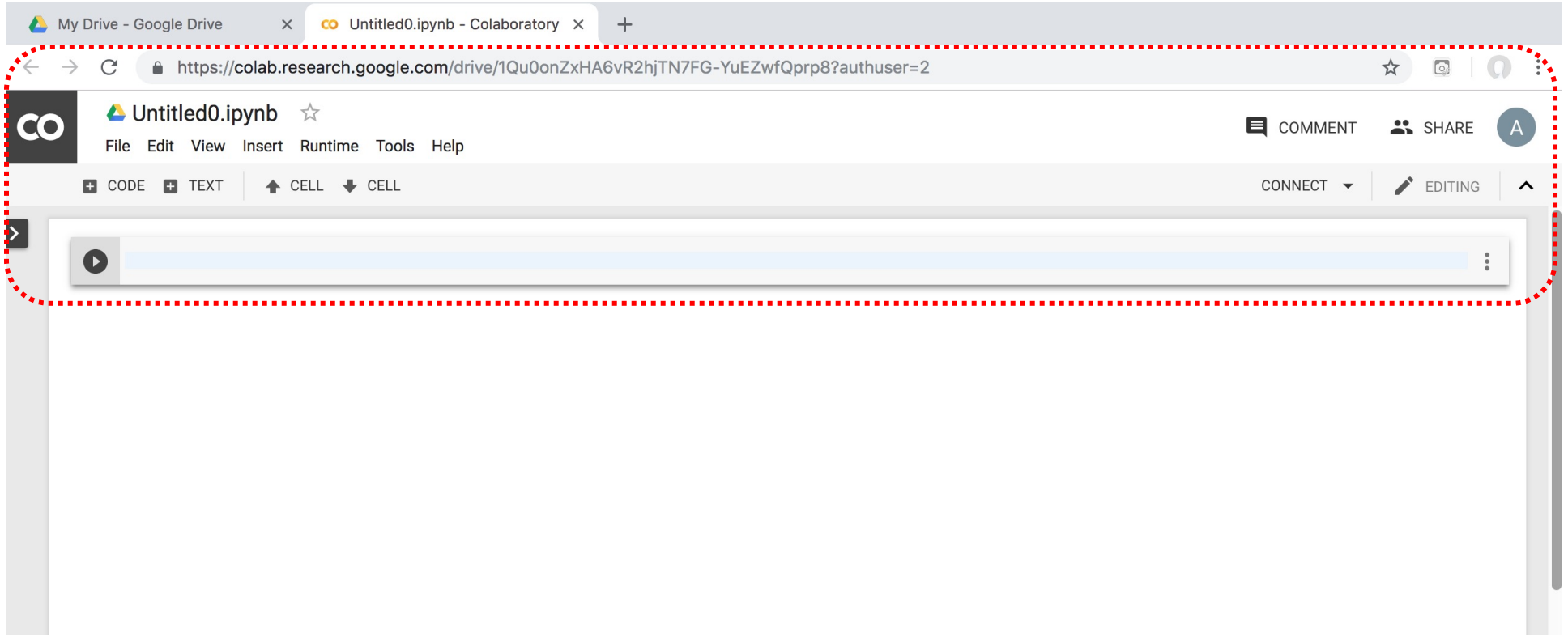
Connect Colaboratory to Google Drive



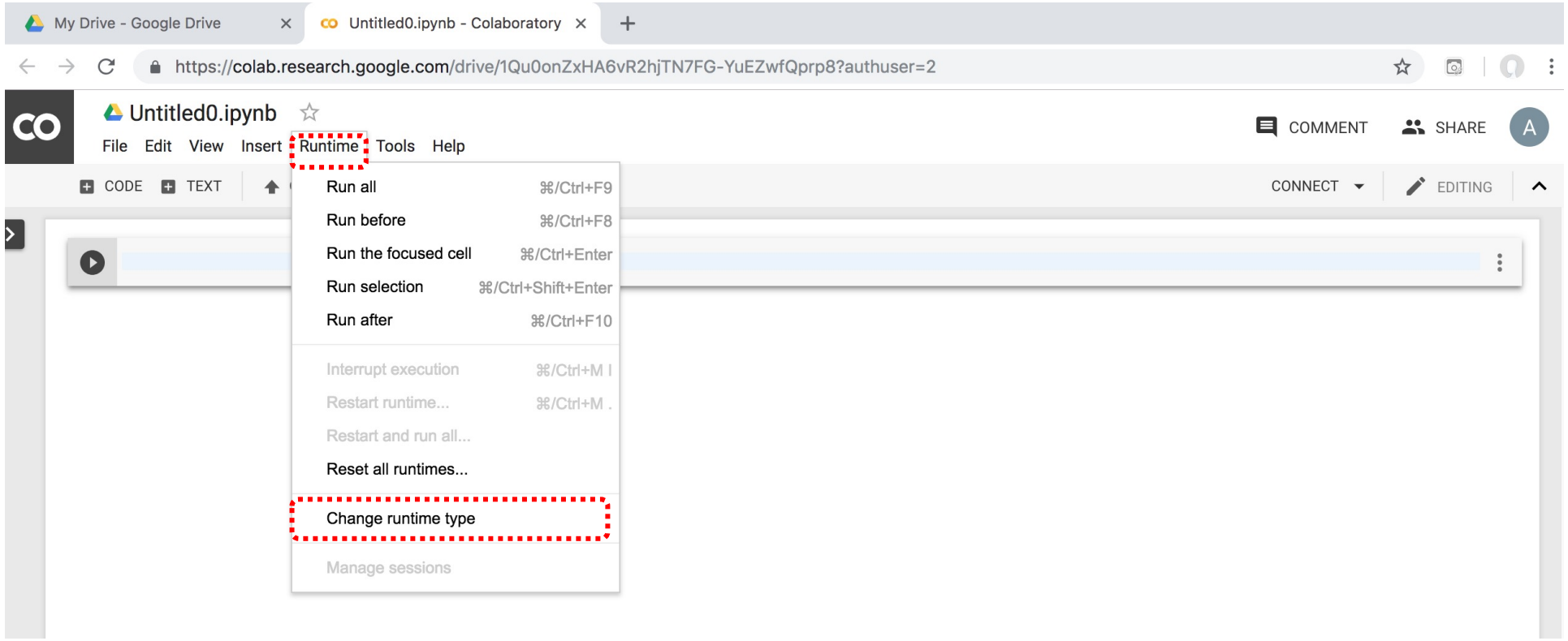
Google Colab



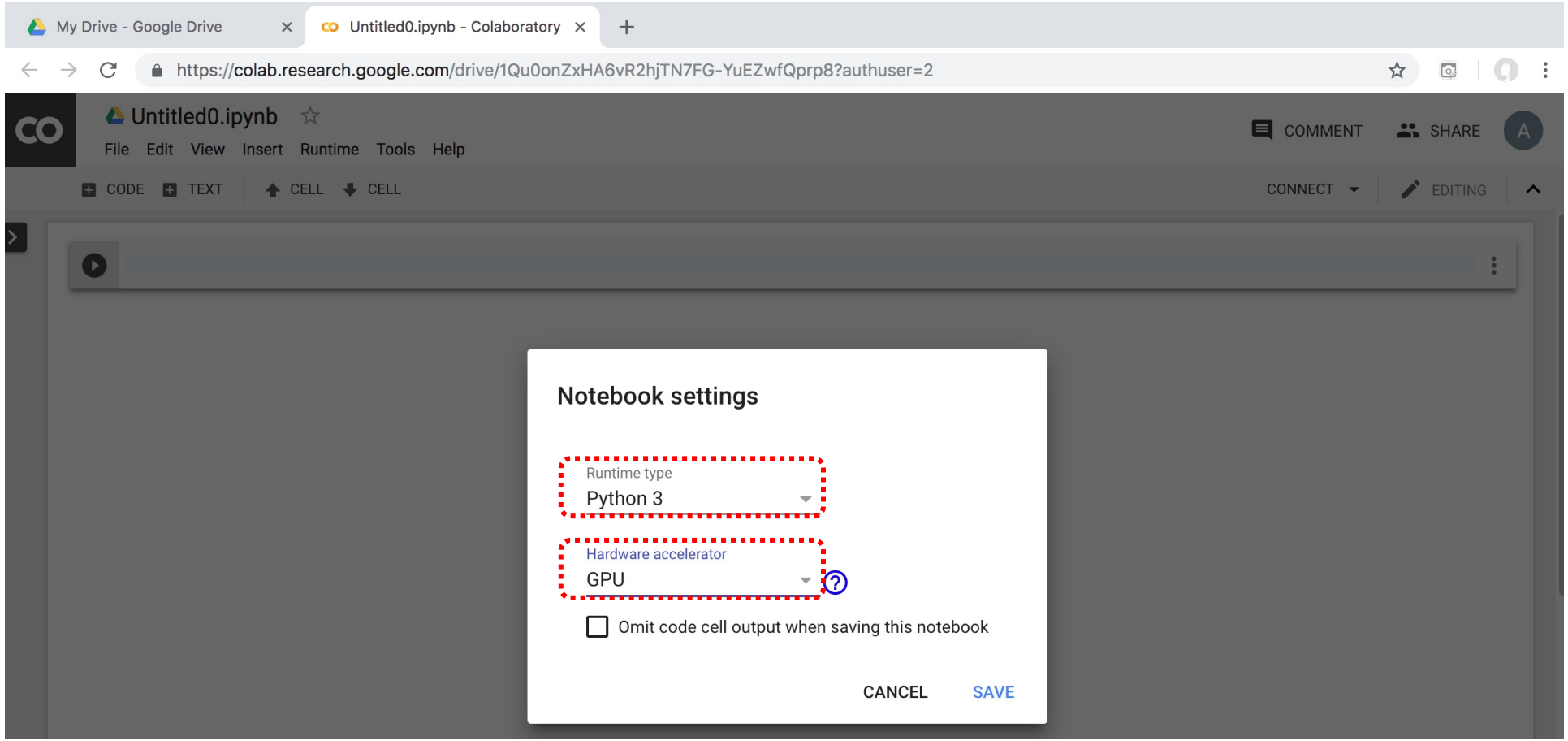
Google Colab



Google Colab



Run Jupyter Notebook
Python3 GPU
Google Colab

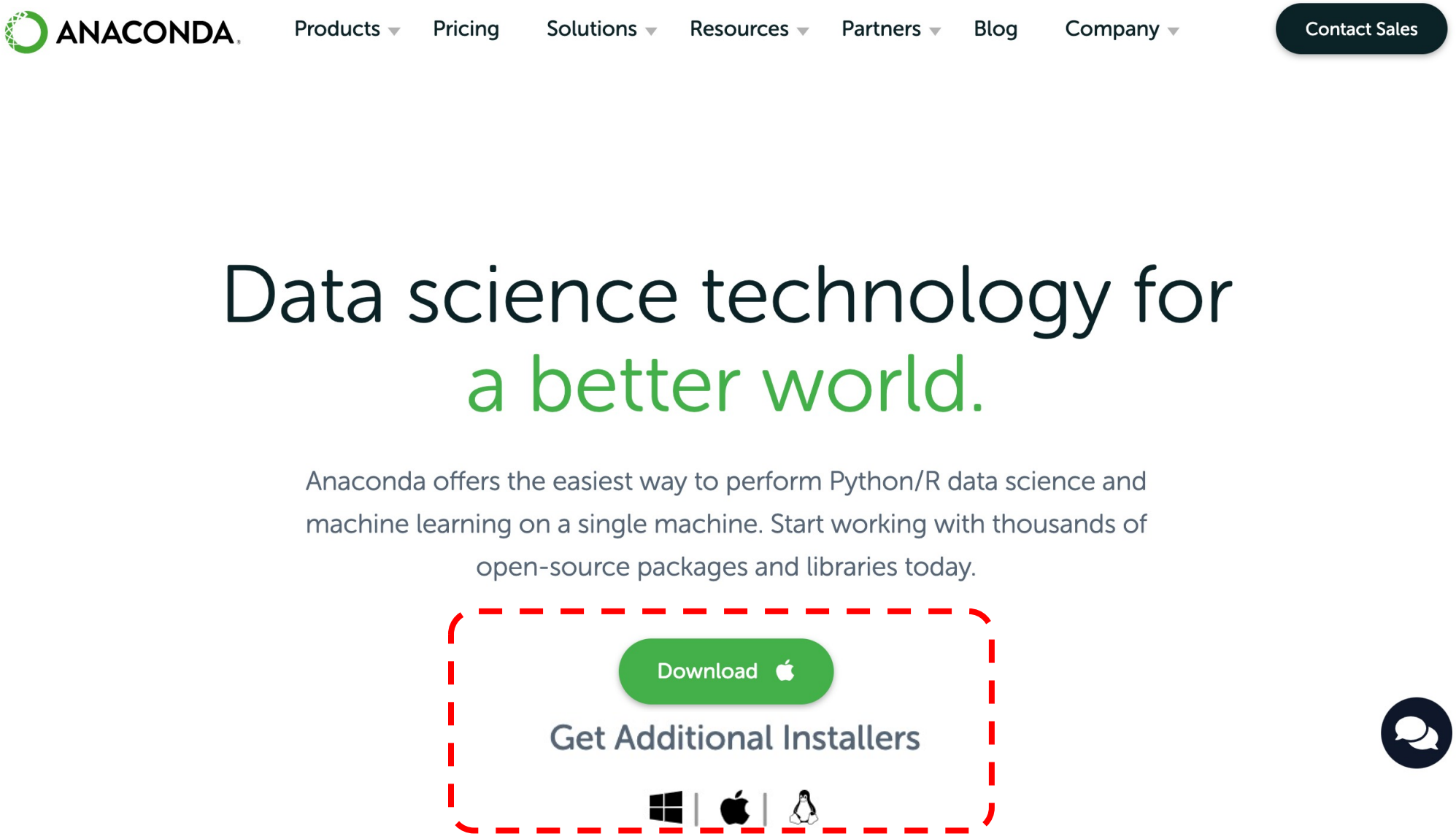


Google Colab Python Hello World
print('Hello World')

