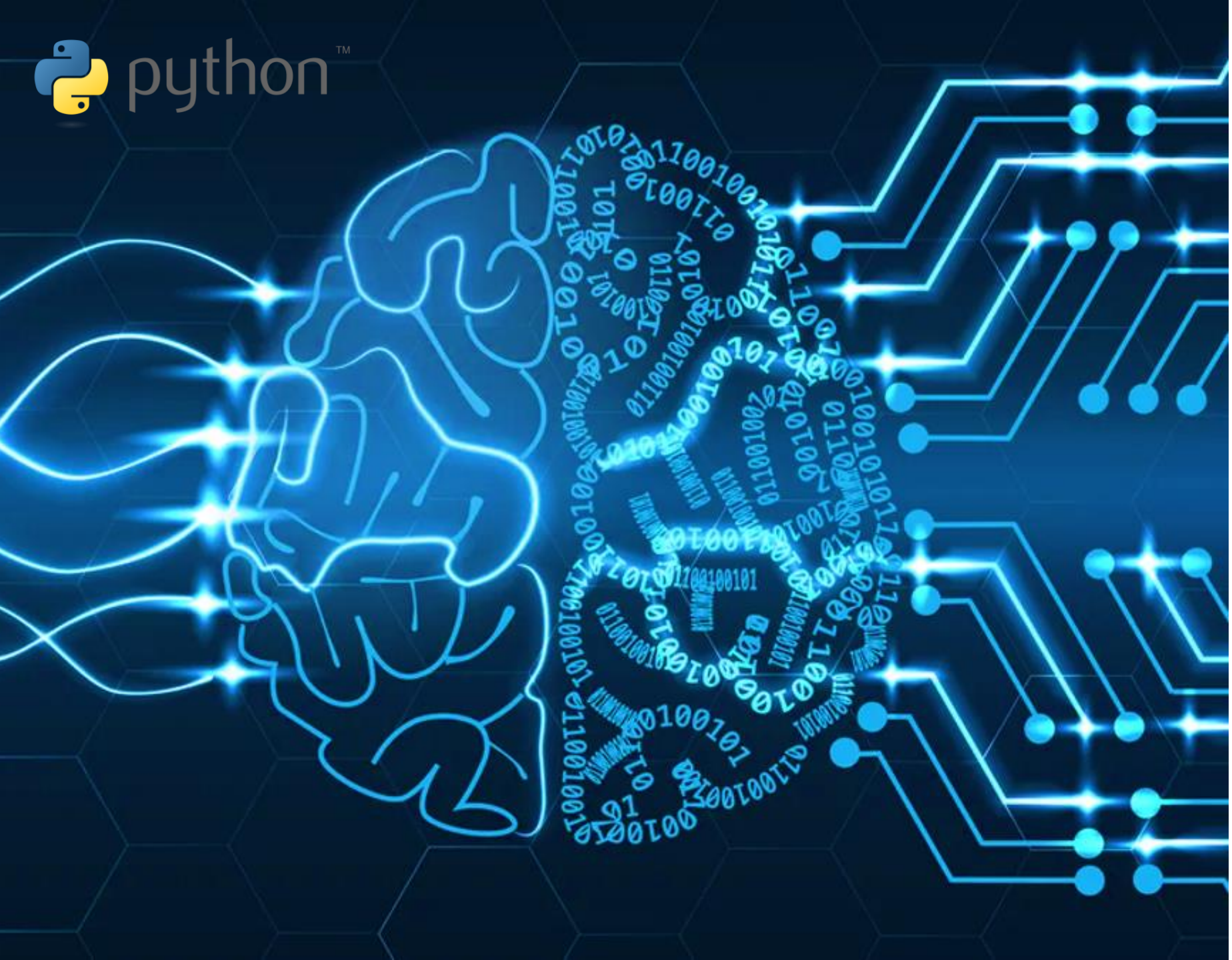


مقدمه ای بر پایتون برای یادگیری ماشین

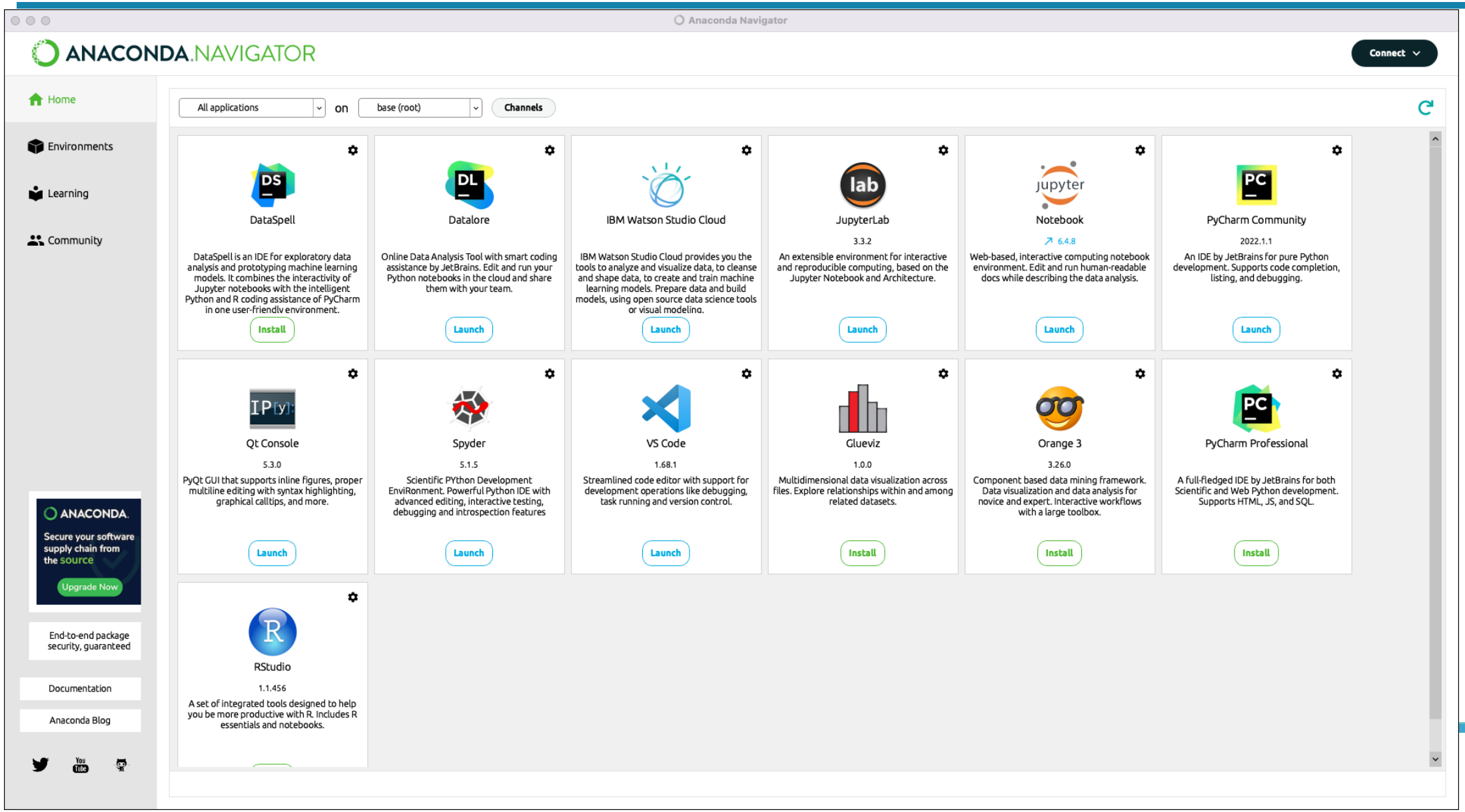
دکتر مهدی شریف‌زاده