Anaconda
The Most Popular
Python
Data Science Platform

Source: https://www.anaconda.com/

Download Anaconda

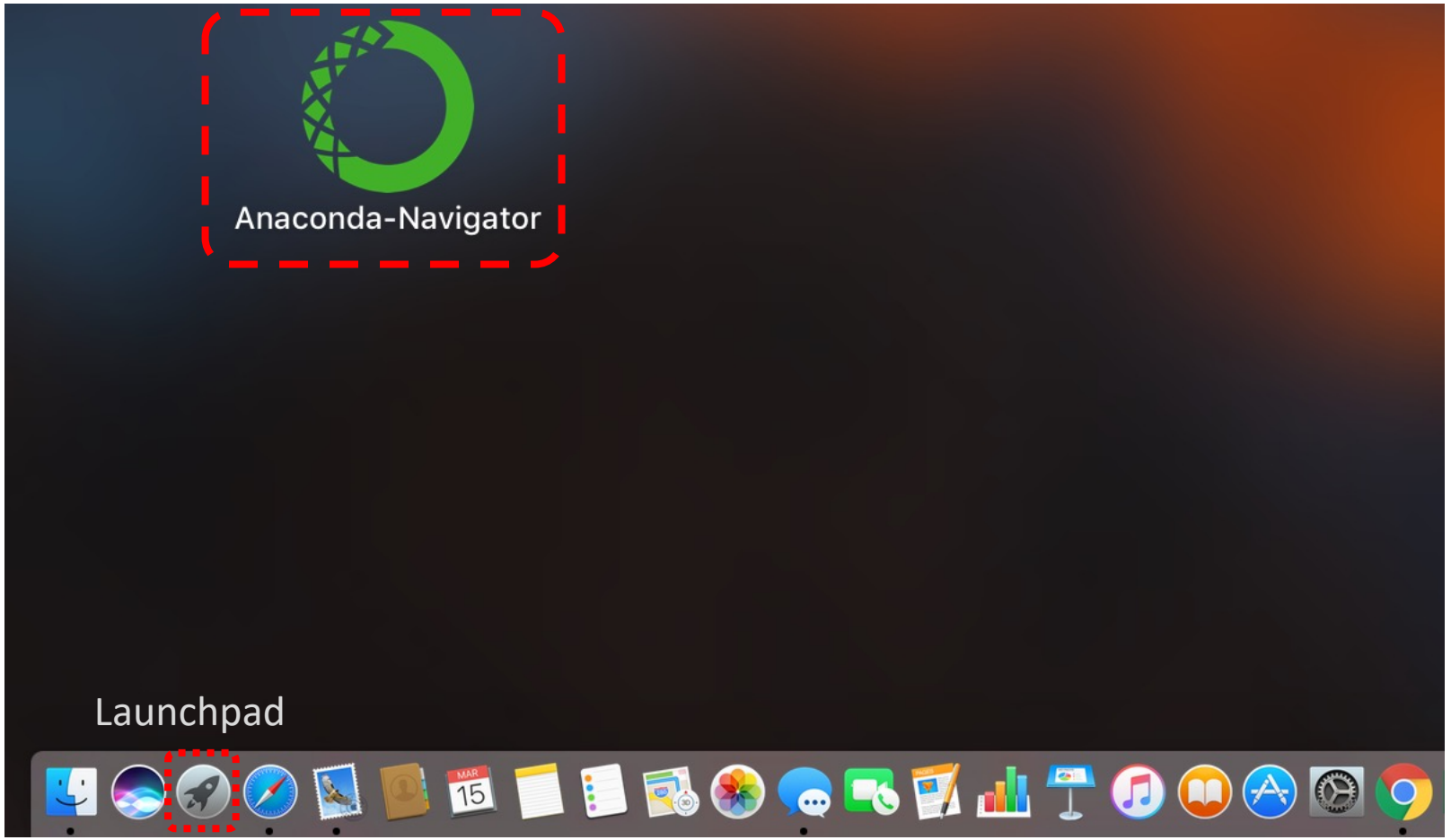


https://www.anaconda.com/download

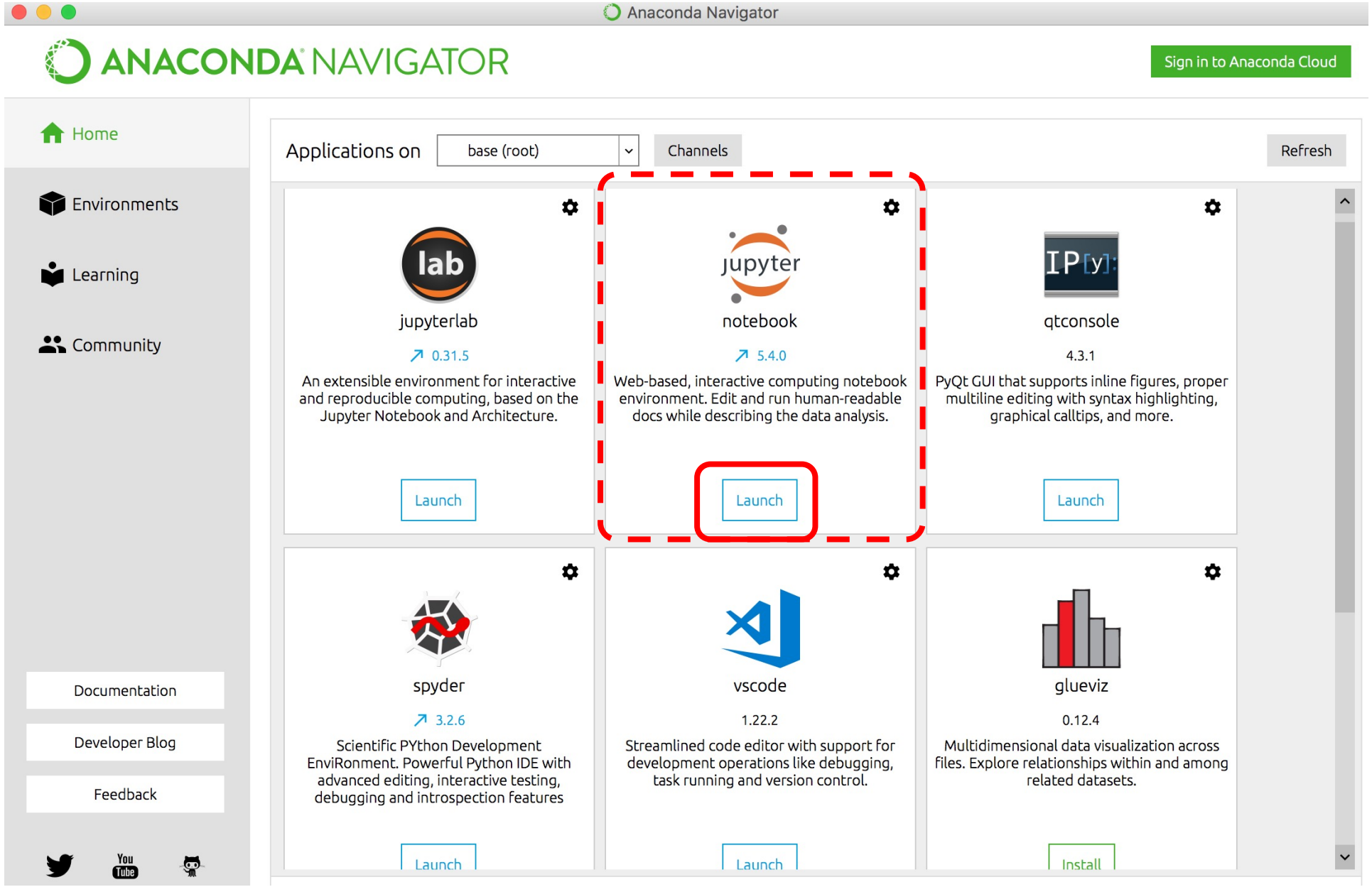
Python

HelloWorld

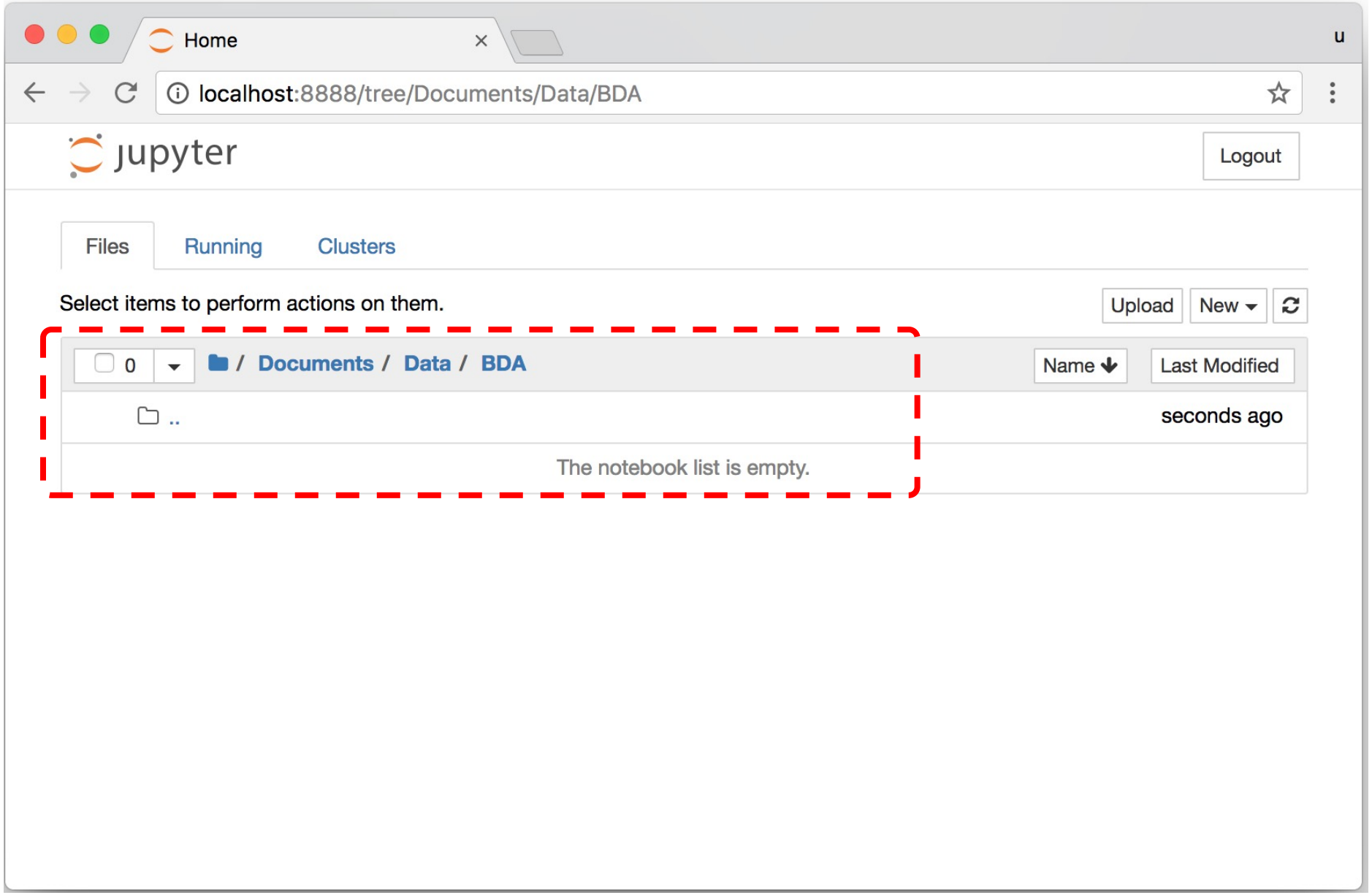
Anaconda-Navigator



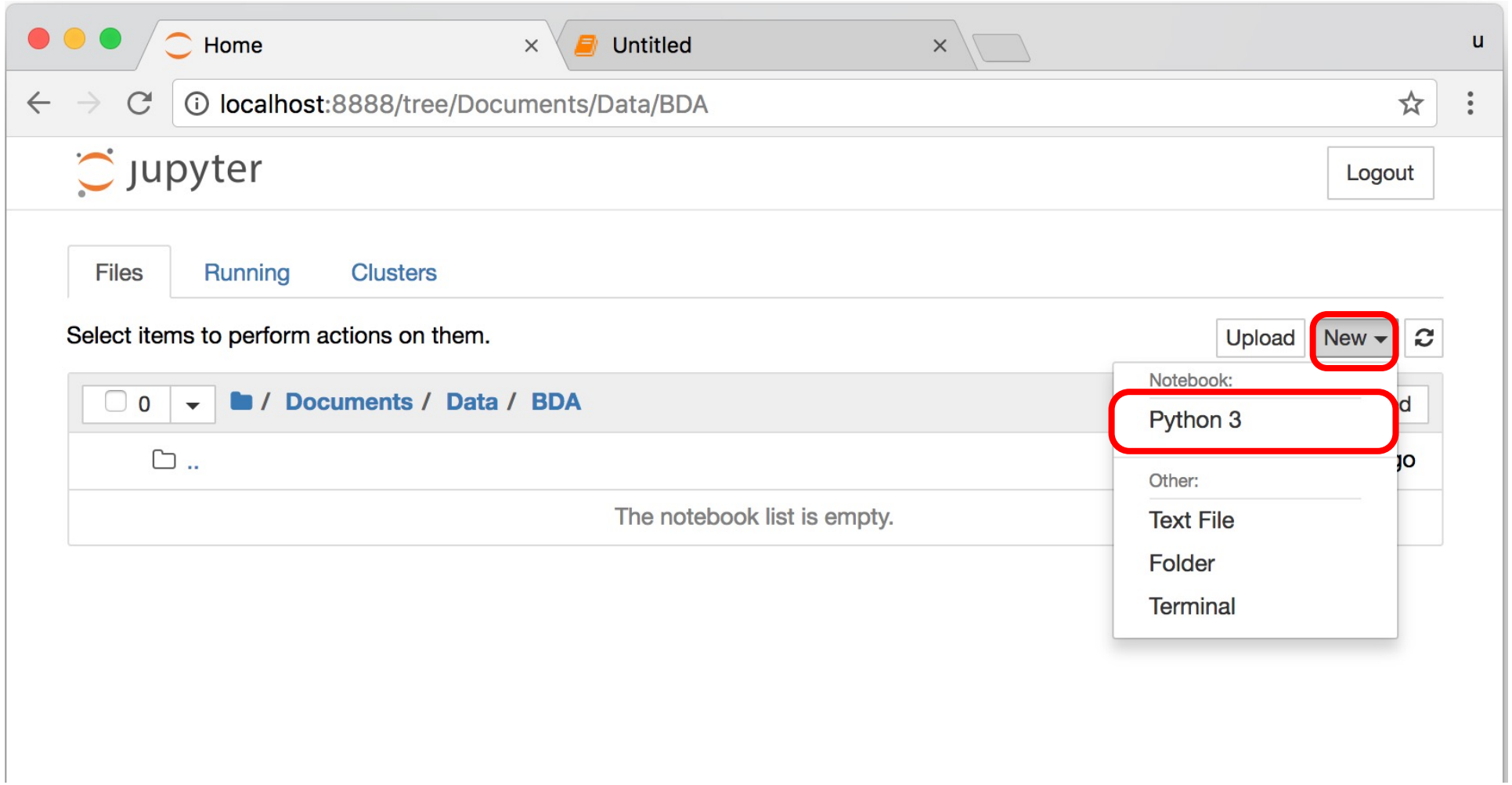
Anaconda Navigator



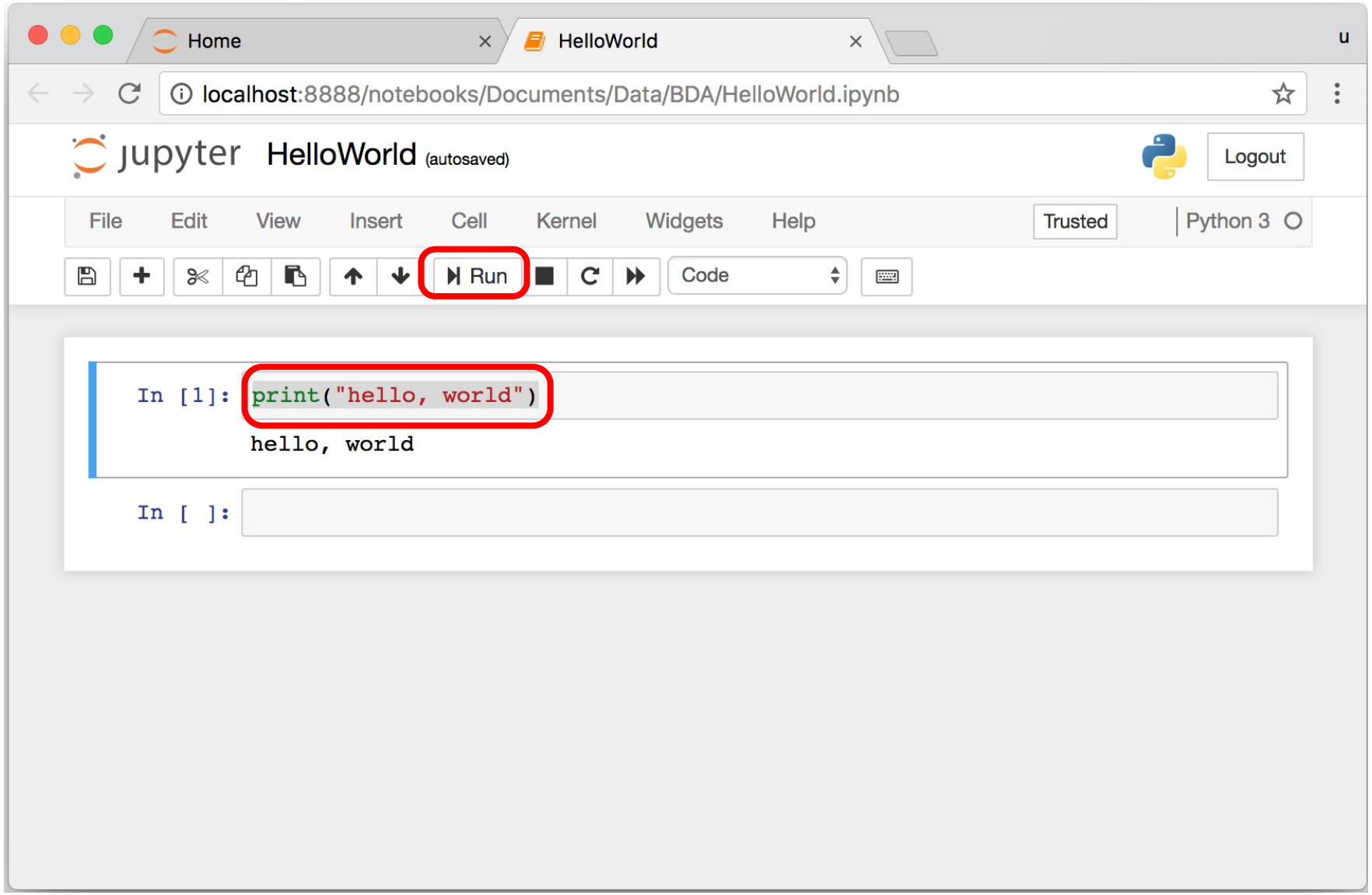
Jupyter Notebook



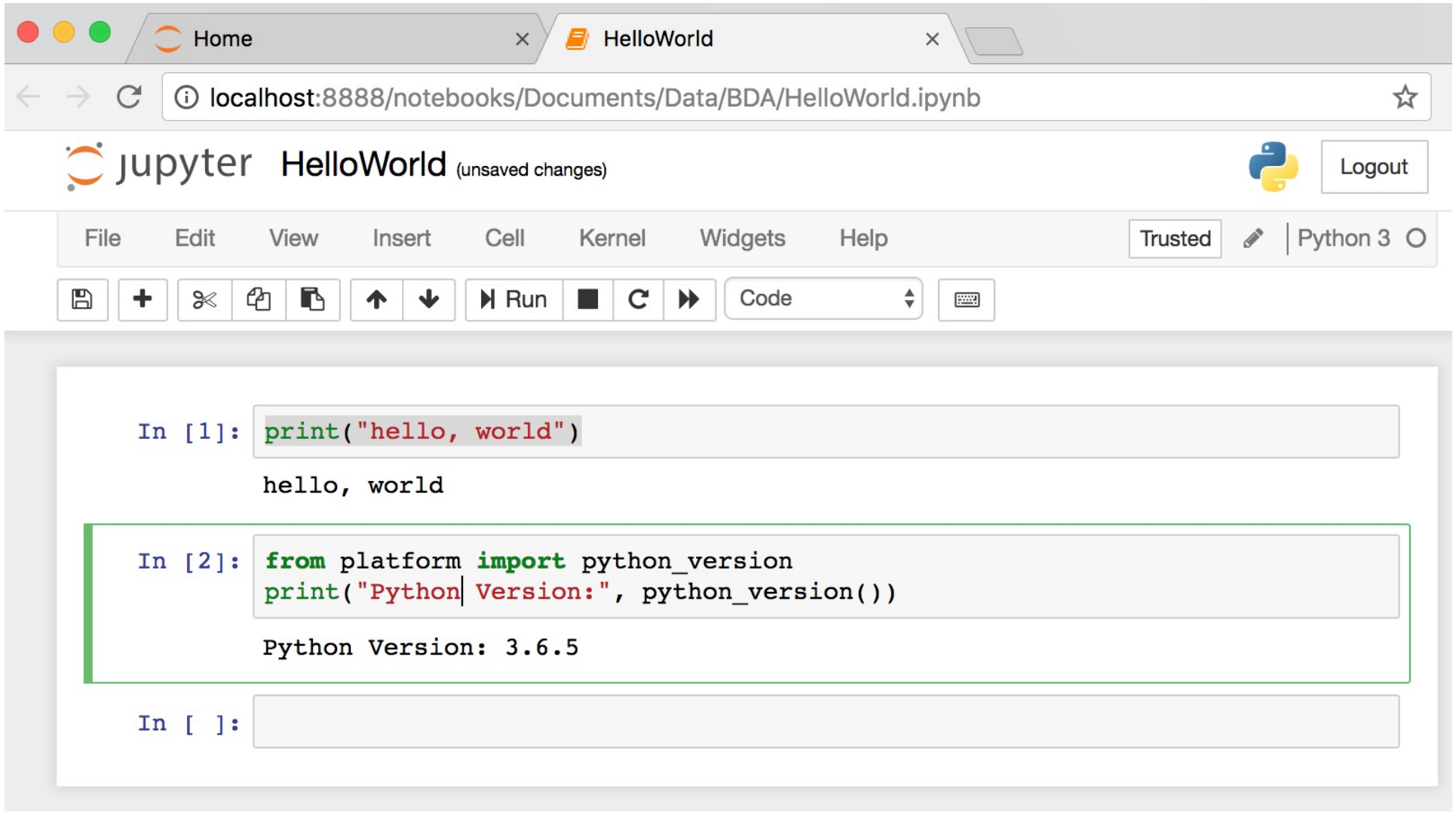
Jupyter Notebook
New Python 3



print("hello, world")



```
from platform import python_version
print("Python Version:", python_version())
```

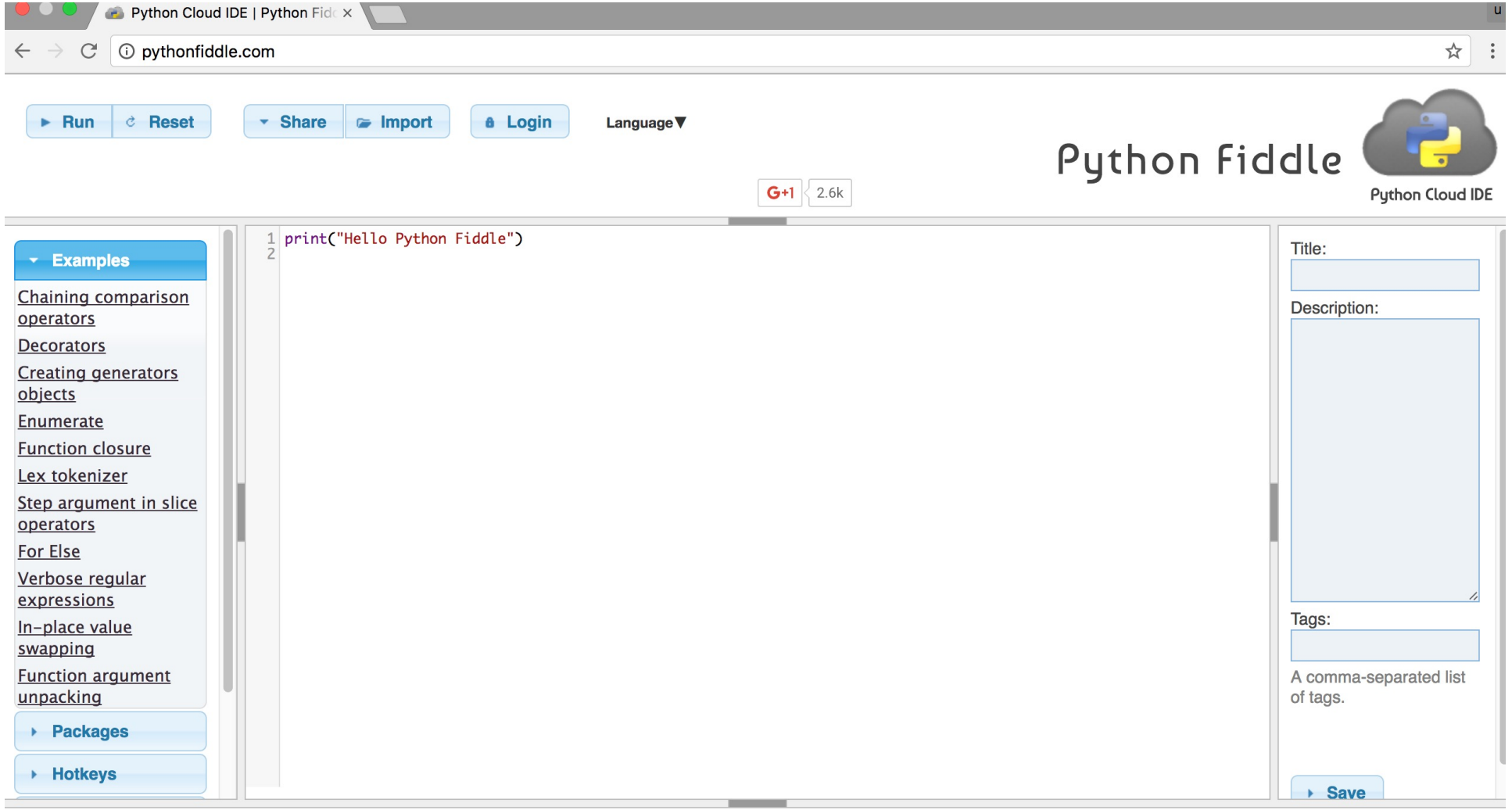


Python

Programming

Source: https://www.python.org/community/logos/

Python Fiddle



http://pythonfiddle.com/

Text input and output

```
print("Hello World")
```

```
print("Hello World\nThis is a message")
```

```
x = 3
print(x)
```

```
x = 2
y = 3
print(x, ' ', y)
```

```
name = input("Enter a name: ")
```

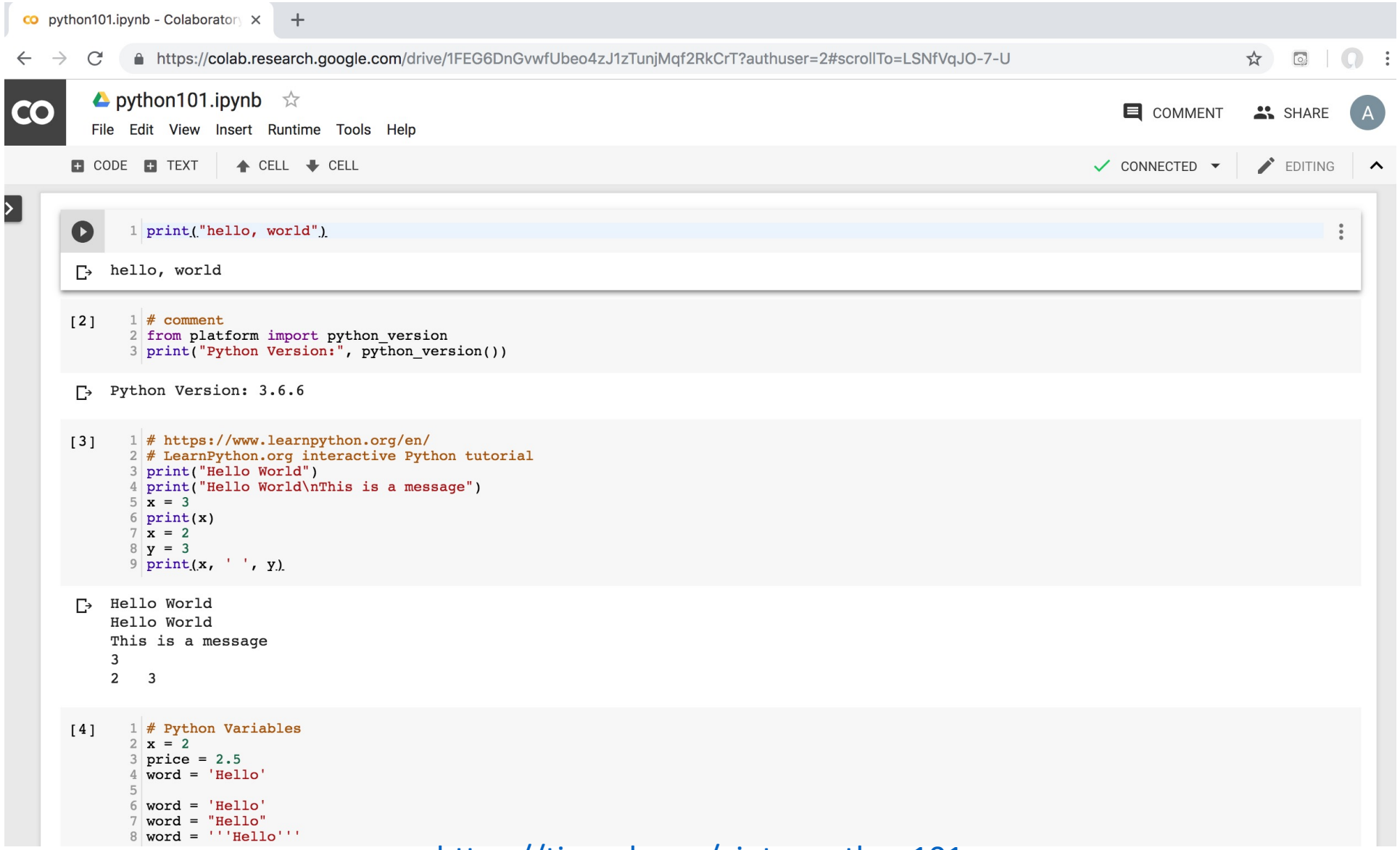
```
x = int(input("What is x? "))
```

```
x = float(input("Write a number "))
```

Source: http://pythonprogramminglanguage.com/text-input-and-output/

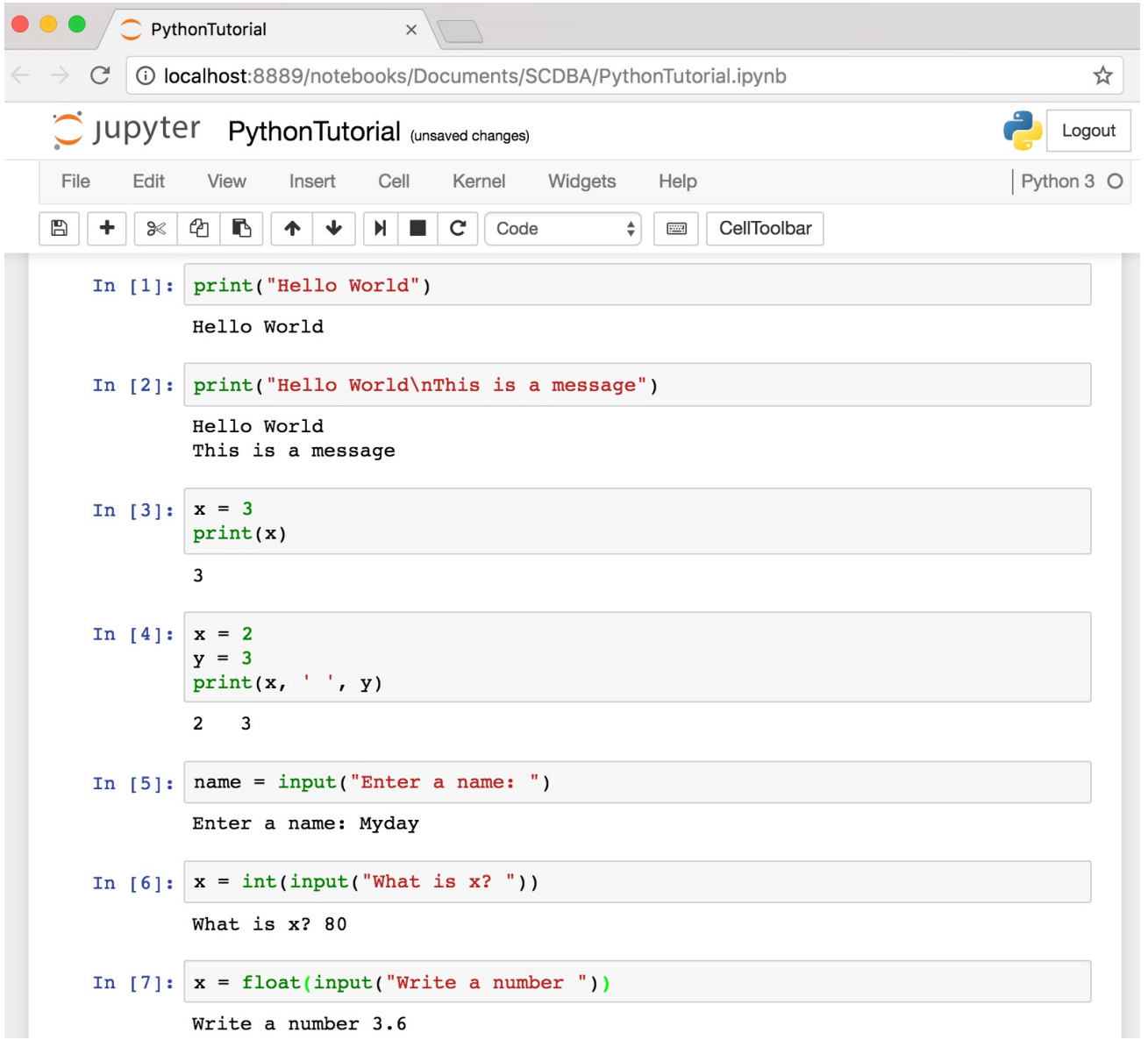
Python in Google Colab

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT



https://tinyurl.com/aintpupython101

Text input and output



Source: http://pythonprogramminglanguage.com/text-input-and-output/

Variables

```
x = 2
price = 2.5
word = 'Hello'
```

```
word = 'Hello'
word = "Hello"
word = '''Hello'''
```

```
x = 2
x = x + 1
x = 5
```

Source: http://pythonprogramminglanguage.com/

Python Basic Operators

```
print('7 + 2 =', 7 + 2)
print('7 - 2 =', 7 - 2)
print('7 * 2 =', 7 * 2)
print('7 / 2 =', 7 / 2)
print('7 // 2 =', 7 // 2)
print('7 % 2 =', 7 % 2)
print('7 ** 2 =', 7 ** 2)
```

```
print('7 + 2 =', 7 + 2)
print('7 - 2 =', 7 - 2)
print('7 * 2 =', 7 * 2)
print('7 / 2 =', 7 / 2)
print('7 // 2 =', 7 // 2)
print('7 % 2 =', 7 % 2)
print('7 ** 2 =', 7 ** 2)
```

```
7 + 2 = 9
7 - 2 = 5
7 * 2 = 14
7 / 2 = 3.5
7 // 2 = 3
7 % 2 = 1
7 ** 2 = 49
```

BMI Calculator in Python

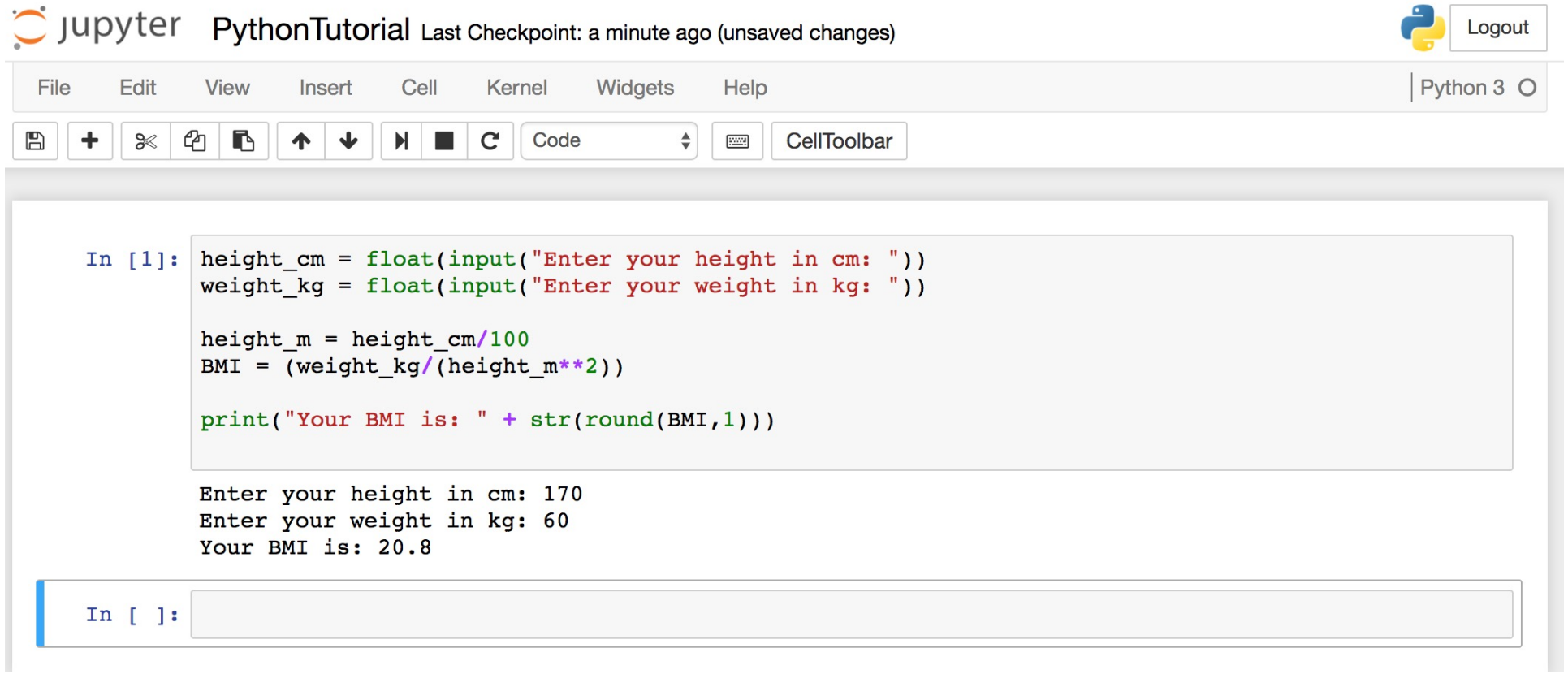
```
height_cm = float(input("Enter your height in cm: "))
weight_kg = float(input("Enter your weight in kg: "))

height_m = height_cm/100
BMI = (weight_kg/(height_m**2))

print("Your BMI is: " + str(round(BMI,1)))
```

Source: http://code.activestate.com/recipes/580615-bmi-code/

BMI Calculator in Python



Source: http://code.activestate.com/recipes/580615-bmi-code/

Future value of a specified principal amount, rate of interest, and a number of years

Source: https://www.w3resource.com/python-exercises/python-basic-exercise-39.php

Future Value (FV)

```
# How much is your $100 worth after 7 years?
print(100 * 1.1 ** 7)
# output = 194.87
```

```
print(100 * 1.1 ** 7)
```

```
194.87171000000012
```

Source: https://www.w3resource.com/python-exercises/python-basic-exercise-39.php

Future Value (FV)

```
pv = 100
r = 0.1
n = 7

fv = pv * ((1 + (r)) ** n)
print(round(fv, 2))
```

```
pv = 100
r = 0.1
n = 7

fv = pv * ((1 + (r)) ** n)
print(round(fv, 2))
```

```
194.87
```

Future Value (FV)

```
amount = 100
interest = 10 #10% = 0.01 * 10
years = 7

future_value = amount * ((1 + (0.01 * interest)) ** years)
print(round(future_value, 2))
```

```
amount = 100
interest = 10 #10% = 0.01 * 10
years = 7

future_value  = amount * ((1 + (0.01 * interest)) ** years)
print(round(future_value, 2))
```

```
194.87
```

Source: https://www.w3resource.com/python-exercises/python-basic-exercise-39.php

if statements

>	greater than
<	smaller than
==	equals
!=	is not

```
score = 80
if score >=60 :
    print("Pass")
else:
    print("Fail")
```

```
Pass
```


```
score = 80
if score >=60 :
    print("Pass")
else:
    print("Fail")
```


Source: http://pythonprogramminglanguage.com/

if elif else

```
score = 90
grade = ""
if score >=90:
    grade = "A"
elif score >= 80:
    grade = "B"
elif score >= 70:
    grade = "C"
elif score >= 60:
    grade = "D"
else:
    grade = "E"
print(grade)
# grade = "A"
```

```
A
```

http://pythontutor.com/visualize.html
https://goo.gl/E6w5ph

Source: http://pythonprogramminglanguage.com/

python™

for loops

```
for i in range(1,11):
    print(i)
```

```
1
2
3
4
5
6
7
8
9
10
```

Source: http://pythonprogramminglanguage.com/

python™

for loops

```
for i in range(1,10):
    for j in range(1,10):
        print(i, ' * ' , j , ' = ', i*j)
```

```
9 * 1 = 9
9 * 2 = 18
9 * 3 = 27
9 * 4 = 36
9 * 5 = 45
9 * 6 = 54
9 * 7 = 63
9 * 8 = 72
9 * 9 = 81
```

Source: http://pythonprogramminglanguage.com/

while loops

```
age = 10

while age < 20:
    print(age)
    age = age + 1
```

```
10
11
12
13
14
15
16
17
18
19
```

Source: https://learnpython.trinket.io/learn-python-part-8-loops#/while-loops/about-while-loops

def Functions

```
def convertCMtoM(xcm):
    m = xcm/100
    return m

cm = 180
m = convertCMtoM(cm)
print(str(m))
```

```
1.8
```

Lists []

```
x = [60, 70, 80, 90]
print(len(x))
print(x[0])
print(x[1])
print(x[-1])
```

```
4
60
70
90
```

Tuples ()

A tuple in Python is a collection that cannot be modified.

A tuple is defined using parenthesis.

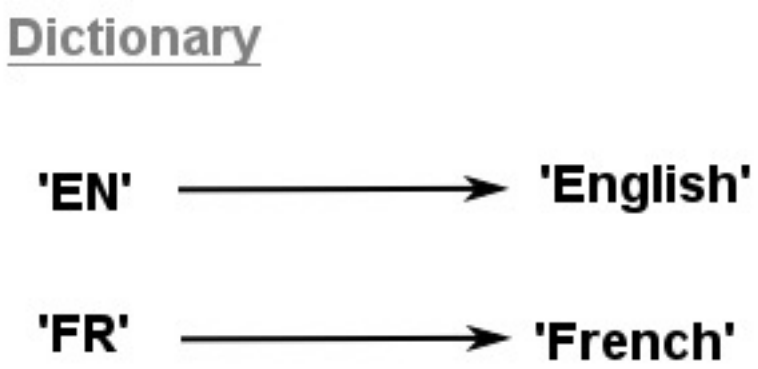
```
x = (10, 20, 30, 40, 50)
print(x[0])
print(x[1])
print(x[2])
print(x[-1])
```

```
10
20
30
50
```

Source: http://pythonprogramminglanguage.com/tuples/

Dictionary {key : value}

```
k = { 'EN':'English', 'FR':'French' }
print(k['EN'])
```



English

Source: http://pythonprogramminglanguage.com/dictionary/

python™

Sets {}

```
animals = {'cat', 'dog'}
```

```
animals = {'cat', 'dog'}
print('cat' in animals)  # Check if an element is in a set; prints "True"
print('fish' in animals) # prints "False"
animals.add('fish')      # Add an element to a set
print('fish' in animals) # Prints "True"
print(len(animals))      # Number of elements in a set; prints "3"
animals.add('cat')       # Adding an element that is already in the set does nothing
print(len(animals))      # Prints "3"
animals.remove('cat')    # Remove an element from a set
print(len(animals))      # Prints "2"
```

```
True
False
True
3
3
2
```

```
animals = {'cat', 'dog'}
print('cat' in animals)
print('fish' in animals)
animals.add('fish')
print('fish' in animals)
print(len(animals))
animals.add('cat')
print(len(animals))
animals.remove('cat')
print(len(animals))
```

Source: http://cs231n.github.io/python-numpy-tutorial/

File Input / Output

```
with open('myfile.txt', 'w') as file:
    file.write('Hello World\nThis is Python File Input Output')

with open('myfile.txt', 'r') as file:
    text = file.read()
print(text)
```

```
with open('myfile.txt', 'w') as file:
    file.write('Hello World\nThis is Python File Input Output')
```

```
with open('myfile.txt', 'r') as file:
    text = file.read()
print(text)
```

```
Hello World
This is Python File Input Output
```

```
text
```

```
'Hello World\nThis is Python File Input Output'
```

Source: https://github.com/TiesdeKok/LearnPythonforResearch/blob/master/0_python_basics.ipynb

File Input / Output

```
with open('myfile.txt', 'a+') as file:
    file.write('\n' + 'New line')

with open('myfile.txt', 'r') as file:
    text = file.read()
print(text)
```

```
with open('myfile.txt', 'a+') as file:
    file.write('\n' + 'New line')
```

```
with open('myfile.txt', 'r') as file:
    text = file.read()
print(text)
```

```
Hello World
This is Python File Input Output
New line
```

Source: https://github.com/TiesdeKok/LearnPythonforResearch/blob/master/0_python_basics.ipynb

try except finally

```
try:
    file = open("myfile.txt")
    #file = open("myfile.txt", 'w')
    file.write("Python write file")
    print("file saved")
except:
    print("Exception file Error")
finally:
    file.close()
    print("finally process")
```

```
Exception file Error
finally process
```

Source: https://pythonbasics.org/try-except/

class

```
class Person:
  def __init__(self, name, age):
    self.name = name
    self.age = age

  def myfunc(self):
    print("Hello my name is " + self.name)

p1 = Person("Alan", 20)
p1.myfunc()
print(p1.name)
print(p1.age)
```

```
Hello my name is Alan
Alan
20
```

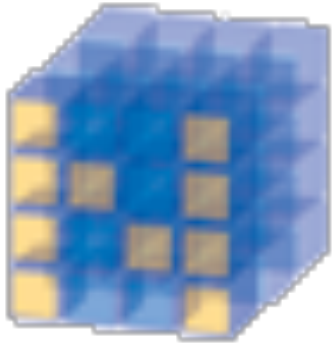
Source: https://www.w3schools.com/python/python_classes.asp

Big Data Analytics with

Numpy

in Python

Numpy



NumPy

Base

N-dimensional array

package

NumPy

is the

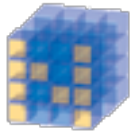
fundamental package

for

scientific computing

with Python.

Source: http://www.numpy.org/



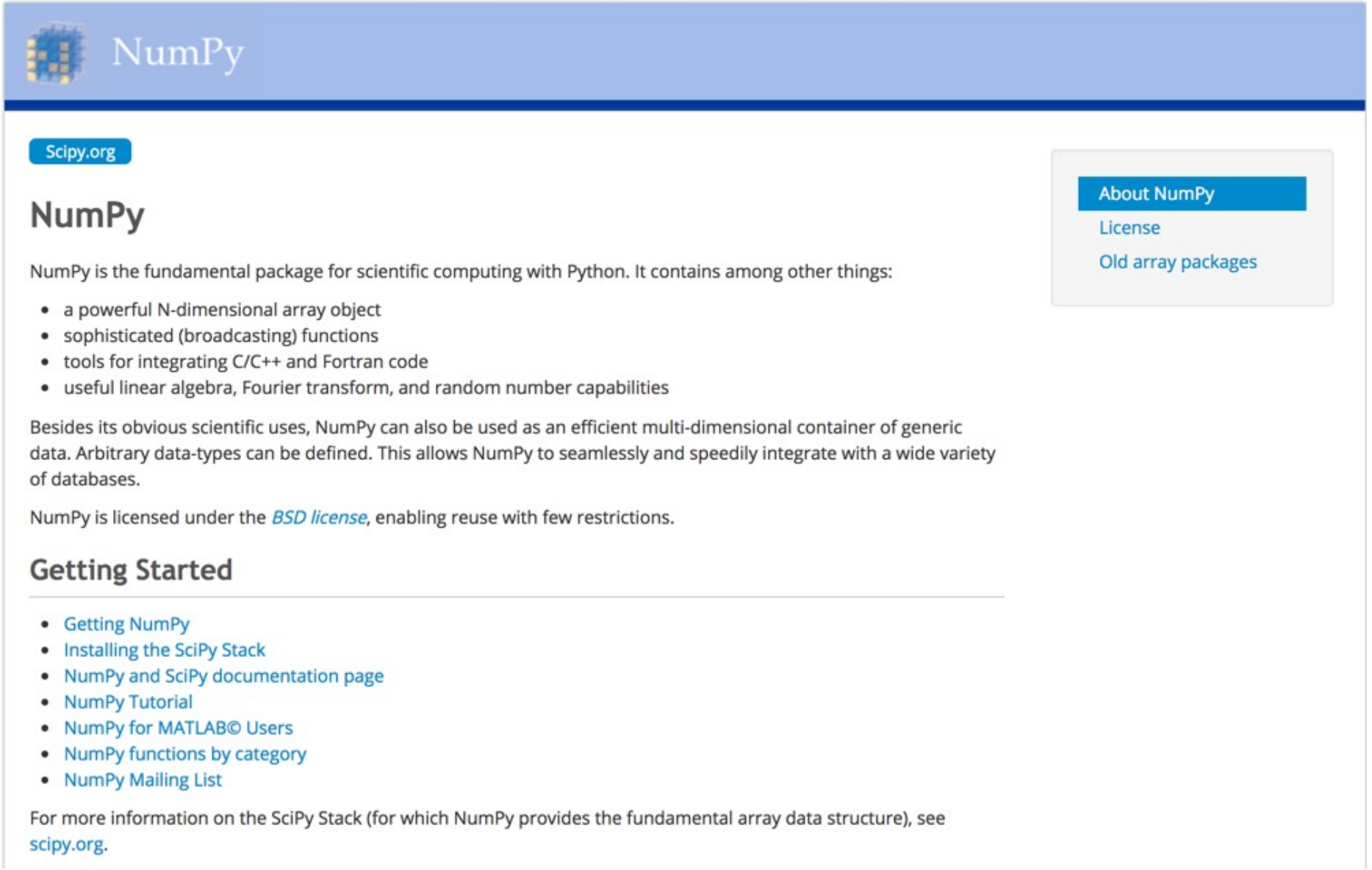
NumPy

NumPy

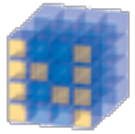
- **NumPy provides a multidimensional array object to store homogenous or heterogeneous data; it also provides optimized functions/methods to operate on this array object.**

Source: Yves Hilpisch (2014), Python for Finance: Analyze Big Financial Data, O'Reilly

NumPy



http://www.numpy.org/



NumPy

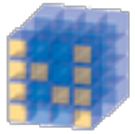
NumPy ndarray

One-dimensional Array (1-D Array)

0	1			n-1
1	**2**	**3**	**4**	**5**

Two-dimensional Array (2-D Array)

	0	1			n-1
0	**1**	**2**	**3**	**4**	**5**
1	**6**	**7**	**8**	**9**	**10**
	11	**12**	**13**	**14**	**15**
m-1	**16**	**17**	**18**	**19**	**20**

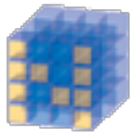


NumPy

NumPy

```
v = list(range(1, 6))
v
2 * v
import numpy as np
v = np.arange(1, 6)
v
2 * v
```

Source: Yves Hilpisch (2014), Python for Finance: Analyze Big Financial Data, O'Reilly



NumPy

Base
N-dimensional
array package

```
1 v = list(range(1, 6))
2 v
```

```
[1, 2, 3, 4, 5]
```

```
1 2 * v
```

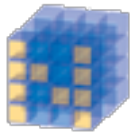
```
[1, 2, 3, 4, 5, 1, 2, 3, 4, 5]
```

```
1 import numpy as np
2 v = np.arange(1, 6)
3 v
```

```
array([1, 2, 3, 4, 5])
```

```
1 2 * v
```

```
array([ 2,  4,  6,  8, 10])
```



NumPy

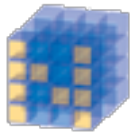
NumPy Create Array

```
import numpy as np
a = np.array([1, 2, 3])
b = np.array([4, 5, 6])
c = a * b
c
```

```
import numpy as np
a = np.array([1, 2, 3])
b = np.array([4, 5, 6])
c = a * b
c
```

```
array([ 4, 10, 18])
```

Source: Yves Hilpisch (2014), Python for Finance: Analyze Big Financial Data, O'Reilly



NumPy

NumPy

```python
import numpy as np

a = np.zeros((2,2))  # Create an array of all zeros
print(a)             # Prints "[[ 0.  0.]
                     #          [ 0.  0.]]"

b = np.ones((1,2))   # Create an array of all ones
print(b)             # Prints "[[ 1.  1.]]"

c = np.full((2,2), 7) # Create a constant array
print(c)               # Prints "[[ 7.  7.]
                       #          [ 7.  7.]]"

d = np.eye(2)        # Create a 2x2 identity matrix
print(d)             # Prints "[[ 1.  0.]
                     #          [ 0.  1.]]"

e = np.random.random((2,2)) # Create an array filled with random values
print(e)                    # Might print "[[ 0.91940167  0.08143941]
                            #               [ 0.68744134  0.87236687]]"
```

```
[[0. 0.]
 [0. 0.]]
[[1. 1.]]
[[7 7]
 [7 7]]
[[1. 0.]
 [0. 1.]]
[[0.66258211 0.65552598]
 [0.00429934 0.21695824]]
```

Source: http://cs231n.github.io/python-numpy-tutorial/

Numpy Quickstart Tutorial

SciPy.org Sponsored By ENTHOUGHT

Scipy.org | Docs | NumPy v1.13.dev0 Manual | NumPy User Guide

index | next | previous

Quickstart tutorial

Prerequisites

Before reading this tutorial you should know a bit of Python. If you would like to refresh your memory, take a look at the Python tutorial.

If you wish to work the examples in this tutorial, you must also have some software installed on your computer. Please see http://scipy.org/install.html for instructions.

The Basics

NumPy's main object is the homogeneous multidimensional array. It is a table of elements (usually numbers), all of the same type, indexed by a tuple of positive integers. In NumPy dimensions are called *axes*. The number of axes is *rank*.

For example, the coordinates of a point in 3D space `[1, 2, 1]` is an array of rank 1, because it has one axis. That axis has a length of 3. In the example pictured below, the array has rank 2 (it is 2-dimensional). The first dimension (axis) has a length of 2, the second dimension has a length of 3.

```
[[ 1., 0., 0.],
 [ 0., 1., 2.]]
```

NumPy's array class is called `ndarray`. It is also known by the alias `array`. Note that `numpy.array` is not the same as the Standard Python Library class `array.array`, which only handles one-dimensional arrays and offers less functionality. The more important attributes of an `ndarray` object are:

ndarray.ndim

the number of axes (dimensions) of the array. In the Python world, the number of dimensions is referred to as *rank*.

ndarray.shape

Table Of Contents

https://docs.scipy.org/doc/numpy-dev/user/quickstart.html

```
import numpy as np
a = np.arange(15).reshape(3, 5)
```

```
a.shape
a.ndim
a.dtype.name
```

```
import numpy as np
a = np.arange(15).reshape(3, 5)
a
```

```
array([[ 0,  1,  2,  3,  4],
       [ 5,  6,  7,  8,  9],
       [10, 11, 12, 13, 14]])
```

```
print(a.shape)
```

```
(3, 5)
```

```
a.ndim
```

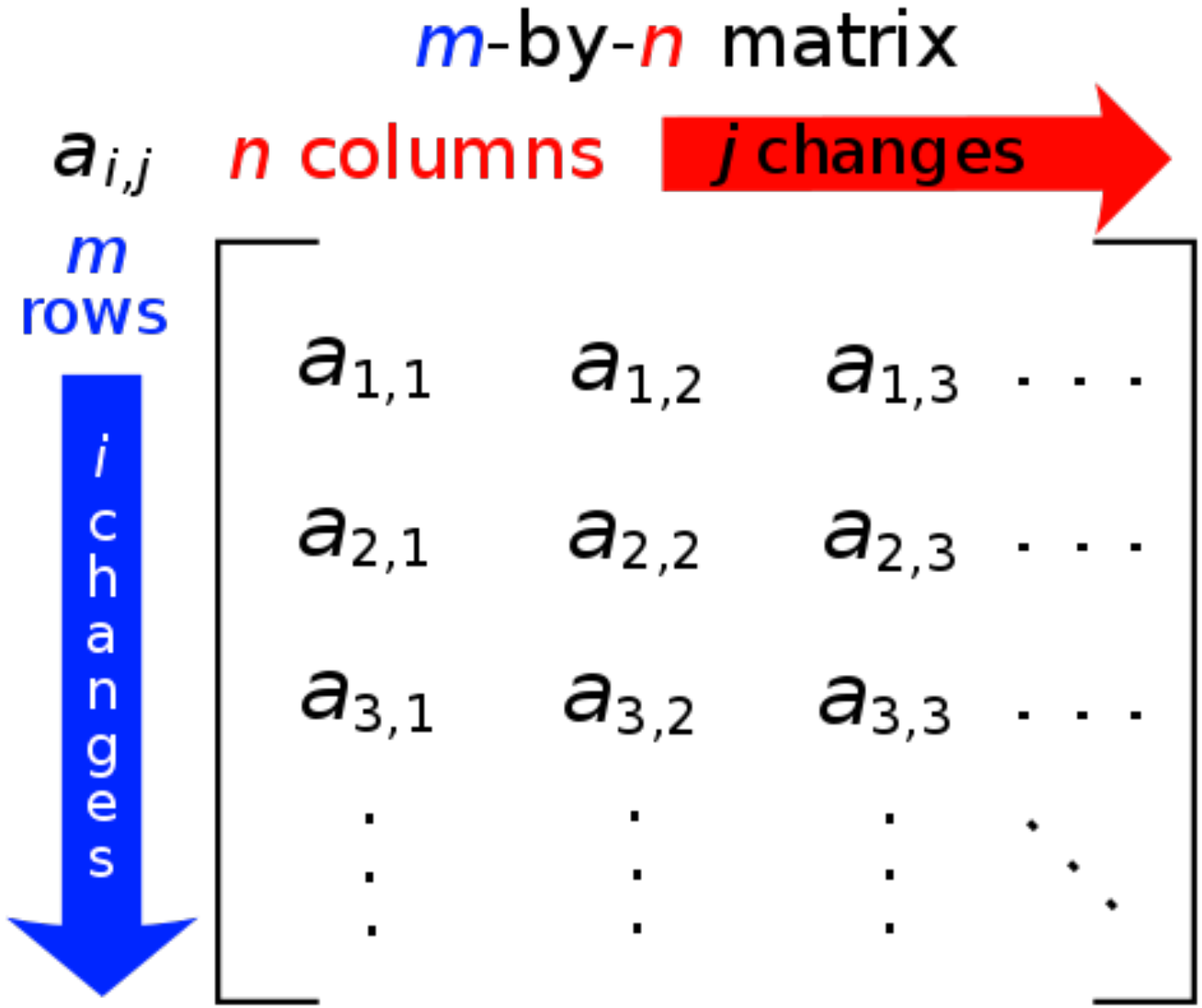
```
2
```

```
a.dtype.name
```

```
'int64'
```

Source: https://docs.scipy.org/doc/numpy-dev/user/quickstart.html

Matrix



Source: https://simple.wikipedia.org/wiki/Matrix_(mathematics)

NumPy ndarray:
Multidimensional Array Object

NumPy ndarray

One-dimensional Array (1-D Array)

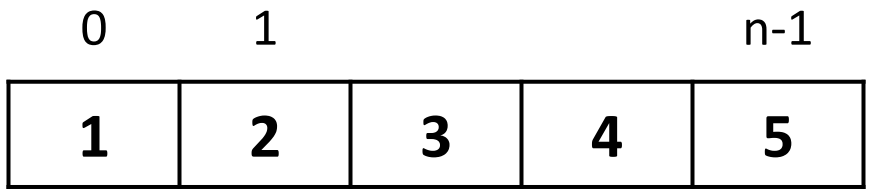
0	1			n-1
1	**2**	**3**	**4**	**5**

Two-dimensional Array (2-D Array)

	0	1			n-1
0	**1**	**2**	**3**	**4**	**5**
1	**6**	**7**	**8**	**9**	**10**
	11	**12**	**13**	**14**	**15**
m-1	**16**	**17**	**18**	**19**	**20**

```
import numpy as np
a = np.array([1,2,3,4,5])
```

One-dimensional Array (1-D Array)




```
a = np.array([1,2,3,4,5])
a
```

```
array([1, 2, 3, 4, 5])
```

```
a = np.array([[1,2,3,4,5],[6,7,8,9,10],[11,12,13,14,15],[16,17,18,19,20]])
```

Two-dimensional Array (2-D Array)

	0	1			n-1
0	**1**	**2**	**3**	**4**	**5**
1	**6**	**7**	**8**	**9**	**10**
	11	**12**	**13**	**14**	**15**
m-1	**16**	**17**	**18**	**19**	**20**

```
a = np.array([[1,2,3,4,5],[6,7,8,9,10],[11,12,13,14,15],[16,17,18,19,20]])
a
```

```
array([[ 1,  2,  3,  4,  5],
       [ 6,  7,  8,  9, 10],
       [11, 12, 13, 14, 15],
       [16, 17, 18, 19, 20]])
```

```
import numpy as np
a = np.array([[0, 1, 2, 3],
[10, 11, 12, 13],
[20, 21, 22, 23]])
a
```

0	1	2	3
10	11	12	13
20	21	22	23

a = np.array([[0, 1, 2, 3], [10, 11, 12, 13], [20, 21, 22, 23]])

```
a = np.array([[0, 1, 2, 3], [10, 11, 12, 13], [20, 21, 22, 23]])
a
```

```
array([[ 0,  1,  2,  3],
       [10, 11, 12, 13],
       [20, 21, 22, 23]])
```

```
print(a.ndim)
```

```
2
```

```
print(a.shape)
```