امیرحسین محمودی

بهمن ۱۴۰۱

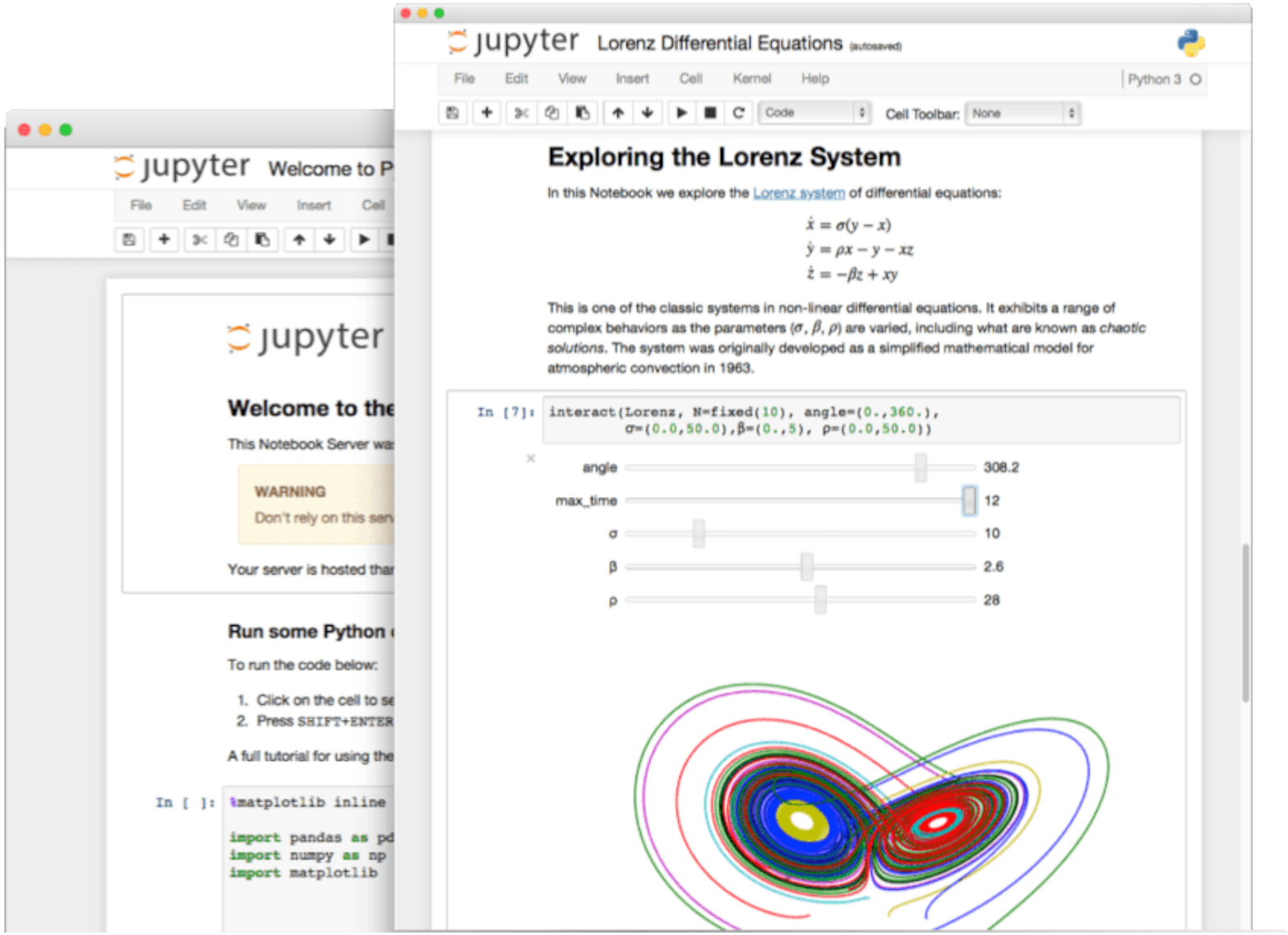

بسم الله الرحمن الرحیم

Python; Anaconda; Jupyter notebook

Python; Anaconda; Jupyter notebook



Python; Anaconda; Jupyter notebook



Setting Up a Python Environment

- ✓ Set Up Anaconda Python Environment (also jupyter notebook)