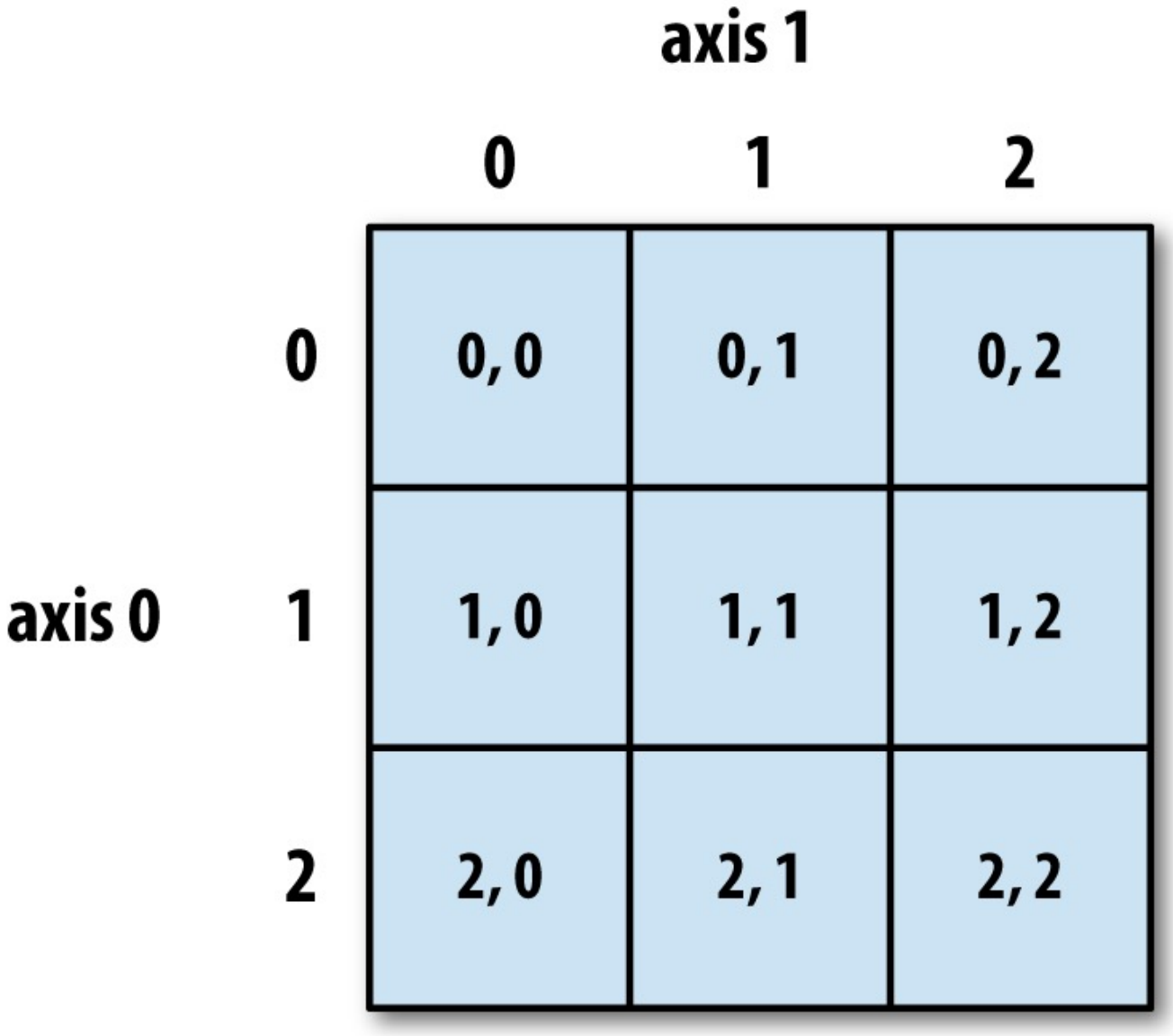
```
(3, 4)
```

0	1	2	3
10	11	12	13
20	21	22	23

NumPy Basics: Arrays and Vectorized Computation

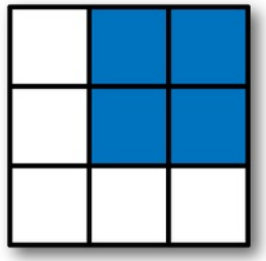
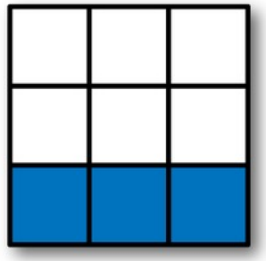
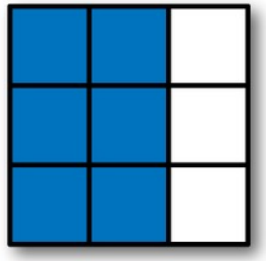
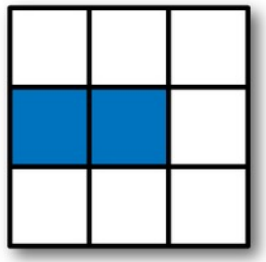
Source: https://www.safaribooksonline.com/library/view/python-for-data/9781449323592/ch04.html

NumPy Array



Source: https://www.safaribooksonline.com/library/view/python-for-data/9781449323592/ch04.html

Numpy Array

	Expression	Shape
	`arr[:2, 1:]`	`(2, 2)`
	`arr[2]`	`(3,)`
	`arr[2, :]`	`(3,)`
	`arr[2:, :]`	`(1, 3)`
	`arr[:, :2]`	`(3, 2)`
	`arr[1, :2]`	`(2,)`
	`arr[1:2, :2]`	`(1, 2)`

Source: https://www.safaribooksonline.com/library/view/python-for-data/9781449323592/ch04.html

TensorFlow

Tensor

- 3
  - a rank 0 tensor; this is a scalar with shape []
- [1. ,2., 3.]
  - a rank 1 tensor; this is a vector with shape [3]
- [[1., 2., 3.], [4., 5., 6.]]
  - a rank 2 tensor; a matrix with shape [2, 3]
- [[[1., 2., 3.]], [[7., 8., 9.]]]
  - a rank 3 tensor with shape [2, 1, 3]

https://www.tensorflow.org/

Scalar 80

Vector [50 60 70]

Matrix

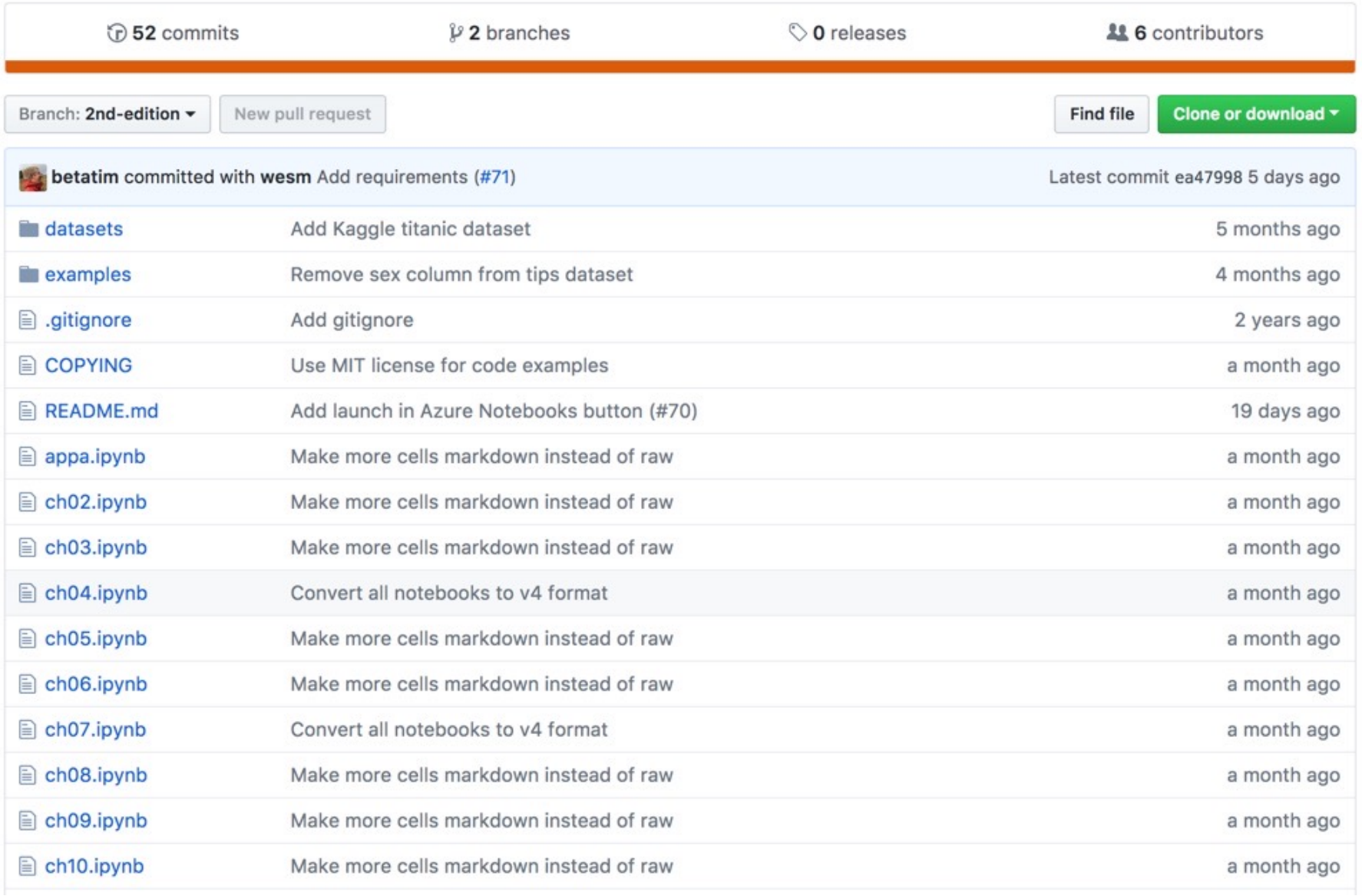
$$\begin{bmatrix} 50 & 60 & 70 \\ 55 & 65 & 75 \end{bmatrix}$$

Tensor

$$\begin{bmatrix} [50 & 60 & 70] & [70 & 80 & 90] \\ [55 & 65 & 75] & [75 & 85 & 95] \end{bmatrix}$$

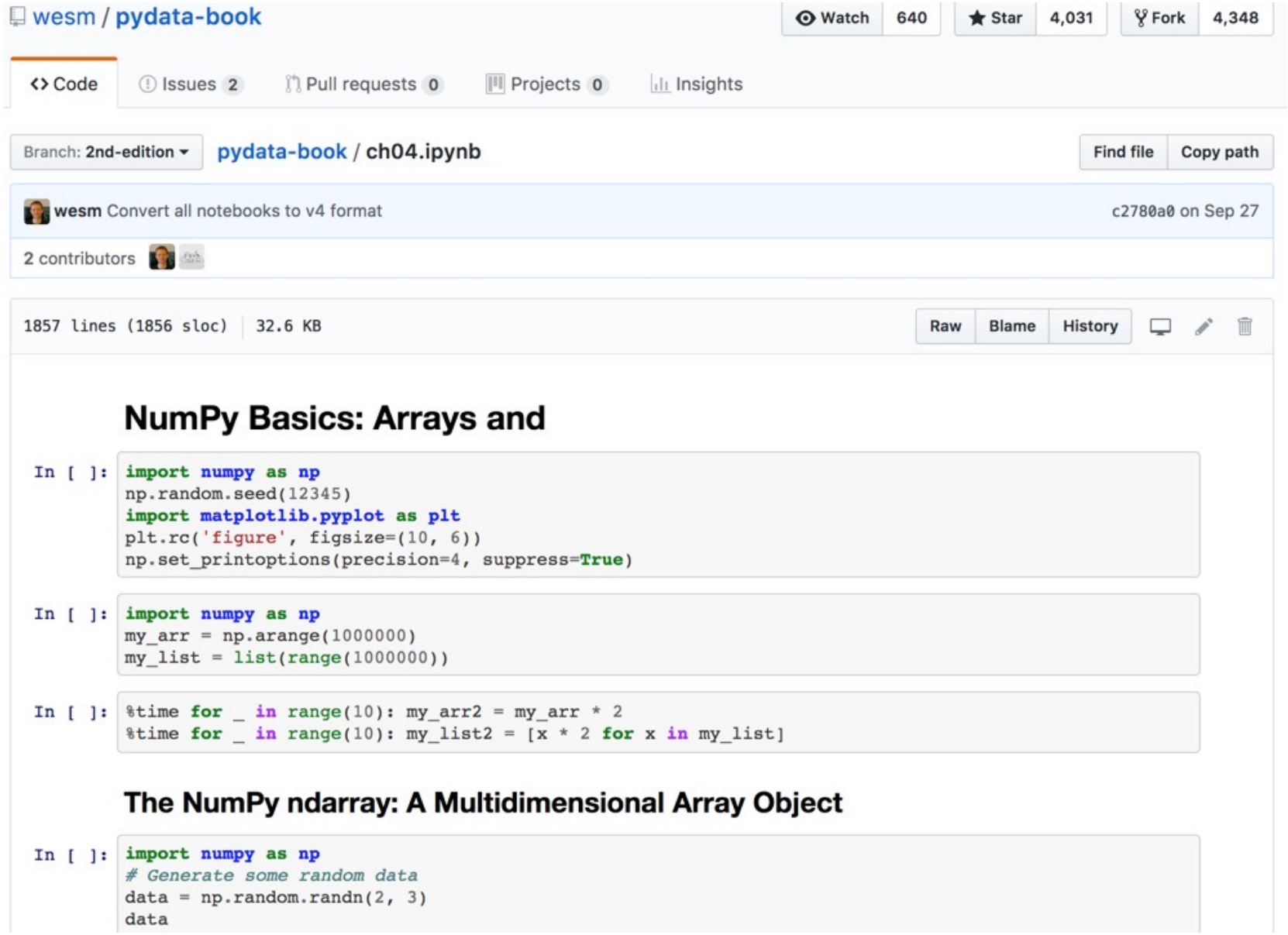
Wes McKinney (2017), "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", 2nd Edition, O'Reilly Media.

Materials and IPython notebooks for "Python for Data Analysis" by Wes McKinney, published by O'Reilly Media



https://github.com/wesm/pydata-book

Wes McKinney (2017), "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", 2nd Edition, O'Reilly Media.



wesm / pydata-book

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Branch: 2nd-edition ▾ pydata-book / ch04.ipynb

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wesm Convert all notebooks to v4 format — c2780a0 on Sep 27

2 contributors

1857 lines (1856 sloc) | 32.6 KB

Raw | Blame | History

NumPy Basics: Arrays and

In [ ]:
```
import numpy as np
np.random.seed(12345)
import matplotlib.pyplot as plt
plt.rc('figure', figsize=(10, 6))
np.set_printoptions(precision=4, suppress=True)
```

In [ ]:
```
import numpy as np
my_arr = np.arange(1000000)
my_list = list(range(1000000))
```

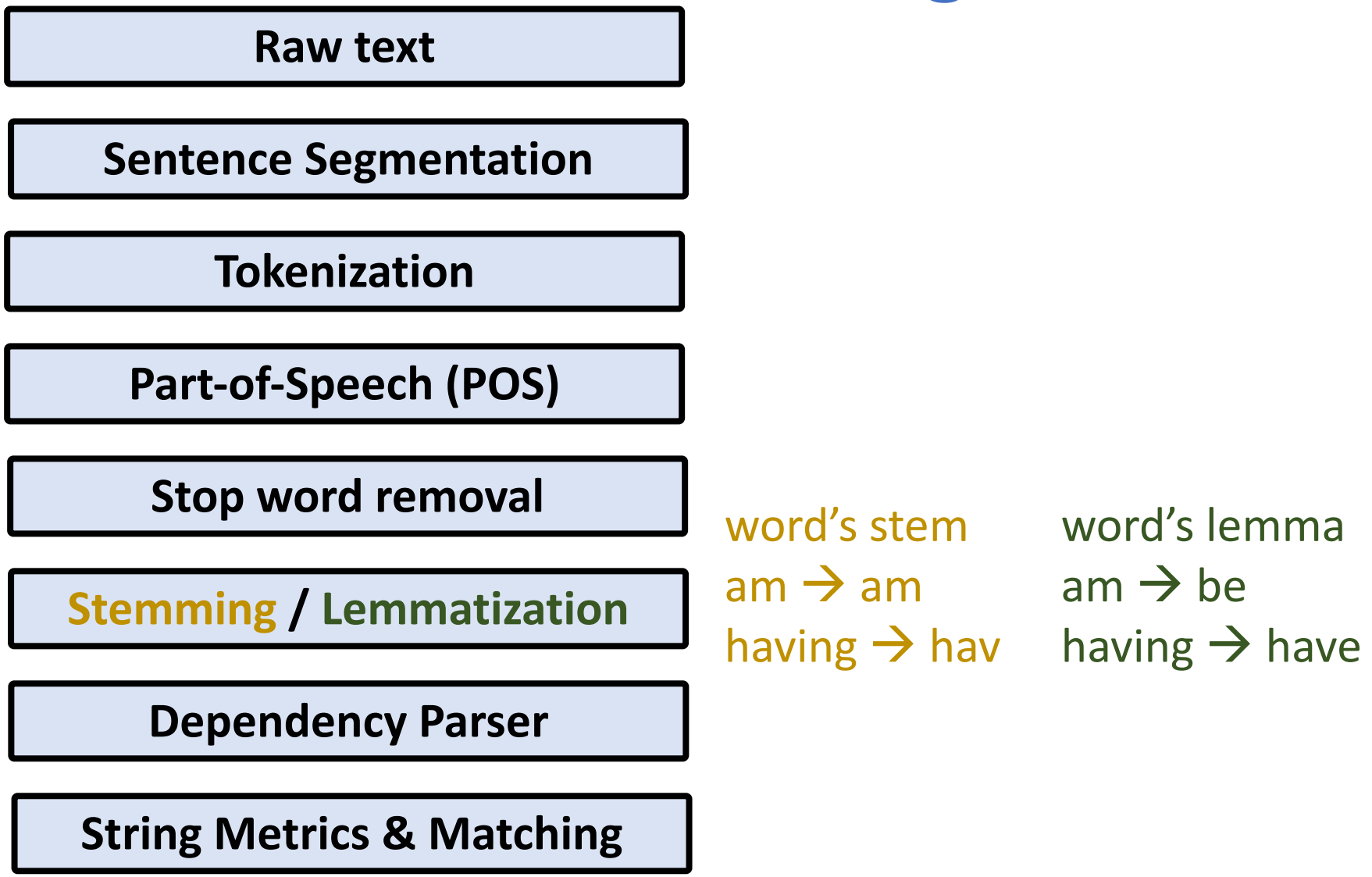
In [ ]:
```
%time for _ in range(10): my_arr2 = my_arr * 2
%time for _ in range(10): my_list2 = [x * 2 for x in my_list]
```

The NumPy ndarray: A Multidimensional Array Object

In [ ]:
```
import numpy as np
# Generate some random data
data = np.random.randn(2, 3)
data
```

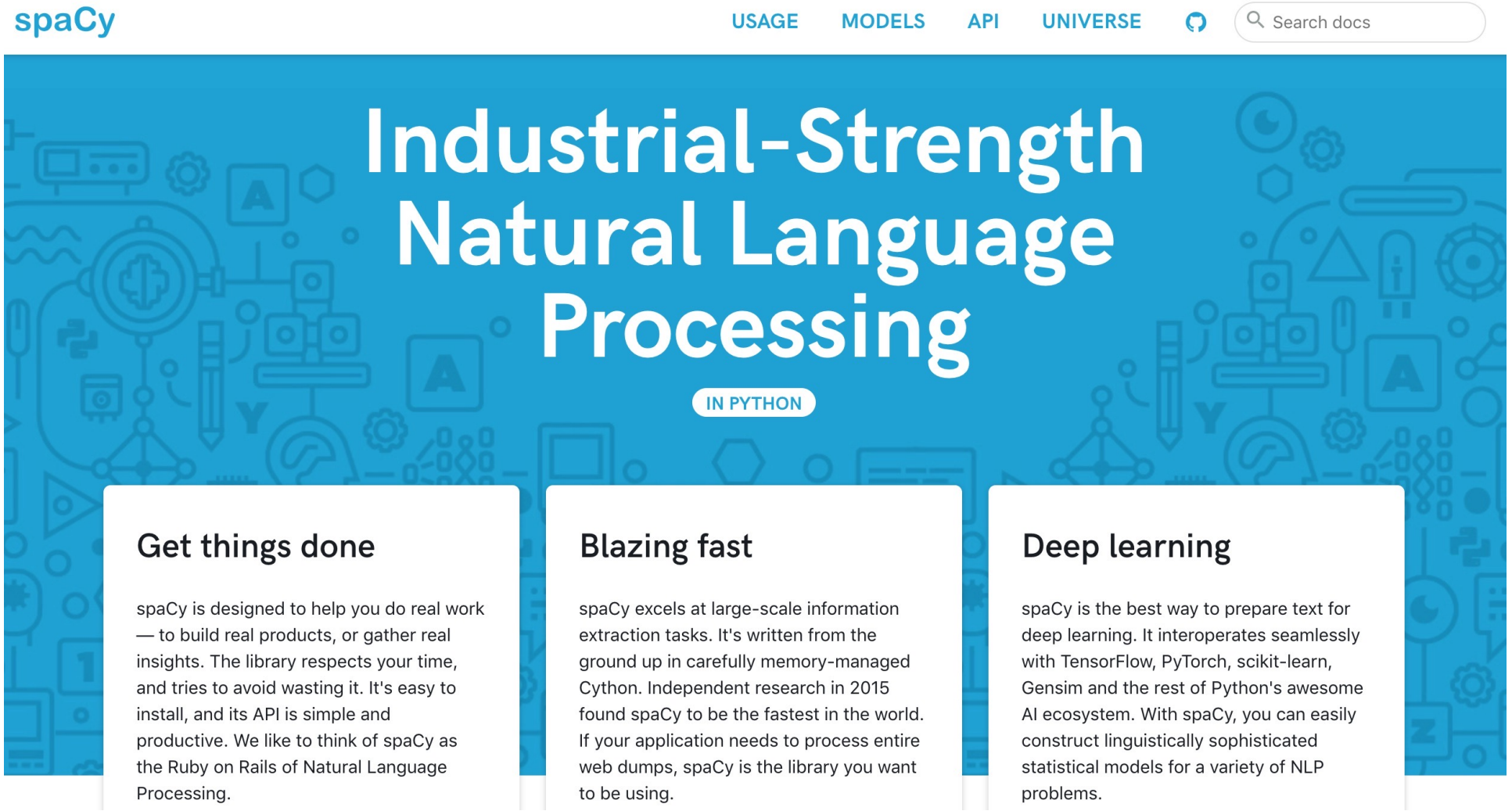
Source: https://github.com/wesm/pydata-book/blob/2nd-edition/ch04.ipynb

Natural Language Processing (NLP) and Text Mining



Source: Nitin Hardeniya (2015), NLTK Essentials, Packt Publishing; Florian Leitner (2015), Text mining - from Bayes rule to dependency parsing

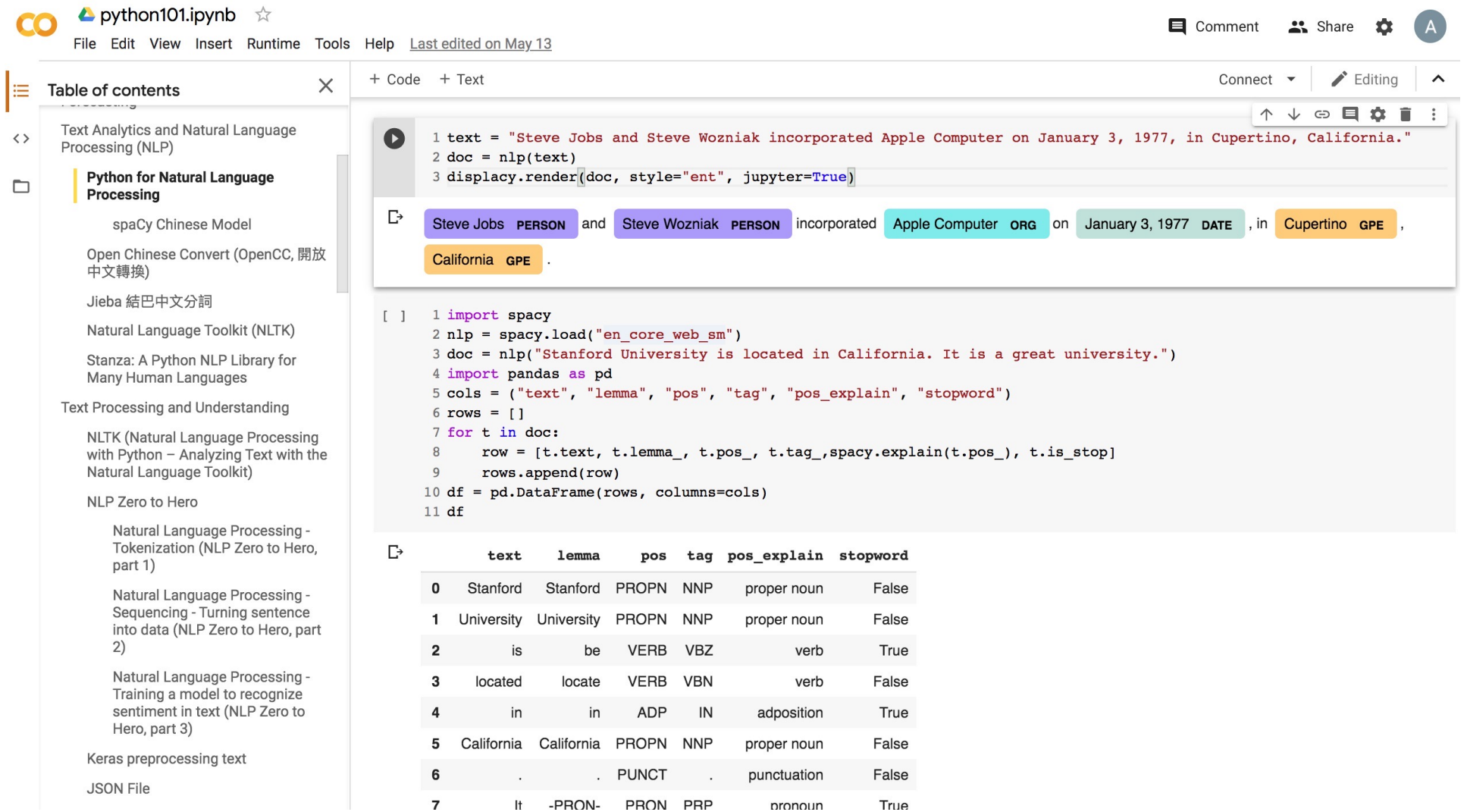
spaCy:
Natural Language Processing



https://spacy.io/

Python in Google Colab (Python101)

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT

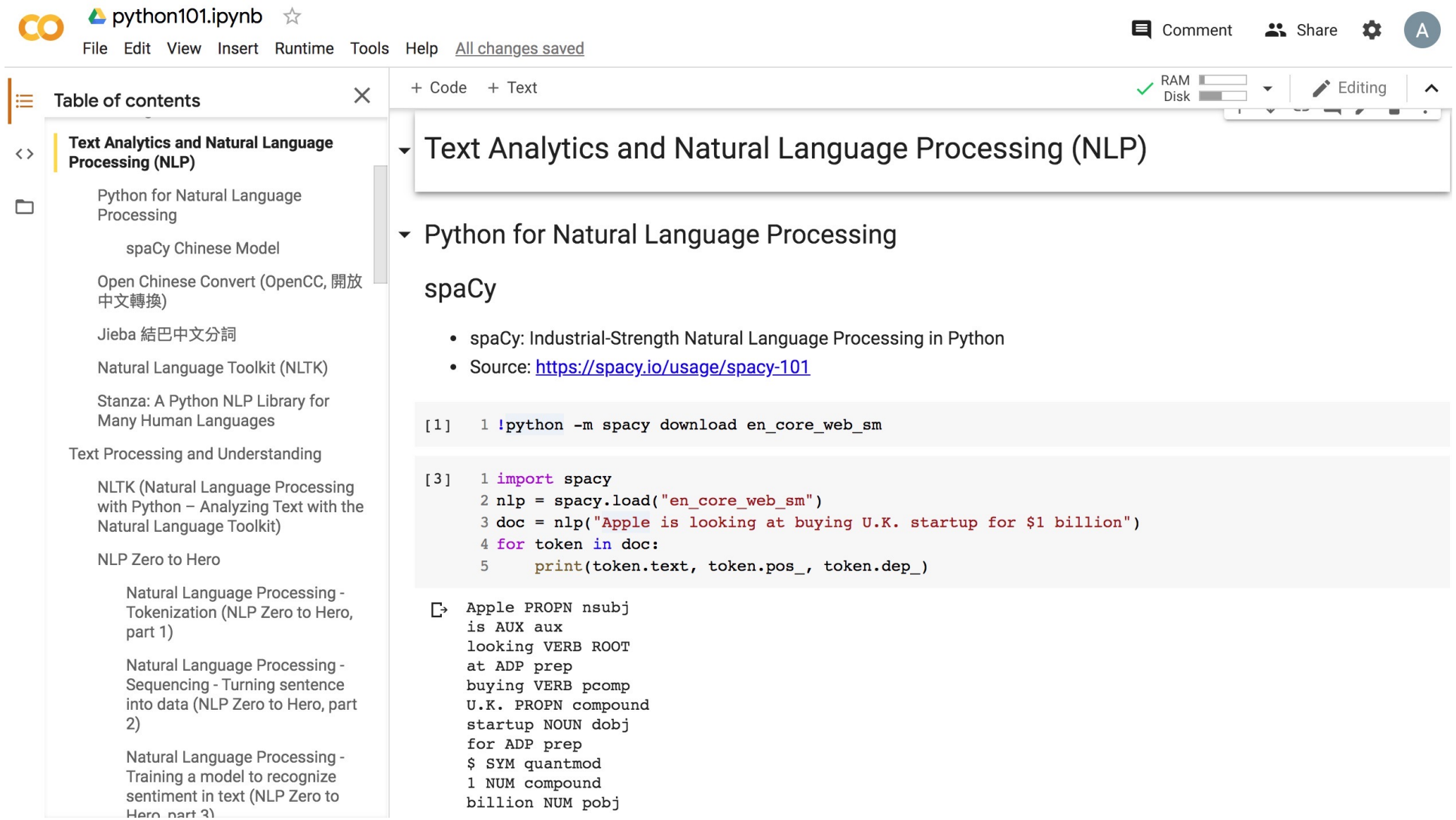


	text	lemma	pos	tag	pos_explain	stopword
0	Stanford	Stanford	PROPN	NNP	proper noun	False
1	University	University	PROPN	NNP	proper noun	False
2	is	be	VERB	VBZ	verb	True
3	located	locate	VERB	VBN	verb	False
4	in	in	ADP	IN	adposition	True
5	California	California	PROPN	NNP	proper noun	False
6	.	.	PUNCT	.	punctuation	False
7	It	-PRON-	PRON	PRP	pronoun	True

https://tinyurl.com/aintpupython101

Python in Google Colab (Python101)

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT



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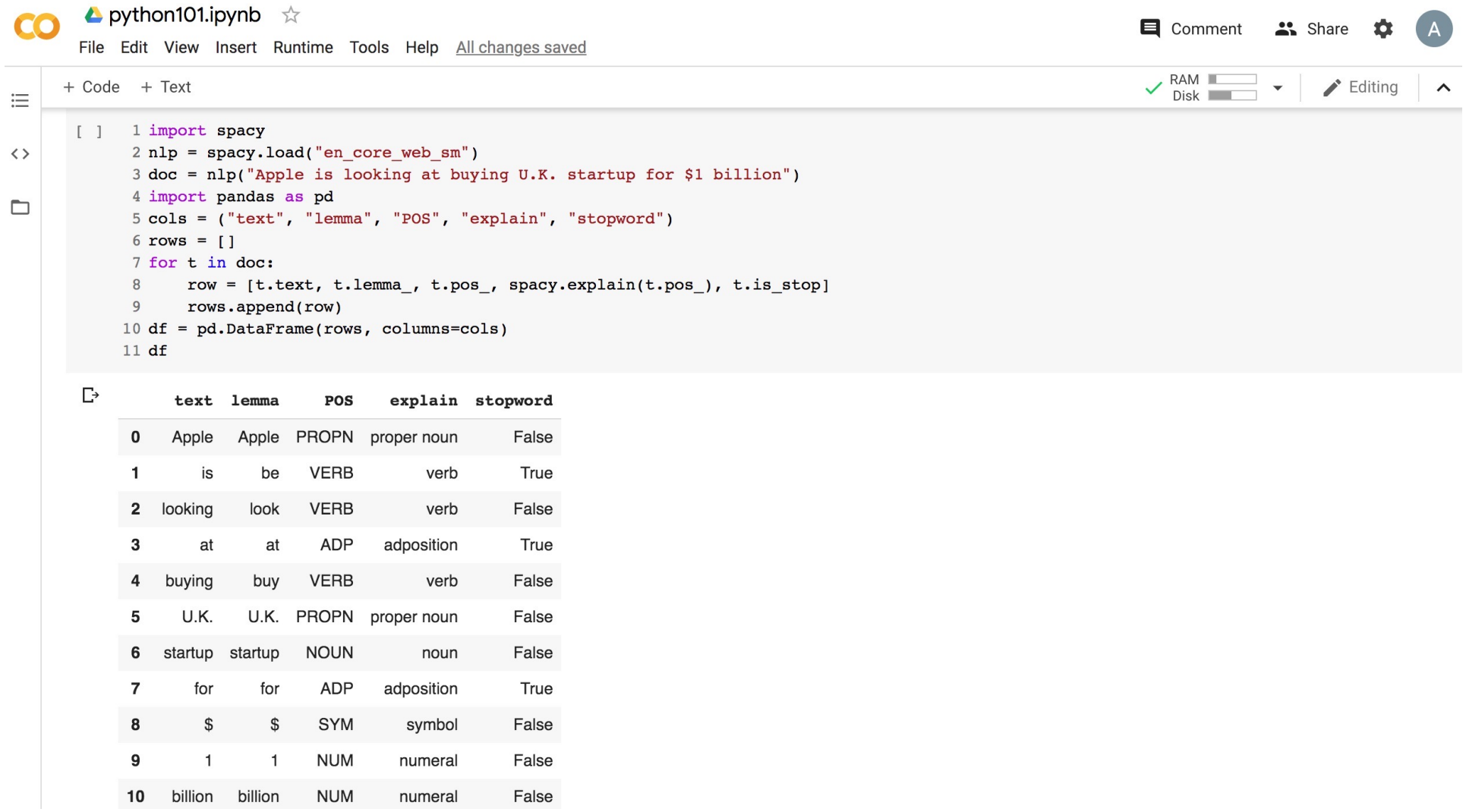
Python in Google Colab (Python101)

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT



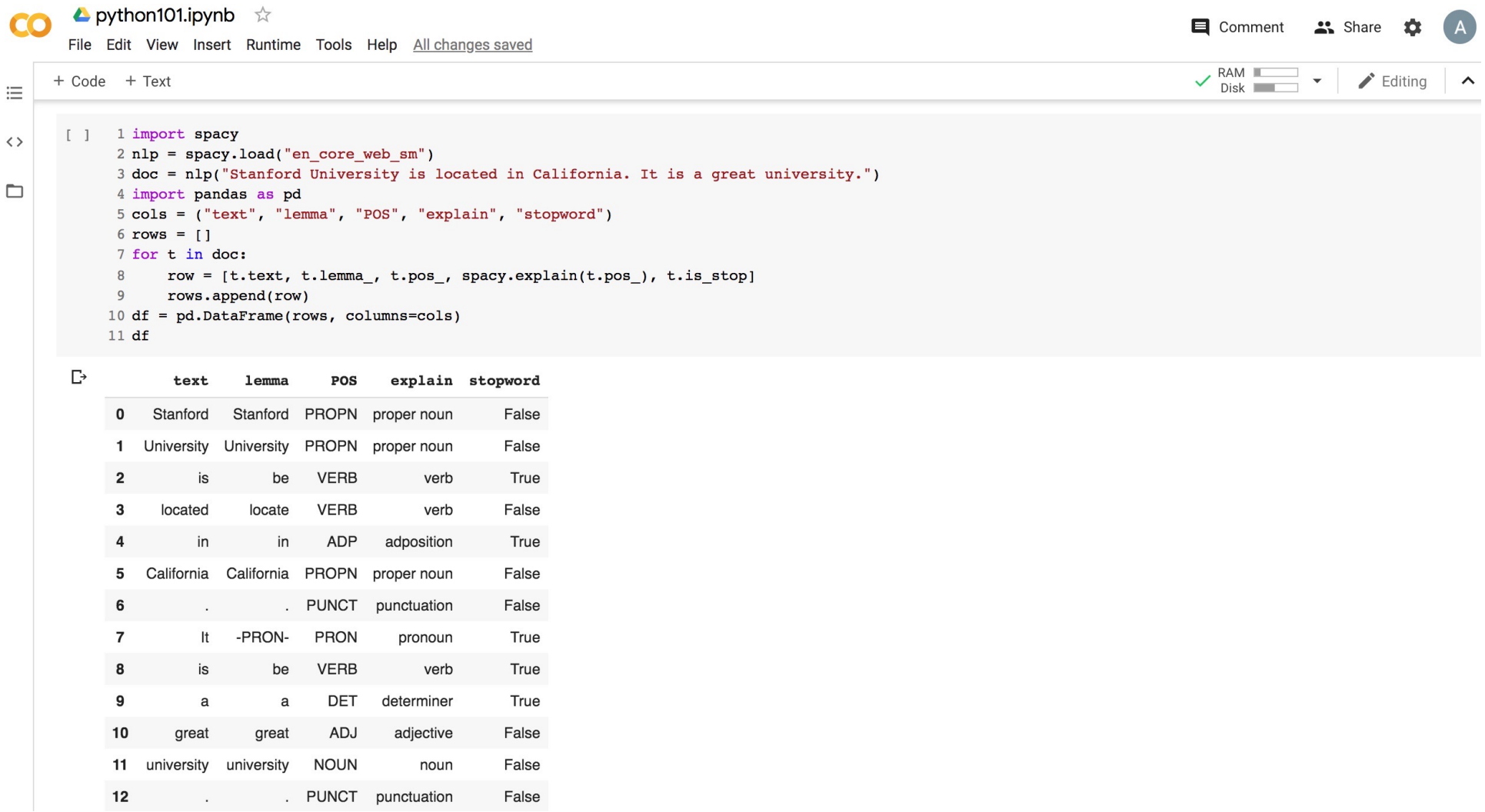

```
[ ]  1 import spacy
     2 nlp = spacy.load("en_core_web_sm")
     3 doc = nlp("Apple is looking at buying U.K. startup for $1 billion")
     4 import pandas as pd
     5 cols = ("text", "lemma", "POS", "explain", "stopword")
     6 rows = []
     7 for t in doc:
     8     row = [t.text, t.lemma_, t.pos_, spacy.explain(t.pos_), t.is_stop]
     9     rows.append(row)
    10 df = pd.DataFrame(rows, columns=cols)
    11 df
```

	text	lemma	POS	explain	stopword
0	Apple	Apple	PROPN	proper noun	False
1	is	be	VERB	verb	True
2	looking	look	VERB	verb	False
3	at	at	ADP	adposition	True
4	buying	buy	VERB	verb	False
5	U.K.	U.K.	PROPN	proper noun	False
6	startup	startup	NOUN	noun	False
7	for	for	ADP	adposition	True
8	$	$	SYM	symbol	False
9	1	1	NUM	numeral	False
10	billion	billion	NUM	numeral	False

https://tinyurl.com/aintpupython101

Python in Google Colab (Python101)

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT



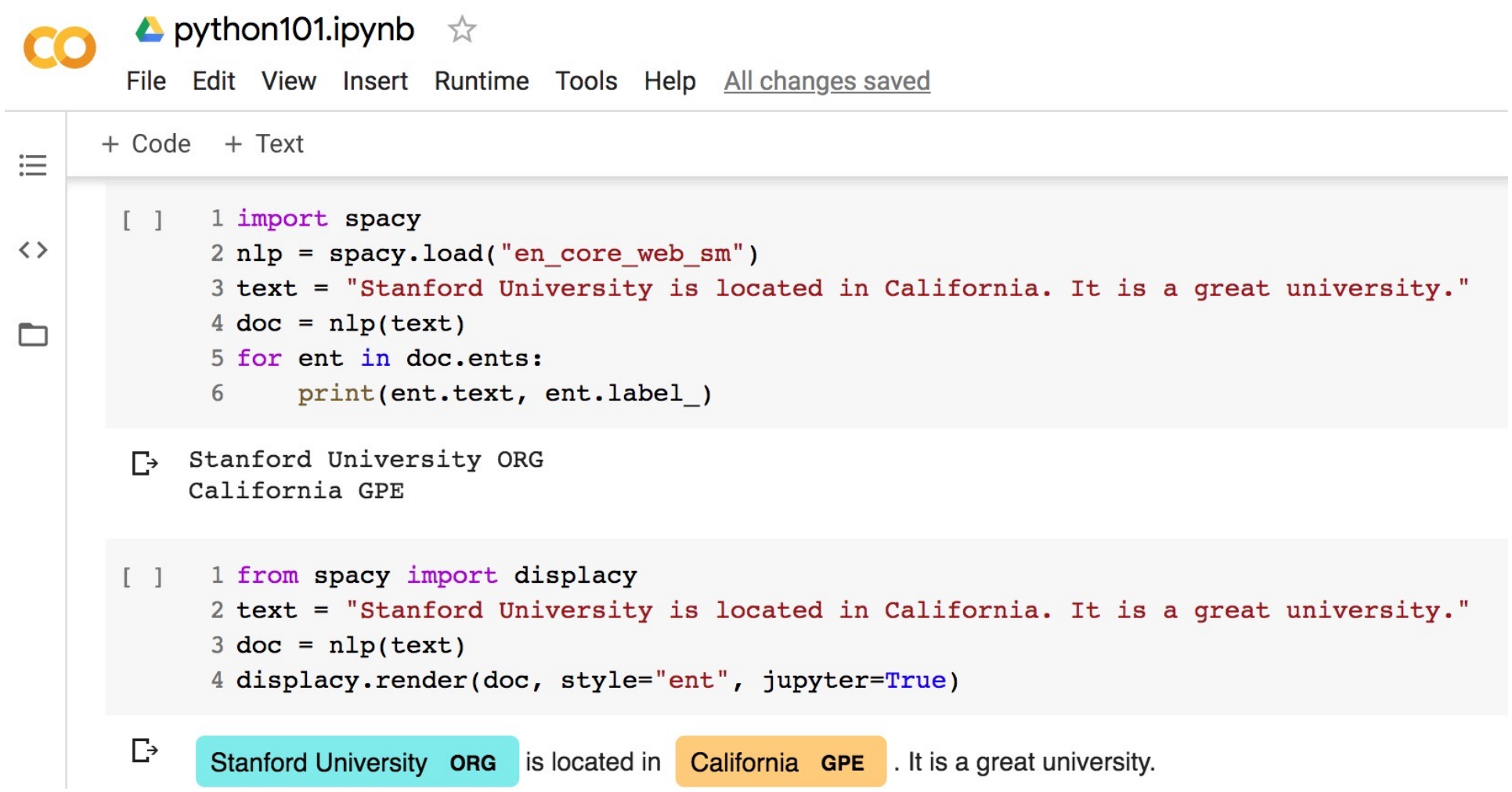

```
[ ]  1 import spacy
     2 nlp = spacy.load("en_core_web_sm")
     3 doc = nlp("Stanford University is located in California. It is a great university.")
     4 import pandas as pd
     5 cols = ("text", "lemma", "POS", "explain", "stopword")
     6 rows = []
     7 for t in doc:
     8     row = [t.text, t.lemma_, t.pos_, spacy.explain(t.pos_), t.is_stop]
     9     rows.append(row)
    10 df = pd.DataFrame(rows, columns=cols)
    11 df
```

	text	lemma	POS	explain	stopword
0	Stanford	Stanford	PROPN	proper noun	False
1	University	University	PROPN	proper noun	False
2	is	be	VERB	verb	True
3	located	locate	VERB	verb	False
4	in	in	ADP	adposition	True
5	California	California	PROPN	proper noun	False
6	.	.	PUNCT	punctuation	False
7	It	-PRON-	PRON	pronoun	True
8	is	be	VERB	verb	True
9	a	a	DET	determiner	True
10	great	great	ADJ	adjective	False
11	university	university	NOUN	noun	False
12	.	.	PUNCT	punctuation	False

https://tinyurl.com/aintpupython101

Python in Google Colab (Python101)

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT



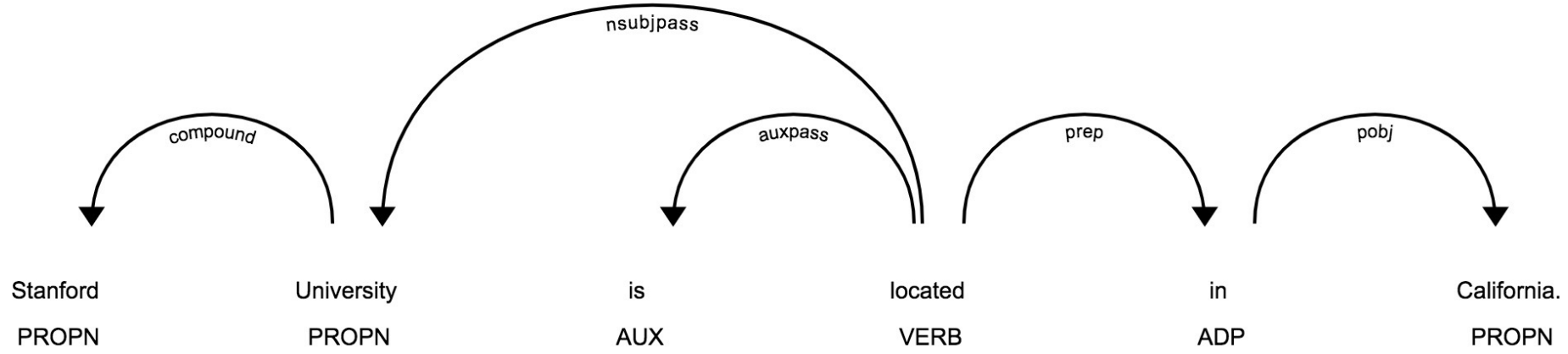
https://tinyurl.com/aintpupython101

Python in Google Colab (Python101)

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT

```
1 from spacy import displacy
2 text = "Stanford University is located in California. It is a great university."
3 doc = nlp(text)
4 displacy.render(doc, style="ent", jupyter=True)
5 displacy.render(doc, style="dep", jupyter=True)
```

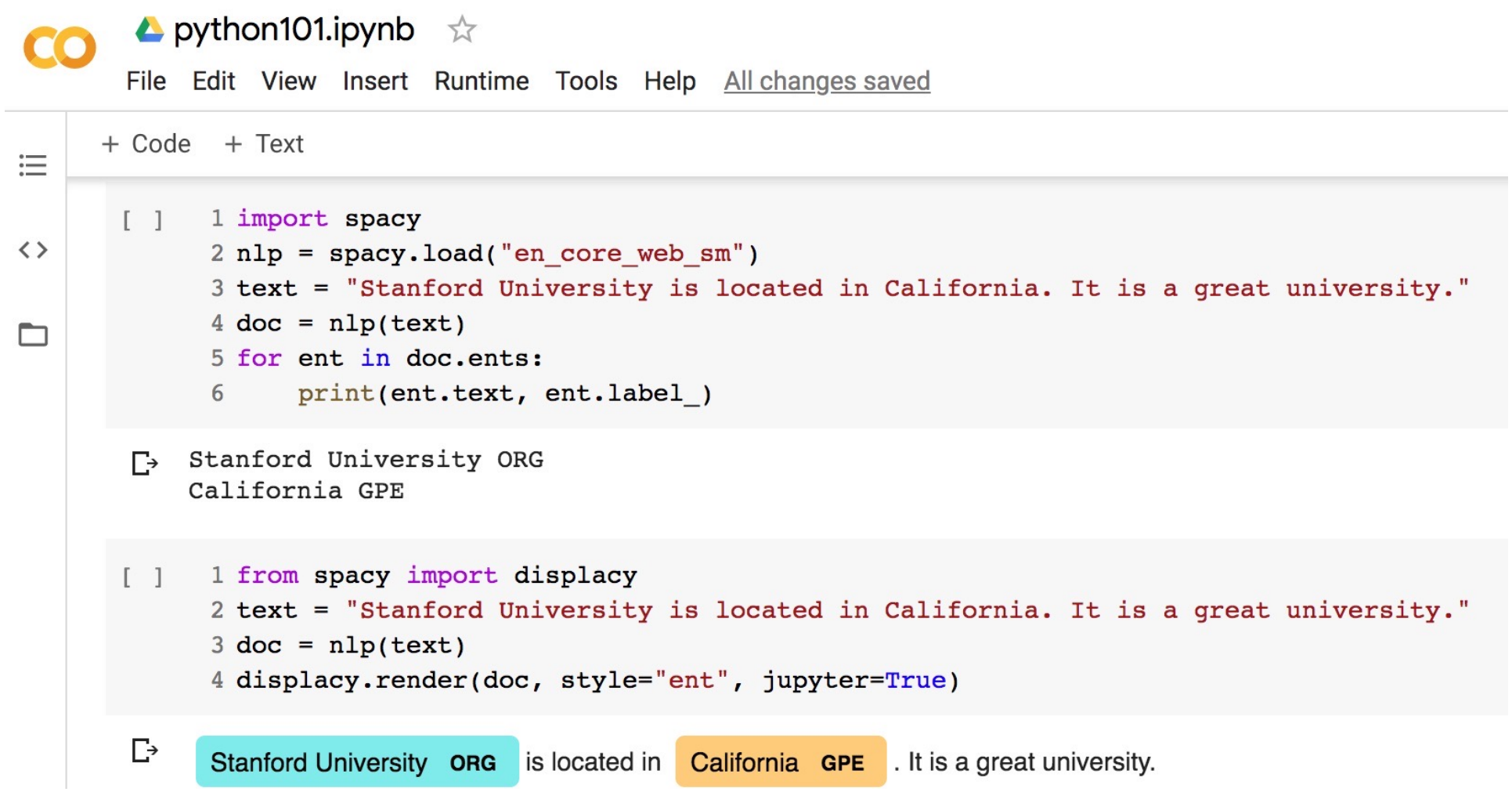
Stanford University ORG is located in California GPE . It is a great university.



https://tinyurl.com/aintpupython101

Python in Google Colab

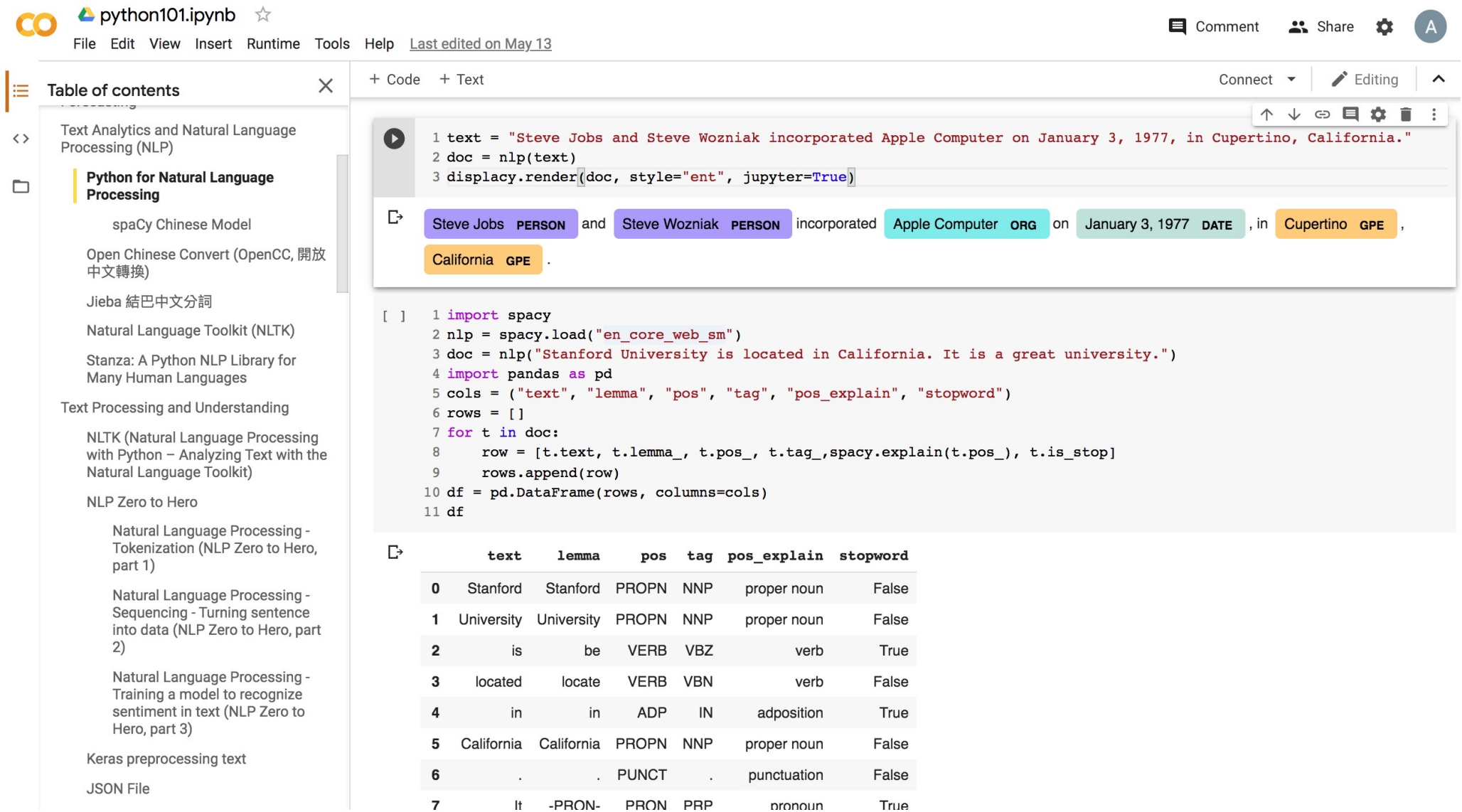
https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT



https://tinyurl.com/aintpupython101

Python in Google Colab (Python101)