https://www.anaconda.com/products/distribution

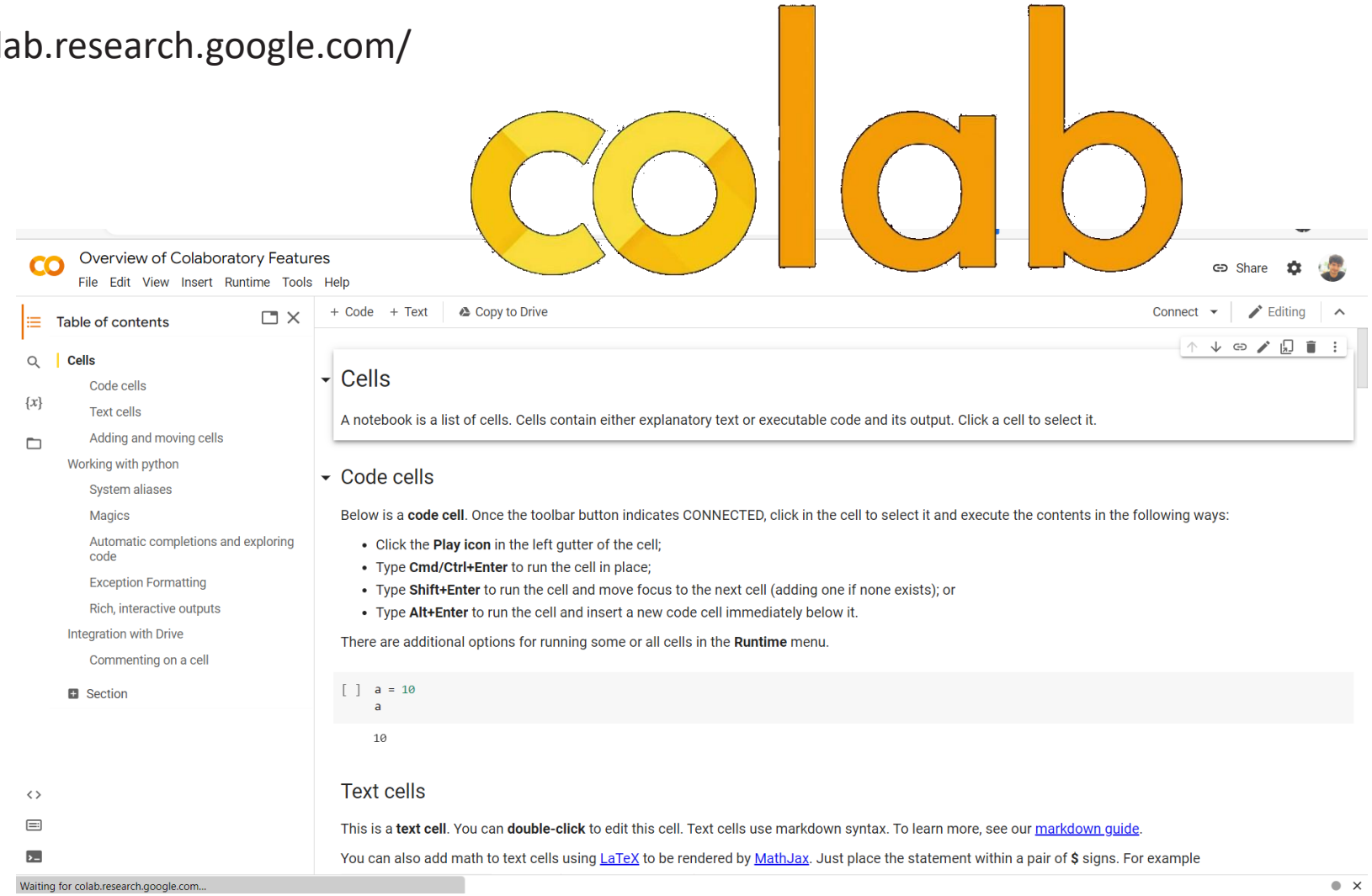
https://code.visualstudio.com/download

Watch video:

https://drive.google.com/file/d/13J9-1tjYpLJ9jy0U5kGq7NSmDT0DOdE/view

Google Colab

- ✓ https://colab.research.google.com/



Python basic functions

- ✓ type( ) function
- ✓ input( ) function
- ✓ abs( ) function
- ✓ pow( ) function
- ✓ dir( ) function
- ✓ sorted( ) function
- ✓ max( ) function
- ✓ round( ) function
- ✓ divmod( ) function
- ✓ id( ) function
- ✓ ord( ) function
- ✓ len( ) function
- ✓ sum( ) function
- ✓ help( ) function
- ✓ Str() function
- ✓ Int() function

Lines and Indentation

Python provides no braces to indicate blocks of code for class and function definitions or flow control. Blocks of code are denoted by line indentation, which is rigidly enforced.

```
if True:
   print "True"
else:
   print "False"
```