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT

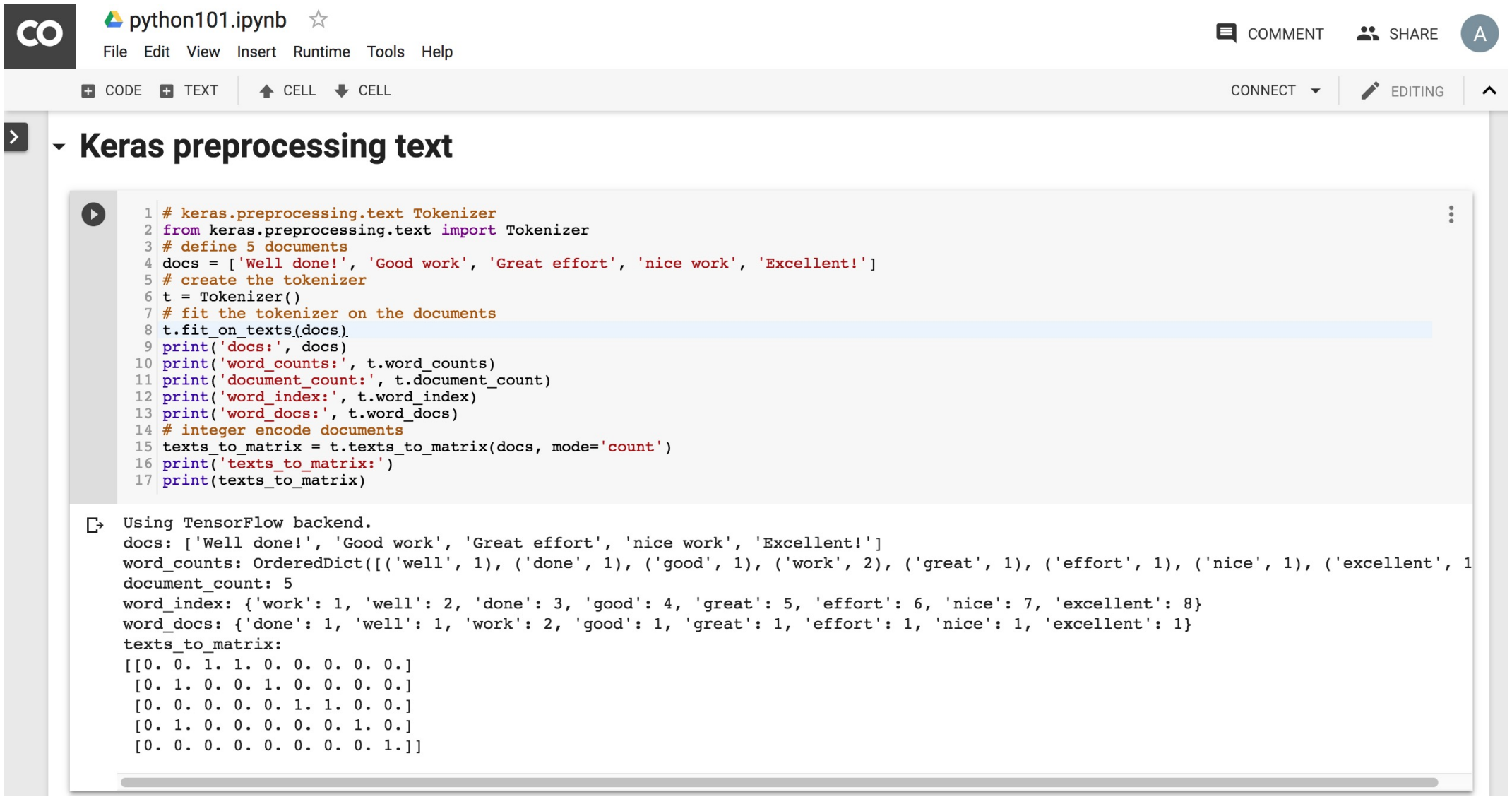


	text	lemma	pos	tag	pos_explain	stopword
0	Stanford	Stanford	PROPN	NNP	proper noun	False
1	University	University	PROPN	NNP	proper noun	False
2	is	be	VERB	VBZ	verb	True
3	located	locate	VERB	VBN	verb	False
4	in	in	ADP	IN	adposition	True
5	California	California	PROPN	NNP	proper noun	False
6	.	.	PUNCT	.	punctuation	False
7	It	-PRON-	PRON	PRP	pronoun	True

https://tinyurl.com/aintpupython101

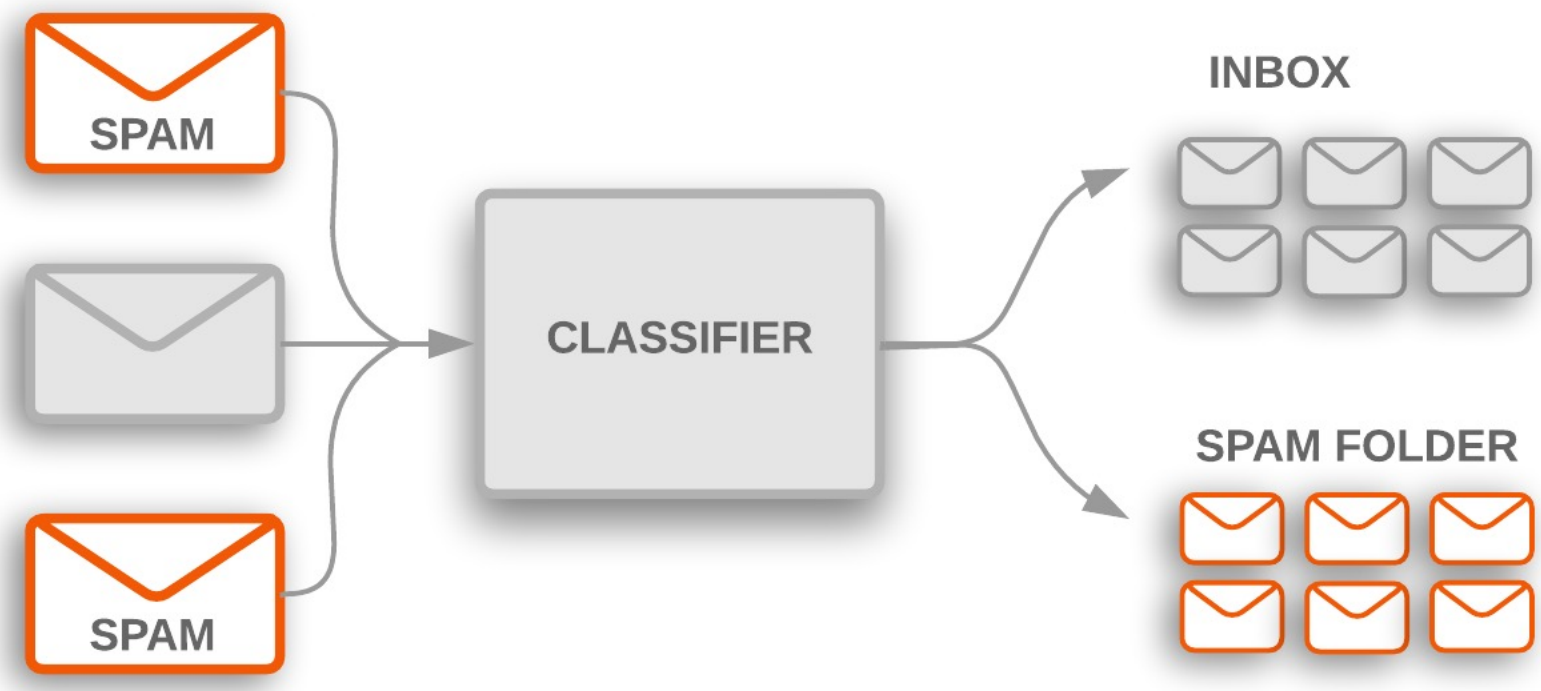
Python in Google Colab (Python101)

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT



https://tinyurl.com/aintpupython101

Text Classification



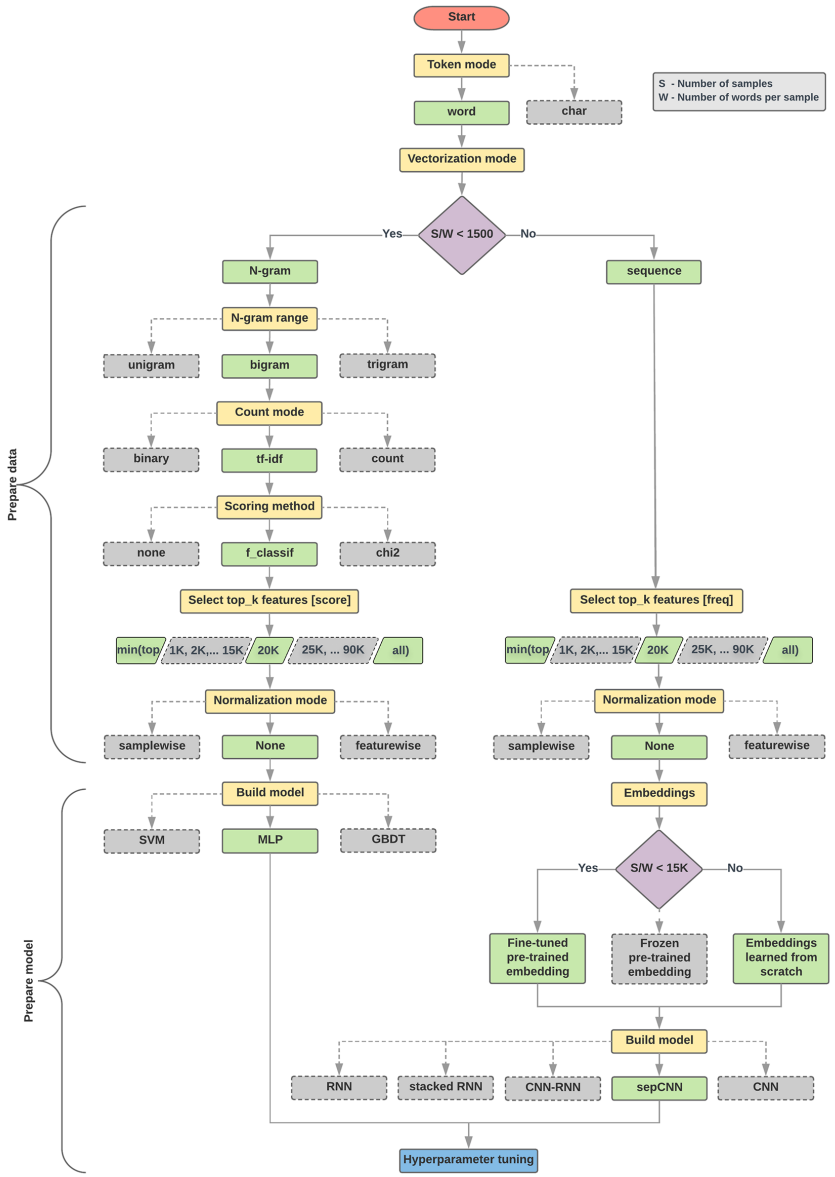
Source: https://developers.google.com/machine-learning/guides/text-classification/

Text Classification Workflow

- Step 1: Gather Data
- Step 2: Explore Your Data
- Step 2.5: Choose a Model*
- Step 3: Prepare Your Data
- Step 4: Build, Train, and Evaluate Your Model
- Step 5: Tune Hyperparameters
- Step 6: Deploy Your Model

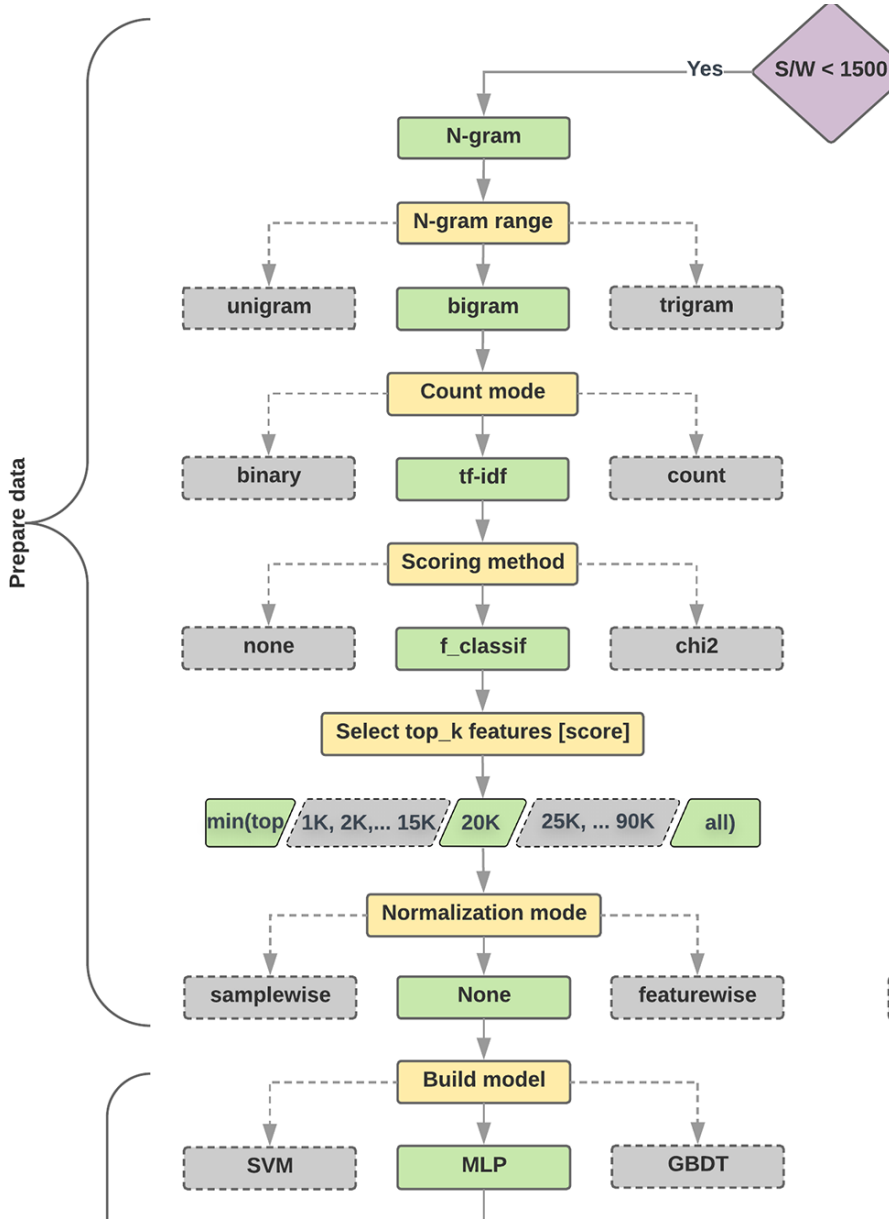
Source: https://developers.google.com/machine-learning/guides/text-classification/

Text Classification Flowchart



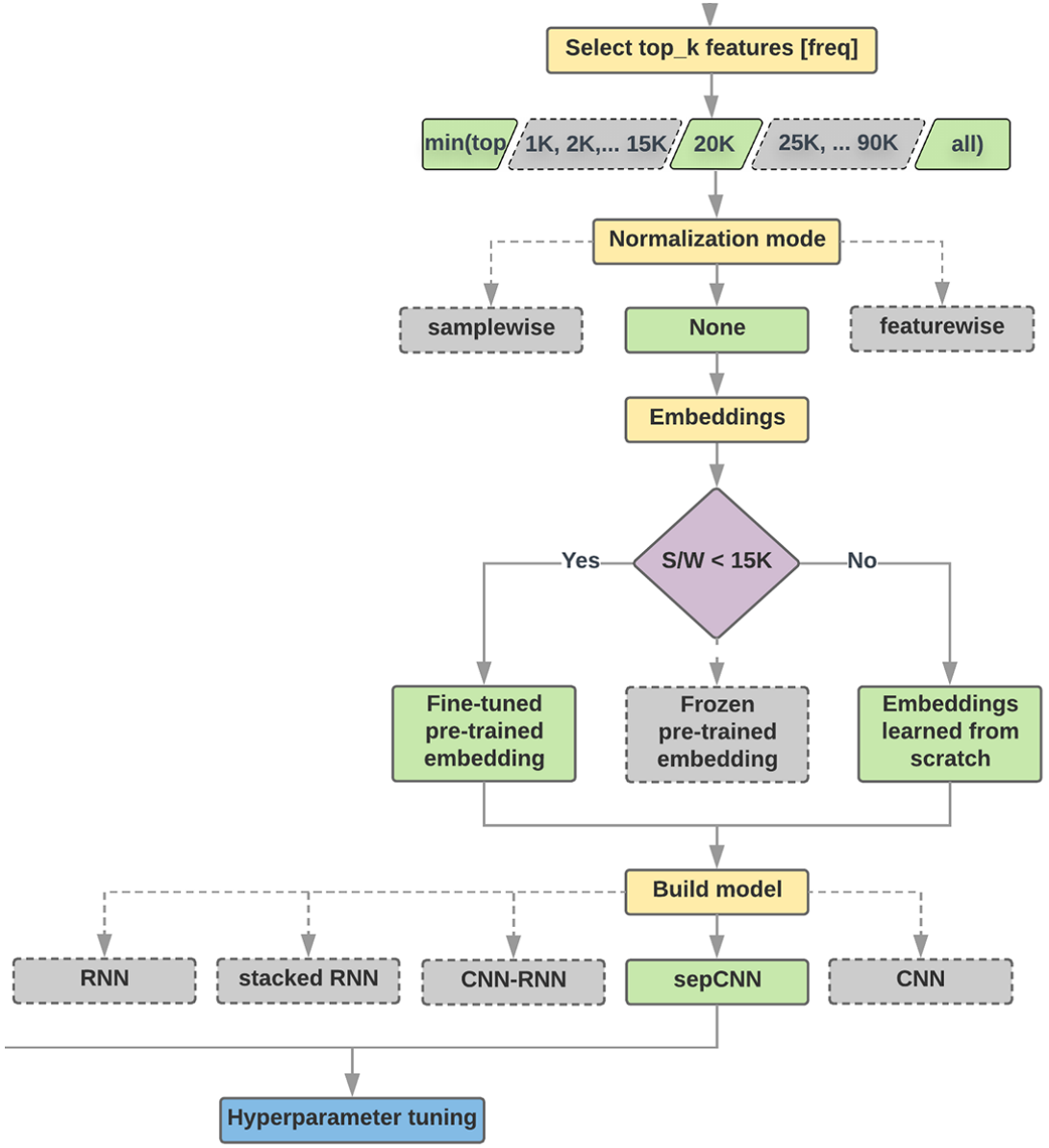
Source: https://developers.google.com/machine-learning/guides/text-classification/step-2-5

Text Classification S/W<1500: N-gram



Source: https://developers.google.com/machine-learning/guides/text-classification/step-2-5

Text Classification S/W>=1500: Sequence

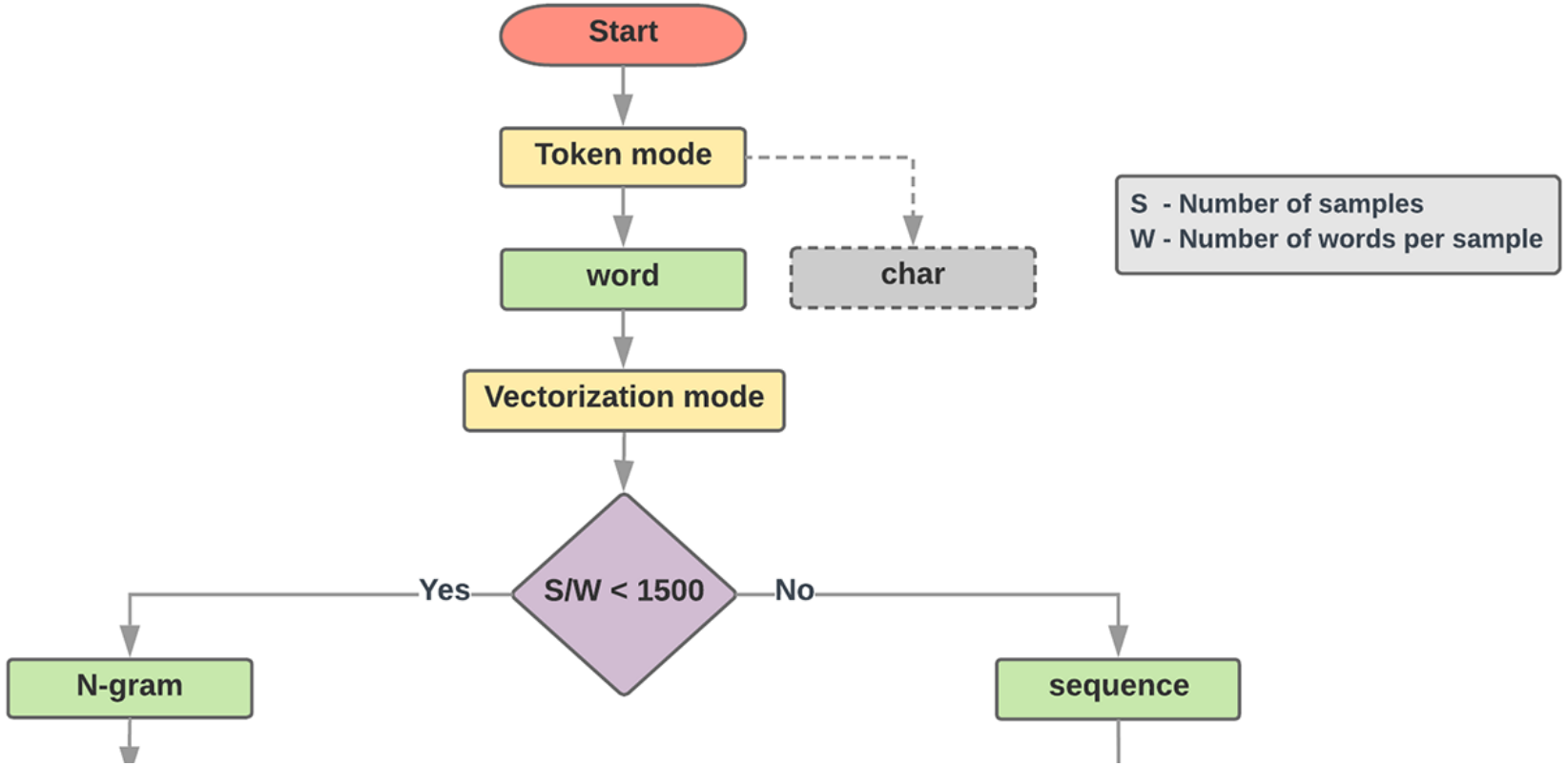


Source: https://developers.google.com/machine-learning/guides/text-classification/step-2-5

Step 2.5: Choose a Model

Samples/Words < 1500

150,000/100 = 1500



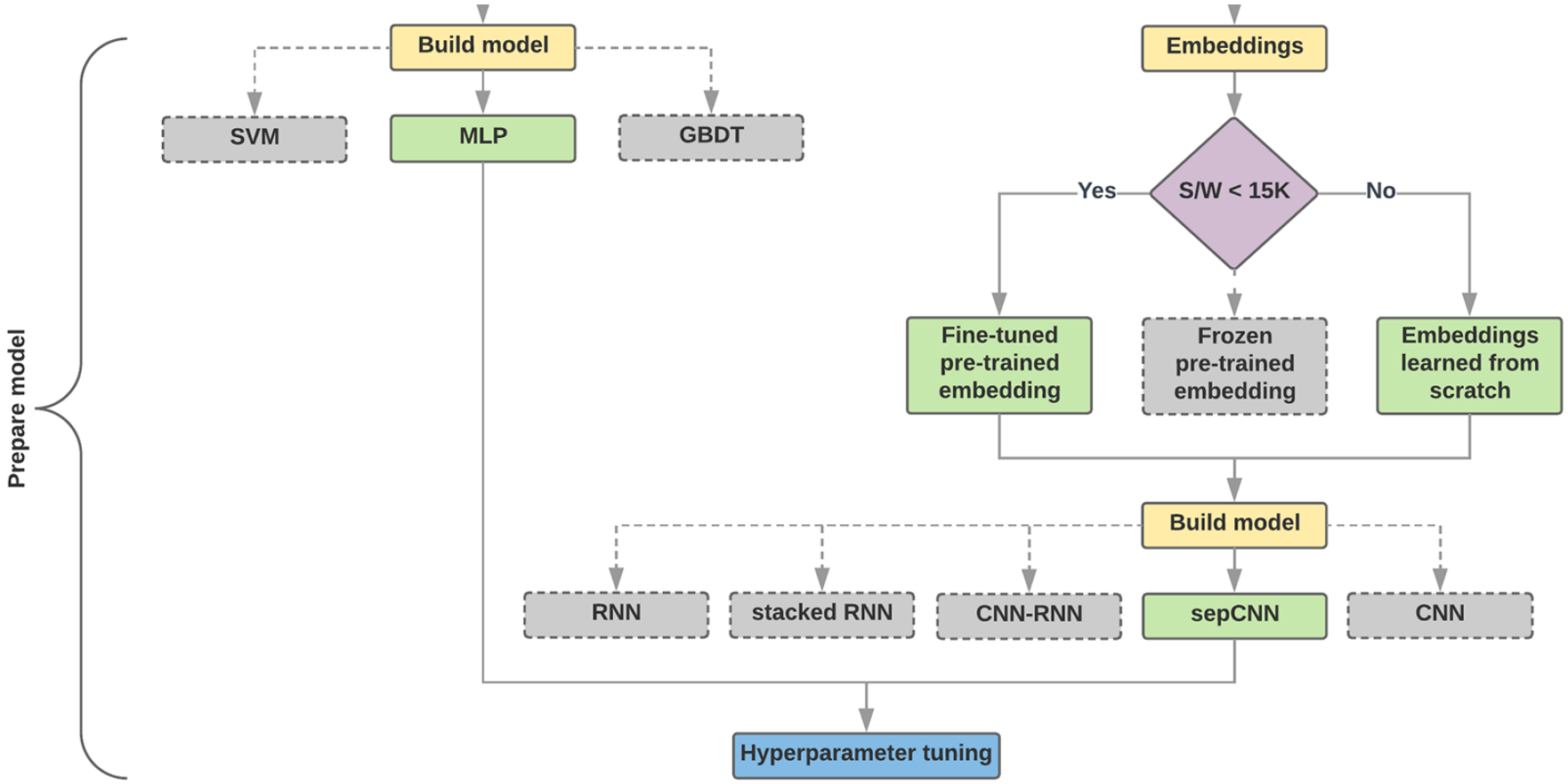
IMDb review dataset,
the samples/words-per-sample ratio is ~ 144

Source: https://developers.google.com/machine-learning/guides/text-classification/step-2-5

Step 2.5: Choose a Model

Samples/Words < 15,000

1,500,000/100 = 15,000



Source: https://developers.google.com/machine-learning/guides/text-classification/step-2-5

Step 3: Prepare Your Data

```
Texts:
T1: ’The mouse ran up the clock'
T2: ’The mouse ran down’

Token Index:
{'the': 1, 'mouse’: 2, 'ran': 3, 'up': 4, 'clock': 5, 'down': 6,}.
   NOTE: 'the' occurs most frequently,
         so the index value of 1 is assigned to it.
         Some libraries reserve index 0 for unknown tokens,
         as is the case here.

Sequence of token indexes:
T1: ‘The mouse ran up the clock’ =
      [1,  2,   3, 4,  1,  5]
T1: ’The mouse ran down’ =
      [1,   2,   3,  6]
```

Source: https://developers.google.com/machine-learning/guides/text-classification/step-3

One-hot encoding

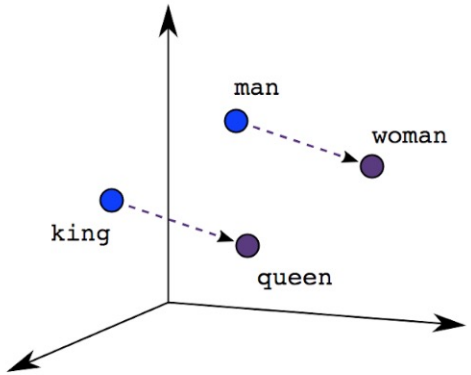
'The mouse ran up the clock' =

The	1	[[0, 1, 0, 0, 0, 0, 0],
mouse	2	[0, 0, 1, 0, 0, 0, 0],
ran	3	[0, 0, 0, 1, 0, 0, 0],
up	4	[0, 0, 0, 0, 1, 0, 0],
the	1	[0, 1, 0, 0, 0, 0, 0],
clock	5	[0, 0, 0, 0, 0, 1, 0]]

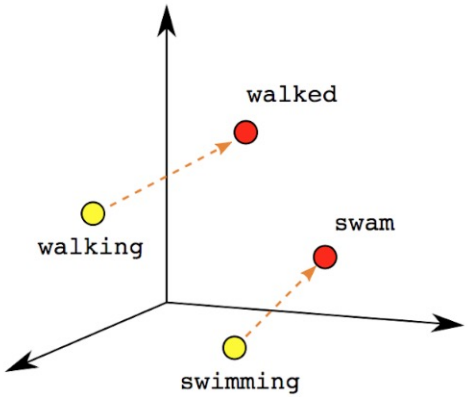
[0, 1, 2, 3, 4, 5, 6]

Source: https://developers.google.com/machine-learning/guides/text-classification/step-3

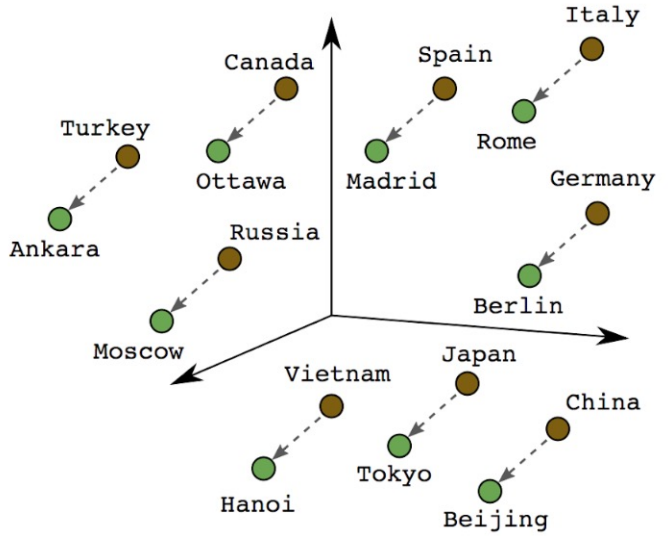
Word embeddings



Male-Female



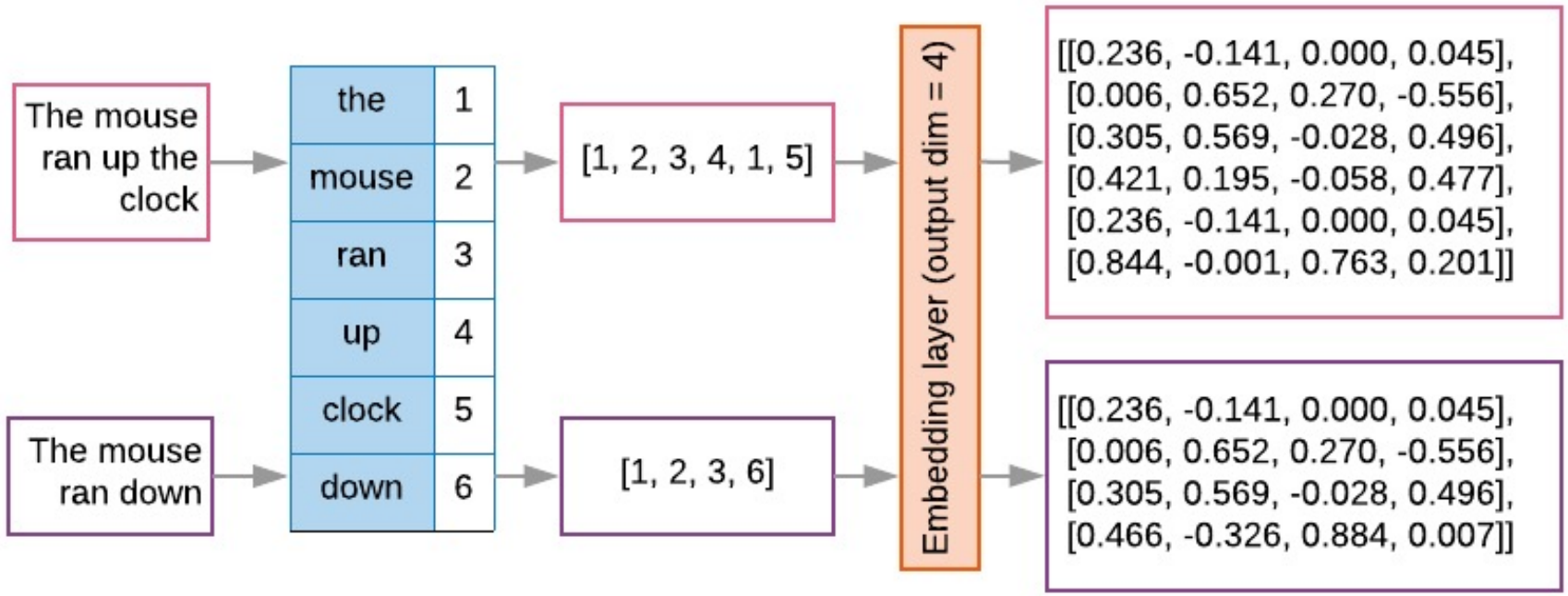
Verb Tense



Country-Capital

Source: https://developers.google.com/machine-learning/guides/text-classification/step-3

Word embeddings



Source: https://developers.google.com/machine-learning/guides/text-classification/step-3

```
t1 = 'The mouse ran up the clock'
t2 = 'The mouse ran down'
s1 = t1.lower().split(' ')
s2 = t2.lower().split(' ')
terms = s1 + s2
sortedset = sorted(set(terms))
print('terms =', terms)
print('sortedset =', sortedset)
```

```
1 t1 = 'The mouse ran up the clock'
2 t2 = 'The mouse ran down'
3 s1 = t1.lower().split(' ')
4 s2 = t2.lower().split(' ')
5 terms = s1 + s2
6 sortedset = sorted(set(terms))
7 print('terms =', terms)
8 print('sortedset =', sortedset)
```

```
terms = ['the', 'mouse', 'ran', 'up', 'the', 'clock', 'the', 'mouse', 'ran', 'down']
sortedset = ['clock', 'down', 'mouse', 'ran', 'the', 'up']
```

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT

```
t1 = 'The mouse ran up the clock'
t2 = 'The mouse ran down'
s1 = t1.lower().split(' ')
s2 = t2.lower().split(' ')
terms = s1 + s2
print(terms)

tfdict = {}
for term in terms:
    if term not in tfdict:
        tfdict[term] = 1
    else:
        tfdict[term] += 1

a = []
for k,v in tfdict.items():
    a.append('{}, {}'.format(k,v))
print(a)
```

```
['the', 'mouse', 'ran', 'up', 'the', 'clock', 'the', 'mouse', 'ran', 'down']
['the, 3', 'mouse, 2', 'ran, 2', 'up, 1', 'clock, 1', 'down, 1']
```

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT

```
sorted_by_value_reverse = sorted(tfdict.items(),
key=lambda kv: kv[1], reverse=True)

sorted_by_value_reverse_dict =
dict(sorted_by_value_reverse)

id2word = {id: word for id, word in
enumerate(sorted_by_value_reverse_dict)}

word2id = dict([(v, k) for (k, v) in
id2word.items()])
```

```
sorted_by_value:  [('up', 1), ('clock', 1), ('down', 1), ('mouse', 2), ('ran', 2), ('the', 3)]
sorted_by_value2:  ['the', 'mouse', 'ran', 'up', 'clock', 'down']
sorted_by_value_reverse:  [('the', 3), ('mouse', 2), ('ran', 2), ('up', 1), ('clock', 1), ('down', 1)]
sorted_by_value_reverse_dict {'the': 3, 'mouse': 2, 'ran': 2, 'up': 1, 'clock': 1, 'down': 1}
id2word {0: 'the', 1: 'mouse', 2: 'ran', 3: 'up', 4: 'clock', 5: 'down'}
word2id {'the': 0, 'mouse': 1, 'ran': 2, 'up': 3, 'clock': 4, 'down': 5}
len_words: 6
sorted_by_key:  [('clock', 1), ('down', 1), ('mouse', 2), ('ran', 2), ('the', 3), ('up', 1)]
the, 3
mouse, 2
ran, 2
up, 1
clock, 1
down, 1
```

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT

```
sorted_by_value = sorted(tfdict.items(), key=lambda kv: kv[1])
print('sorted_by_value: ', sorted_by_value)
sorted_by_value2 = sorted(tfdict, key=tfdict.get, reverse=True)
print('sorted_by_value2: ', sorted_by_value2)
sorted_by_value_reverse = sorted(tfdict.items(), key=lambda kv: kv[1], reverse=True)
print('sorted_by_value_reverse: ', sorted_by_value_reverse)
sorted_by_value_reverse_dict = dict(sorted_by_value_reverse)
print('sorted_by_value_reverse_dict', sorted_by_value_reverse_dict)
id2word = {id: word for id, word in enumerate(sorted_by_value_reverse_dict)}
print('id2word', id2word)
word2id = dict([(v, k) for (k, v) in id2word.items()])
print('word2id', word2id)
print('len_words:', len(word2id))

sorted_by_key = sorted(tfdict.items(), key=lambda kv: kv[0])
print('sorted_by_key: ', sorted_by_key)

tfstring = '\n'.join(a)
print(tfstring)
tf = tfdict.get('mouse')
print(tf)
```

```
sorted_by_value:  [('up', 1), ('clock', 1), ('down', 1), ('mouse', 2), ('ran', 2), ('the', 3)]
sorted_by_value2:  ['the', 'mouse', 'ran', 'up', 'clock', 'down']
sorted_by_value_reverse:  [('the', 3), ('mouse', 2), ('ran', 2), ('up', 1), ('clock', 1), ('down', 1)]
sorted_by_value_reverse_dict {'the': 3, 'mouse': 2, 'ran': 2, 'up': 1, 'clock': 1, 'down': 1}
id2word {0: 'the', 1: 'mouse', 2: 'ran', 3: 'up', 4: 'clock', 5: 'down'}
word2id {'the': 0, 'mouse': 1, 'ran': 2, 'up': 3, 'clock': 4, 'down': 5}
len_words: 6
sorted_by_key:  [('clock', 1), ('down', 1), ('mouse', 2), ('ran', 2), ('the', 3), ('up', 1)]
the, 3
mouse, 2
ran, 2
up, 1
clock, 1
down, 1
```

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT

from keras.preprocessing.text import Tokenizer

```
1  from keras.preprocessing.text import Tokenizer
2  # define 5 documents
3  docs = ['Well done!', 'Good work', 'Great effort', 'nice work', 'Excellent!']
4  # create the tokenizer
5  t = Tokenizer()
6  # fit the tokenizer on the documents
7  t.fit_on_texts(docs)
8  print('docs:', docs)
9  print('word_counts:', t.word_counts)
10 print('document_count:', t.document_count)
11 print('word_index:', t.word_index)
12 print('word_docs:', t.word_docs)
13 # integer encode documents
14 texts_to_matrix = t.texts_to_matrix(docs, mode='count')
15 print('texts_to_matrix:')
16 print(texts_to_matrix)
```

```
docs: ['Well done!', 'Good work', 'Great effort', 'nice work', 'Excellent!']
word_counts: OrderedDict([('well', 1), ('done', 1), ('good', 1), ('work', 2), ('great', 1), ('effort', 1), ('ni
document_count: 5
word_index: {'work': 1, 'well': 2, 'done': 3, 'good': 4, 'great': 5, 'effort': 6, 'nice': 7, 'excellent': 8}
word_docs: {'done': 1, 'well': 1, 'work': 2, 'good': 1, 'great': 1, 'effort': 1, 'nice': 1, 'excellent': 1}
texts_to_matrix:
[[0. 0. 1. 1. 0. 0. 0. 0. 0.]
 [0. 1. 0. 0. 1. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 1. 1. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 1. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 1.]]
```

Source: https://machinelearningmastery.com/prepare-text-data-deep-learning-keras/

from keras.preprocessing.text import Tokenizer

```
from keras.preprocessing.text import Tokenizer
# define 5 documents
docs = ['Well done!', 'Good work', 'Great effort', 'nice
work', 'Excellent!']
# create the tokenizer
t = Tokenizer()
# fit the tokenizer on the documents
t.fit_on_texts(docs)
print('docs:', docs)
print('word_counts:', t.word_counts)
print('document_count:', t.document_count)
print('word_index:', t.word_index)
print('word_docs:', t.word_docs)
# integer encode documents
texts_to_matrix = t.texts_to_matrix(docs, mode='count')
print('texts_to_matrix:')
print(texts_to_matrix)
```

Source: https://machinelearningmastery.com/prepare-text-data-deep-learning-keras/

texts_to_matrix = t.texts_to_matrix(docs, mode='count')

```
docs: ['Well done!', 'Good work', 'Great effort’,
'nice work', 'Excellent!’]
word_counts: OrderedDict([('well', 1), ('done', 1),
('good', 1), ('work', 2), ('great', 1), ('effort', 1),
('nice', 1), ('excellent', 1)])
document_count: 5
word_index: {'work': 1, 'well': 2, 'done': 3, 'good':
4, 'great': 5, 'effort': 6, 'nice': 7, 'excellent': 8}
word_docs: {'done': 1, 'well': 1, 'work': 2, 'good': 1,
'great': 1, 'effort': 1, 'nice': 1, 'excellent': 1}
texts_to_matrix:
[[0. 0. 1. 1. 0. 0. 0. 0. 0.]
 [0. 1. 0. 0. 1. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 1. 1. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 1. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 1.]]
```

Source: https://machinelearningmastery.com/prepare-text-data-deep-learning-keras/

t.texts_to_matrix(docs, mode='tfidf')

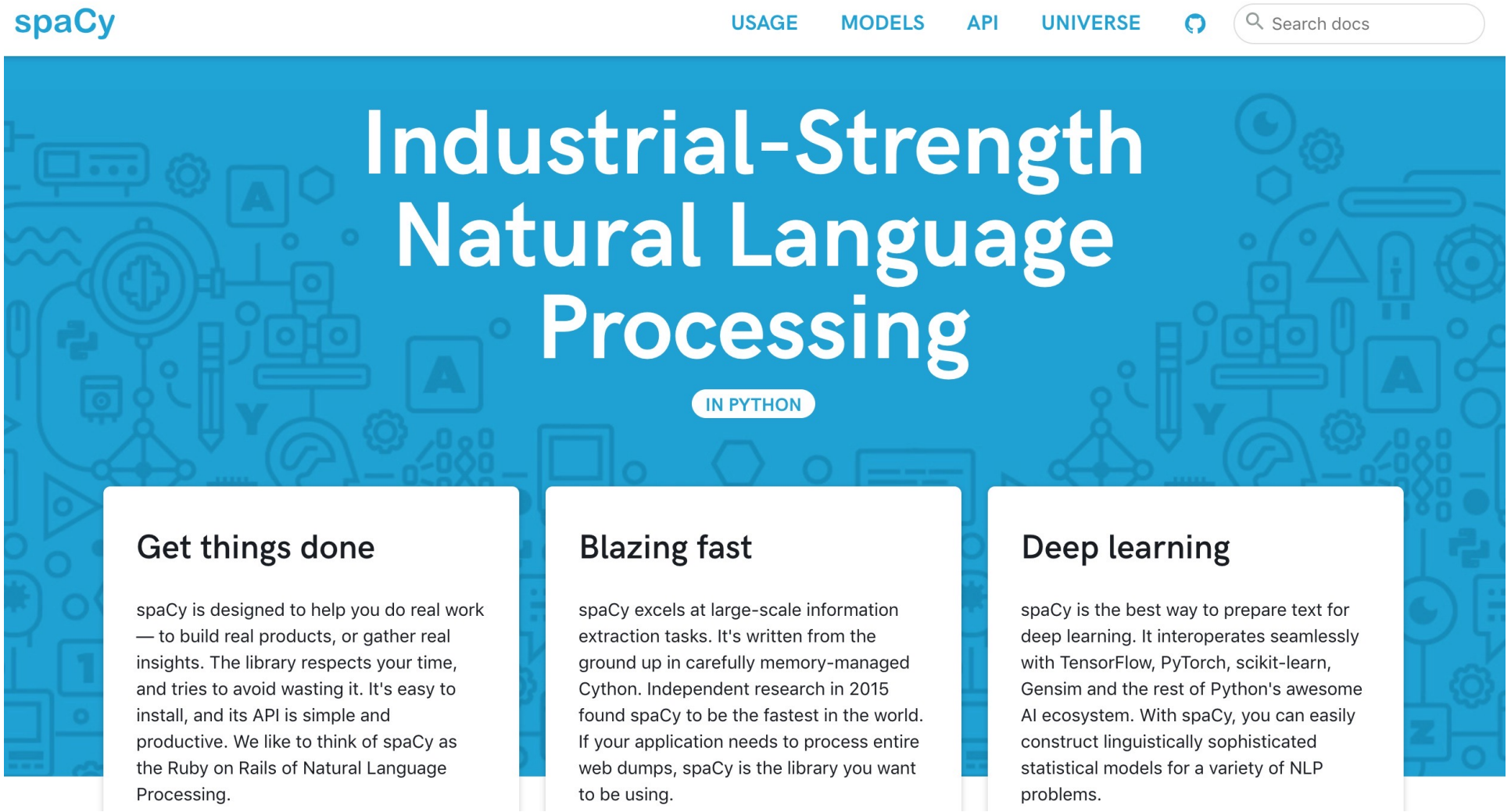
```
from keras.preprocessing.text import Tokenizer
# define 5 documents
docs = ['Well done!', 'Good work', 'Great effort', 'nice work',
'Excellent!']
# create the tokenizer
t = Tokenizer()
# fit the tokenizer on the documents
t.fit_on_texts(docs)
print('docs:', docs)
print('word_counts:', t.word_counts)
print('document_count:', t.document_count)
print('word_index:', t.word_index)
print('word_docs:', t.word_docs)
# integer encode documents
texts_to_matrix = t.texts_to_matrix(docs, mode='tfidf')
print('texts_to_matrix:')
print(texts_to_matrix)
```

```
texts_to_matrix:
[[0.  0.  1.25276297 1.25276297 0.  0.  0.  0.  0. ]
[0.  0.98082925 0.  0.  1.25276297 0.  0.  0.  0. ]
[0.  0.  0.  0.  0.  1.25276297 1.25276297 0.  0. ]
[0.  0.98082925 0.  0.  0.  0.  0.  1.25276297 0. ]
[0.  0.  0.  0.  0.  0.  0.  0.  1.25276297]]
```

Source: https://machinelearningmastery.com/prepare-text-data-deep-learning-keras/

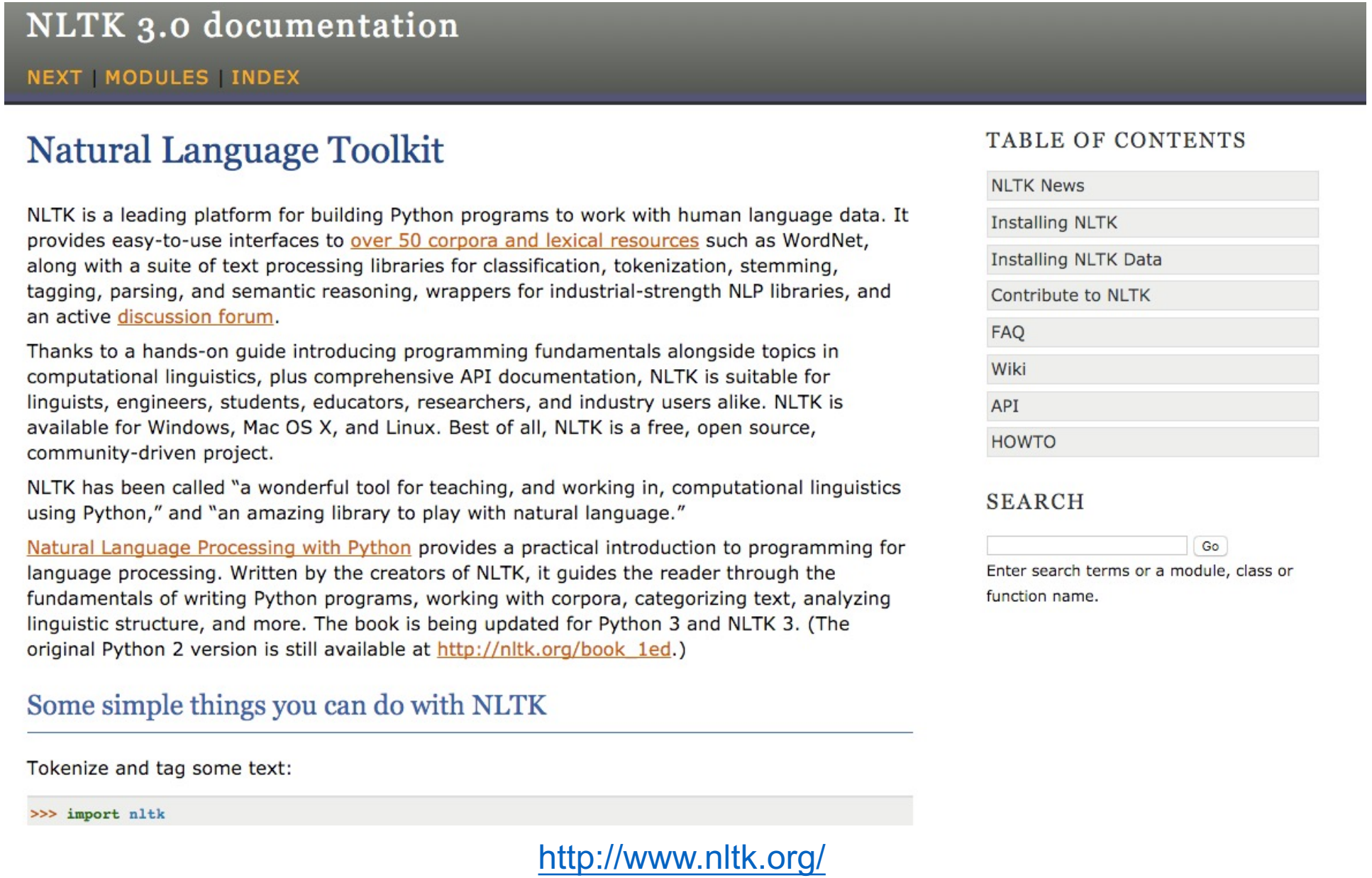
NLP Libraries and Tools

spaCy:
Natural Language Processing



https://spacy.io/

NLTK (Natural Language Toolkit)



NLTK 3.0 documentation

NEXT | MODULES | INDEX

Natural Language Toolkit

NLTK is a leading platform for building Python programs to work with human language data. It provides easy-to-use interfaces to over 50 corpora and lexical resources such as WordNet, along with a suite of text processing libraries for classification, tokenization, stemming, tagging, parsing, and semantic reasoning, wrappers for industrial-strength NLP libraries, and an active discussion forum.

Thanks to a hands-on guide introducing programming fundamentals alongside topics in computational linguistics, plus comprehensive API documentation, NLTK is suitable for linguists, engineers, students, educators, researchers, and industry users alike. NLTK is available for Windows, Mac OS X, and Linux. Best of all, NLTK is a free, open source, community-driven project.

NLTK has been called "a wonderful tool for teaching, and working in, computational linguistics using Python," and "an amazing library to play with natural language."

Natural Language Processing with Python provides a practical introduction to programming for language processing. Written by the creators of NLTK, it guides the reader through the fundamentals of writing Python programs, working with corpora, categorizing text, analyzing linguistic structure, and more. The book is being updated for Python 3 and NLTK 3. (The original Python 2 version is still available at http://nltk.org/book_1ed.)

Some simple things you can do with NLTK

Tokenize and tag some text:

```
>>> import nltk
```

TABLE OF CONTENTS

- NLTK News
- Installing NLTK
- Installing NLTK Data
- Contribute to NLTK
- FAQ
- Wiki
- API
- HOWTO

SEARCH

Go

Enter search terms or a module, class or function name.

http://www.nltk.org/

Natural Language Processing with Python
– Analyzing Text with the Natural Language Toolkit

Natural Language Processing with Python

– Analyzing Text with the Natural Language Toolkit

NLTK

Steven Bird, Ewan Klein, and Edward Loper

This version of the NLTK book is updated for Python 3 and NLTK 3. The first edition of the book, published by O'Reilly, is available at http://nltk.org/book_1ed/. (There are currently no plans for a second edition of the book.)

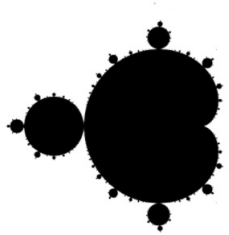
This book is made available under the terms of the Creative Commons Attribution Noncommercial No-Derivative-Works 3.0 US License. Please post any questions about the materials to the nltk-users mailing list. Please report any errors on the issue tracker.

http://www.nltk.org/book/

gensim

https://radimrehurek.com/gensim/

TextBlob



TextBlob

Star 3,777

TextBlob is a Python (2 and 3) library for processing textual data. It provides a consistent API for diving into common natural language processing (NLP) tasks such as part-of-speech tagging, noun phrase extraction, sentiment analysis, and more.

Useful Links

TextBlob @ PyPI
TextBlob @ GitHub
Issue Tracker

Stay Informed

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If you find TextBlob useful,

TextBlob: Simplified Text Processing

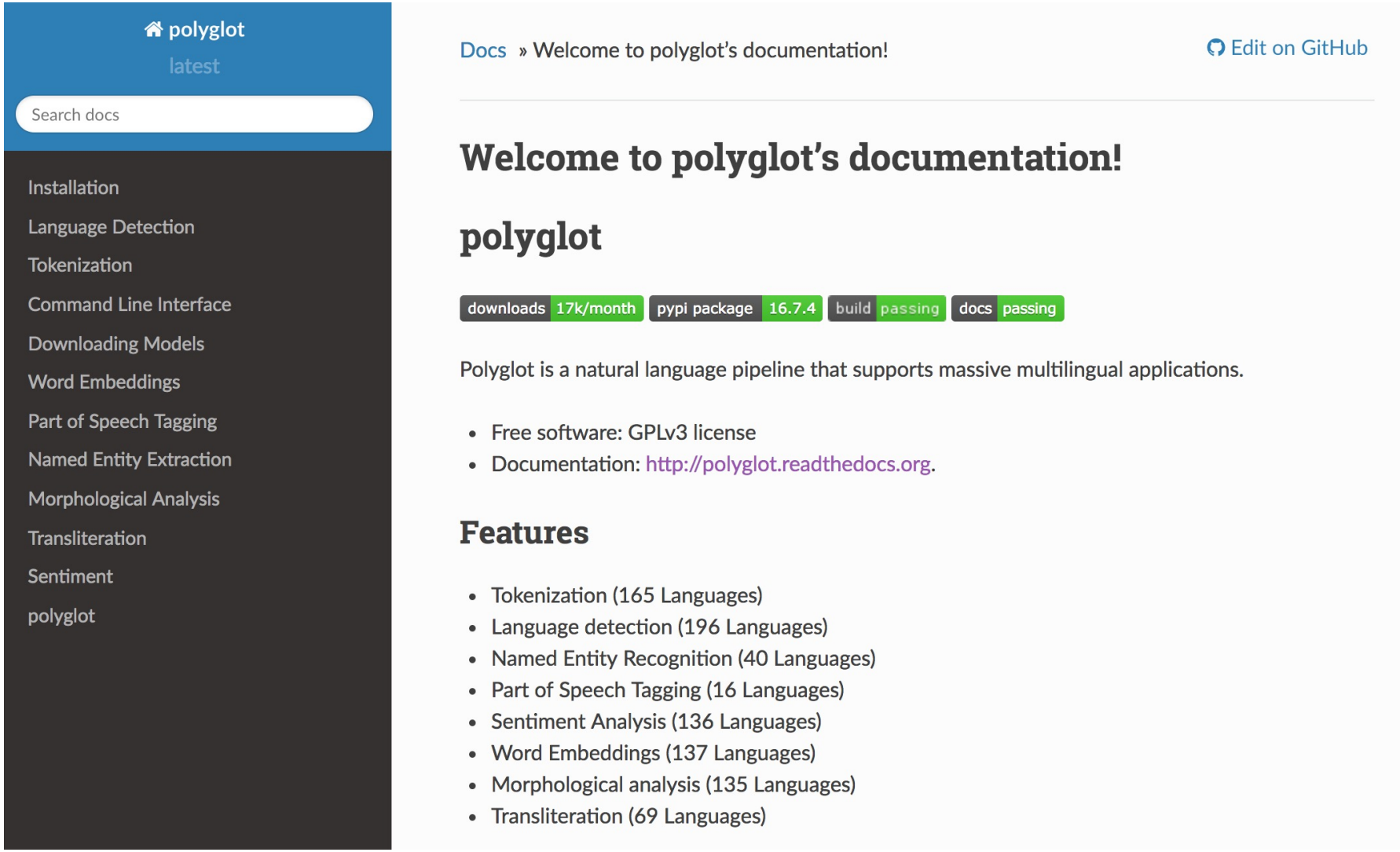
Release v0.12.0. (Changelog)

TextBlob is a Python (2 and 3) library for processing textual data. It provides a simple API for diving into common natural language processing (NLP) tasks such as part-of-speech tagging, noun phrase extraction, sentiment analysis, classification, translation, and more.

```
from textblob import TextBlob

text = '''
The titular threat of The Blob has always struck me as the ultimate movie
monster: an insatiably hungry, amoeba-like mass able to penetrate
virtually any safeguard, capable of--as a doomed doctor chillingly
describes it--"assimilating flesh on contact.
Snide comparisons to gelatin be damned, it's a concept with the most
devastating of potential consequences, not unlike the grey goo scenario
proposed by technological theorists fearful of
artificial intelligence run rampant.
'''

blob = TextBlob(text)
blob.tags           # [('The', 'DT'), ('titular', 'JJ'),
                    #  ('threat', 'NN'), ('of', 'IN'), ...]

blob.noun_phrases   # WordList(['titular threat', 'blob',
                    #           'ultimate movie monster',
                    #           'amoeba-like mass', ...])

for sentence in blob.sentences:
    print(sentence.sentiment.polarity)
# 0.060
```

https://textblob.readthedocs.io

Polyglot



https://polyglot.readthedocs.io/

scikit-learn

scikit learn

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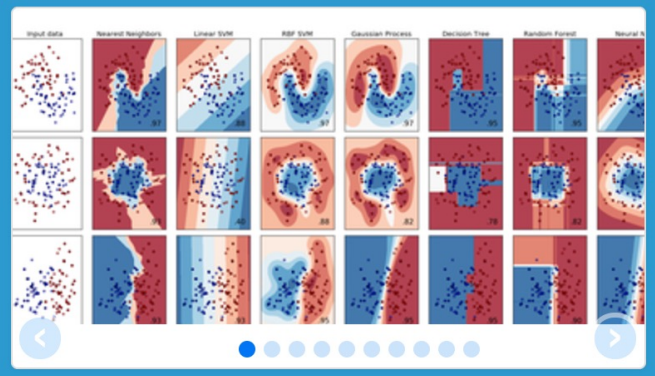


scikit-learn

Machine Learning in Python

- Simple and efficient tools for data mining and data analysis
- Accessible to everybody, and reusable in various contexts
- Built on NumPy, SciPy, and matplotlib
- Open source, commercially usable - BSD license

Classification

Identifying to which category an object belongs to.

Applications: Spam detection, Image recognition.
Algorithms: SVM, nearest neighbors, random forest, ... — Examples

Regression

Predicting a continuous-valued attribute associated with an object.

Applications: Drug response, Stock prices.
Algorithms: SVR, ridge regression, Lasso, ... — Examples

Clustering

Automatic grouping of similar objects into sets.

Applications: Customer segmentation, Grouping experiment outcomes
Algorithms: k-Means, spectral clustering, mean-shift, ... — Examples

Dimensionality reduction

Reducing the number of random variables to consider.

Applications: Visualization, Increased efficiency

Model selection

Comparing, validating and choosing parameters and models.

Goal: Improved accuracy via parameter tuning

Preprocessing

Feature extraction and normalization.

Application: Transforming input data such as text for use with machine learning algorithms.
Modules: preprocessing, feature extraction.

http://scikit-learn.org/

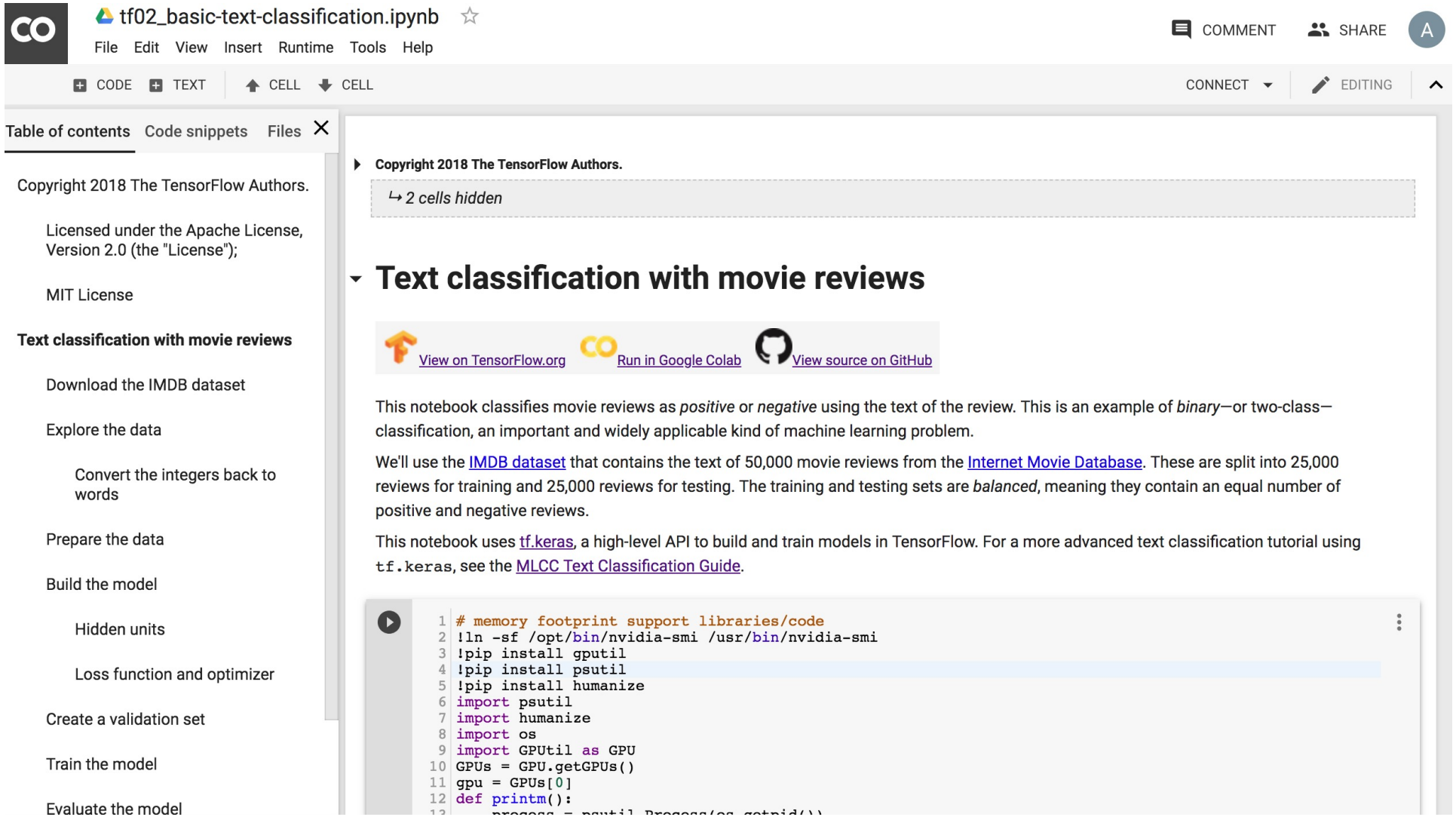
TensorFlow NLP Examples

- **Basic Text Classification (Text Classification) (46 Seconds)**
  - https://colab.research.google.com/github/tensorflow/docs/blob/master/site/en/tutorials/keras/basic_text_classification.ipynb
- **NMT with Attention (20-30 minutes)**
  - https://colab.research.google.com/github/tensorflow/tensorflow/blob/master/tensorflow/contrib/eager/python/examples/nmt_with_attention/nmt_with_attention.ipynb

Text Classification

IMDB Movie Reviews

https://colab.research.google.com/drive/1x16h1GhHsLIrLYtPCvCHaoO1W-i_gror



Source: https://colab.research.google.com/github/tensorflow/docs/blob/master/site/en/tutorials/keras/basic_text_classification.ipynb

NLP with Transformers Github

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nlp-with-transformers / notebooks Public

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main 1 branch 0 tags Go to file Code

lewtun Merge pull request #21 from JingchaoZhang/patch-3 ... ae5b7c1 15 days ago 71 commits

.github/ISSUE_TEMPLATE	Update issue templates	25 days ago
data	Move dataset to data directory	4 months ago
images	Add README	last month
scripts	Update issue templates	25 days ago
.gitignore	Initial commit	4 months ago
01_introduction.ipynb	Remove Colab badges & fastdoc refs	27 days ago
02_classification.ipynb	Merge pull request #8 from nlp-with-transformers/remove-display-df	26 days ago
03_transformer-anatomy.ipynb	[Transformers Anatomy] Remove cells with figure references	22 days ago
04_multilingual-ner.ipynb	Merge pull request #8 from nlp-with-transformers/remove-display-df	26 days ago
05_text-generation.ipynb	Merge pull request #8 from nlp-with-transformers/remove-display-df	26 days ago

About

Jupyter notebooks for the Natural Language Processing with Transformers book

transformersbook.com/

Readme

Apache-2.0 License

1.1k stars

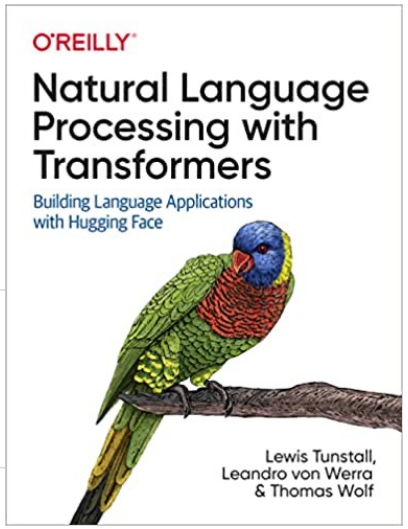
33 watching

170 forks

Releases

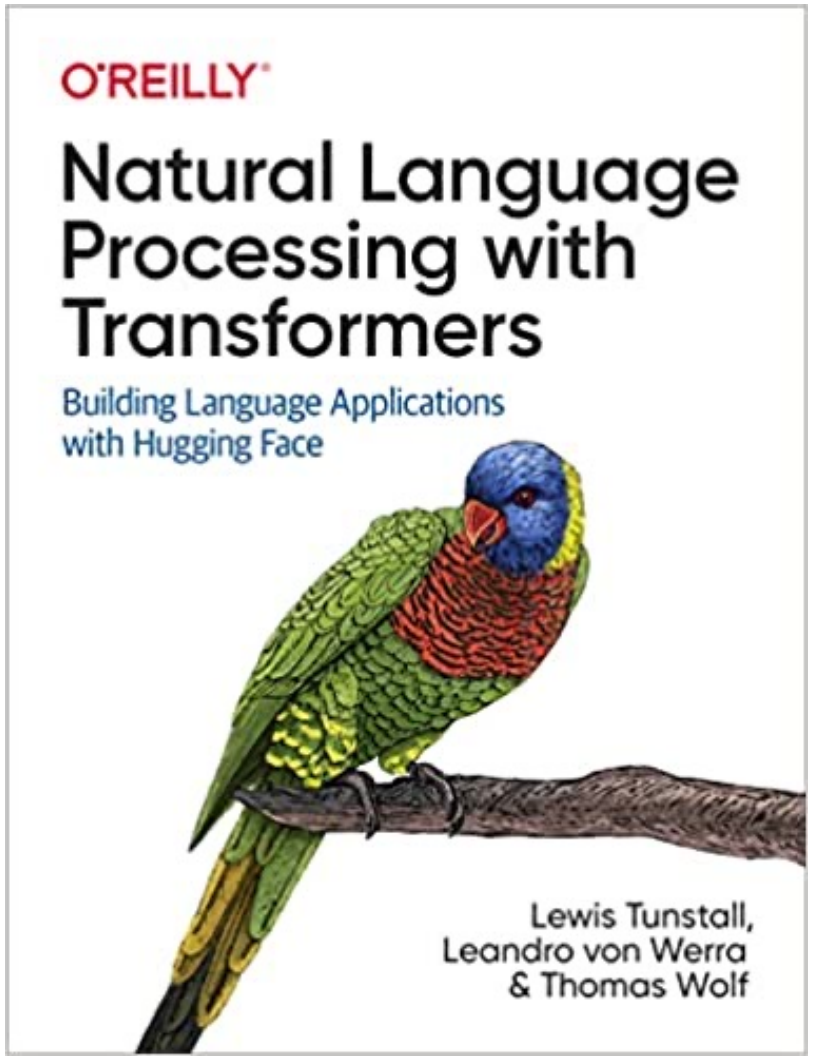
No releases published

Packages



https://github.com/nlp-with-transformers/notebooks

NLP with Transformers Github Notebooks



Running on a cloud platform

To run these notebooks on a cloud platform, just click on one of the badges in the table below:

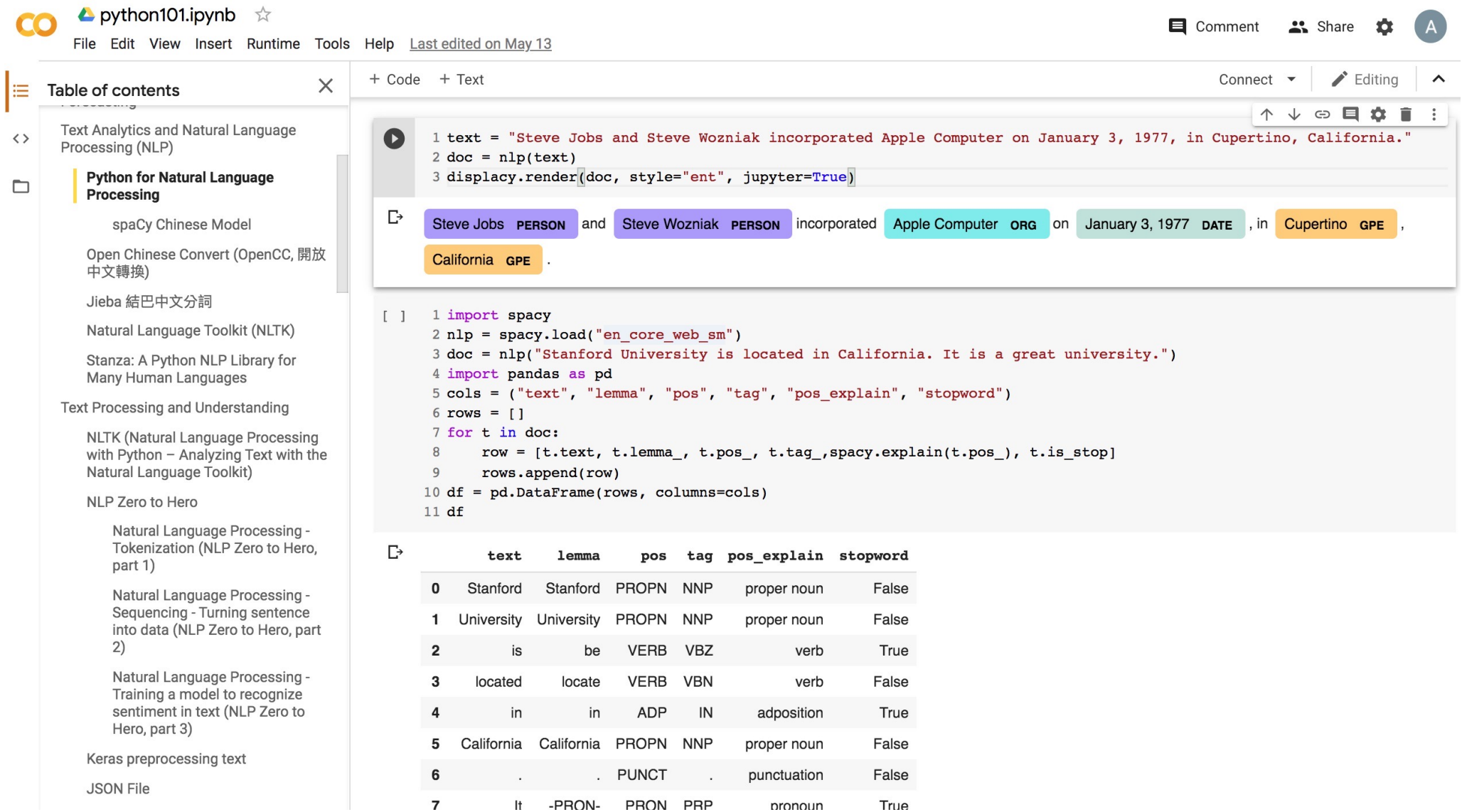
Chapter	Colab	Kaggle	Gradient	Studio Lab
Introduction	Open in Colab	Open in Kaggle	Run on Gradient	Open Studio Lab
Text Classification	Open in Colab	Open in Kaggle	Run on Gradient	Open Studio Lab
Transformer Anatomy	Open in Colab	Open in Kaggle	Run on Gradient	Open Studio Lab
Multilingual Named Entity Recognition	Open in Colab	Open in Kaggle	Run on Gradient	Open Studio Lab
Text Generation	Open in Colab	Open in Kaggle	Run on Gradient	Open Studio Lab
Summarization	Open in Colab	Open in Kaggle	Run on Gradient	Open Studio Lab
Question Answering	Open in Colab	Open in Kaggle	Run on Gradient	Open Studio Lab
Making Transformers Efficient in Production	Open in Colab	Open in Kaggle	Run on Gradient	Open Studio Lab
Dealing with Few to No Labels	Open in Colab	Open in Kaggle	Run on Gradient	Open Studio Lab
Training Transformers from Scratch	Open in Colab	Open in Kaggle	Run on Gradient	Open Studio Lab
Future Directions	Open in Colab	Open in Kaggle	Run on Gradient	Open Studio Lab

Nowadays, the GPUs on Colab tend to be K80s (which have limited memory), so we recommend using Kaggle, Gradient, or SageMaker Studio Lab. These platforms tend to provide more performant GPUs like P100s, all for free!

https://github.com/nlp-with-transformers/notebooks

Python in Google Colab (Python101)

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT



	text	lemma	pos	tag	pos_explain	stopword
0	Stanford	Stanford	PROPN	NNP	proper noun	False
1	University	University	PROPN	NNP	proper noun	False
2	is	be	VERB	VBZ	verb	True
3	located	locate	VERB	VBN	verb	False
4	in	in	ADP	IN	adposition	True
5	California	California	PROPN	NNP	proper noun	False
6	.	.	PUNCT	.	punctuation	False
7	It	-PRON-	PRON	PRP	pronoun	True

https://tinyurl.com/aintpupython101

Summary

- **Python for Natural Language Processing**
  - **Python Ecosystem for Data Science**
  - **Python**
    - Programming language
  - **Numpy**
    - Scientific computing
  - **SpaCy**
    - Natural Language Processing

References

- Lewis Tunstall, Leandro von Werra, and Thomas Wolf (2022), Natural Language Processing with Transformers: Building Language Applications with Hugging Face, O'Reilly Media.
- Denis Rothman (2021), Transformers for Natural Language Processing: Build innovative deep neural network architectures for NLP with Python, PyTorch, TensorFlow, BERT, RoBERTa, and more, Packt Publishing.
- Savaş Yıldırım and Meysam Asgari-Chenaghlu (2021), Mastering Transformers: Build state-of-the-art models from scratch with advanced natural language processing techniques, Packt Publishing.
- Sowmya Vajjala, Bodhisattwa Majumder, Anuj Gupta (2020), Practical Natural Language Processing: A Comprehensive Guide to Building Real-World NLP Systems, O'Reilly Media.
- Ramesh Sharda, Dursun Delen, and Efraim Turban (2017), Business Intelligence, Analytics, and Data Science: A Managerial Perspective, 4th Edition, Pearson.
- Dipanjan Sarkar (2019), Text Analytics with Python: A Practitioner's Guide to Natural Language Processing, Second Edition. APress.
- Benjamin Bengfort, Rebecca Bilbro, and Tony Ojeda (2018), Applied Text Analysis with Python: Enabling Language-Aware Data Products with Machine Learning, O'Reilly.
- Charu C. Aggarwal (2018), Machine Learning for Text, Springer.
- Gabe Ignatow and Rada F. Mihalcea (2017), An Introduction to Text Mining: Research Design, Data Collection, and Analysis, SAGE Publications.
- Rajesh Arumugam (2018), Hands-On Natural Language Processing with Python: A practical guide to applying deep learning architectures to your NLP applications, Packt.
- Jake VanderPlas (2016), Python Data Science Handbook: Essential Tools for Working with Data, O'Reilly Media.
- Devlin, Jacob, Ming-Wei Chang, Kenton Lee, and Kristina Toutanova (2018). "BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding." arXiv preprint arXiv:1810.04805.
- Steven Bird, Ewan Klein and Edward Loper (2009), Natural Language Processing with Python, O'Reilly Media, http://www.nltk.org/book/
- The Super Duper NLP Repo, https://notebooks.quantumstat.com/
- Avinash Jain (2017), Introduction To Python Programming, Udemy, https://www.udemy.com/pythonforbeginnersintro/
- Python Programming, https://pythonprogramming.net/
- Python, https://www.python.org/
- Python Programming Language, http://pythonprogramminglanguage.com/
- Numpy, http://www.numpy.org/
- Pandas, http://pandas.pydata.org/
- Min-Yuh Day (2022), Python 101, https://tinyurl.com/aintpupython101