Multi-Line Statements

Statements in Python typically end with a new line. Python does, however, allow the use of the line continuation character (\) to denote that the line should continue

```
total = item_one + \
        item_two + \
        item_three
```

Statements contained within the [], {}, or () brackets do not need to use the line continuation character. For example

```
days = ['Monday', 'Tuesday', 'Wednesday',
        'Thursday', 'Friday']
```

Quotation in Python

Python accepts single ('), double (") and triple (''' or """) quotes to denote string literals, as long as the same type of quote starts and ends the string.
The triple quotes are used to span the string across multiple lines.

```
word = 'word'
sentence = "This is a sentence."
paragraph = """This is a paragraph. It is
made up of multiple lines and sentences."""
```

Comments in Python

A hash sign (#) that is not inside a string literal begins a comment. All characters after the # and up to the end of the physical line are part of the comment and the Python interpreter ignores them.

```
# First comment
print "Hello, Python!" # second comment
```

Waiting for the User

A hash sign (#) that is not inside a string literal begins a comment. All characters after the # and up to the end of the physical line are part of the comment and the Python interpreter ignores them.

```
raw_input("\n\nPress the enter key to exit.")
```

Multiple Statements on a Single Line

The semicolon (;) allows multiple statements on the single line given that neither statement starts a new code block. Here is a sample snip using the semicolon

```
import sys; x = 'foo'; sys.stdout.write(x + '\n')
```

Multiple Assignment

```
a,b,c = 1,2,"john"
```

Python reserved keywords

and	exec	not
assert	finally	or
break	for	pass
class	from	print
continue	global	raise
def	if	return
del	import	try
elif	in	while
else	is	with
except	lambda	yield

Basic Arithmetic Operations

In [2]:

```
a = 12
b = 2

print(a + b)
print(a**b)
print(a/b)
```

```
14
144
6.0
```

Python Libraries

In [3]:

```
import numpy as np

# mathematical constants
print(np.pi)
print(np.e)

# trignometric functions
angle = np.pi/4
print(np.sin(angle))
print(np.cos(angle))
print(np.tan(angle))
```

```
3.141592653589793
2.718281828459045
0.707106781187
0.707106781187
1.0
```

Python Lists

A list is a data structure in Python that is a mutable, or changeable, ordered sequence of elements. Each element or value that is inside of a list is called an item. Just as strings are defined as characters between quotes, lists are defined by having values between square brackets [ ].

In [4]:
```
xList = [1, 2, 3, 4]
xList
```

Out[4]:
```
[1, 2, 3, 4]
```

In [5]:
```
# Concatenation
x = [1, 2, 3, 4];
y = [5, 6, 7, 8];

x + y
```

Out[5]:
```
[1, 2, 3, 4, 5, 6, 7, 8]
```

Python Lists

Sum a list of numbers:

In [6]:
```
np.sum(x)
```

Out[6]:
```
10
```

An element-by-element operation between two lists may be performed with

In [7]:
```
print(np.add(x,y))
print(np.dot(x,y))
```

```
[ 6  8 10 12]
70
```

Python Tuples

Tuples can be thought of as read-only lists

```
tuple = ( 'abcd', 786 , 2.23, 'john', 70.2  )
tinytuple = (123, 'john')

print tuple               # Prints the complete tuple
print tuple[0]            # Prints first element of the tuple
print tuple[1:3]          # Prints elements of the tuple starting from 2nd till 3rd
print tuple[2:]           # Prints elements of the tuple starting from 3rd element
print tinytuple * 2       # Prints the contents of the tuple twice
print tuple + tinytuple   # Prints concatenated tuples
```

```
tuple = ( 'abcd', 786 , 2.23, 'john', 70.2  )
list = [ 'abcd', 786 , 2.23, 'john', 70.2  ]
tuple[2] = 1000    # Invalid syntax with tuple
list[2] = 1000     # Valid syntax with list
```

Python Dictionary

Dictionaries are used to store data values in key:value pairs.
A dictionary is a collection which is ordered*, changeable and do not allow duplicates.
Dictionaries are written with curly brackets, and have keys and values:

```
In [9]:
mw = {'CH4': 16.04, 'H2O': 18.02, 'O2':32.00, 'CO2': 44.01}
mw
```

```
Out[9]: {'CH4': 16.04, 'CO2': 44.01, 'H2O': 18.02, 'O2': 32.0}
```

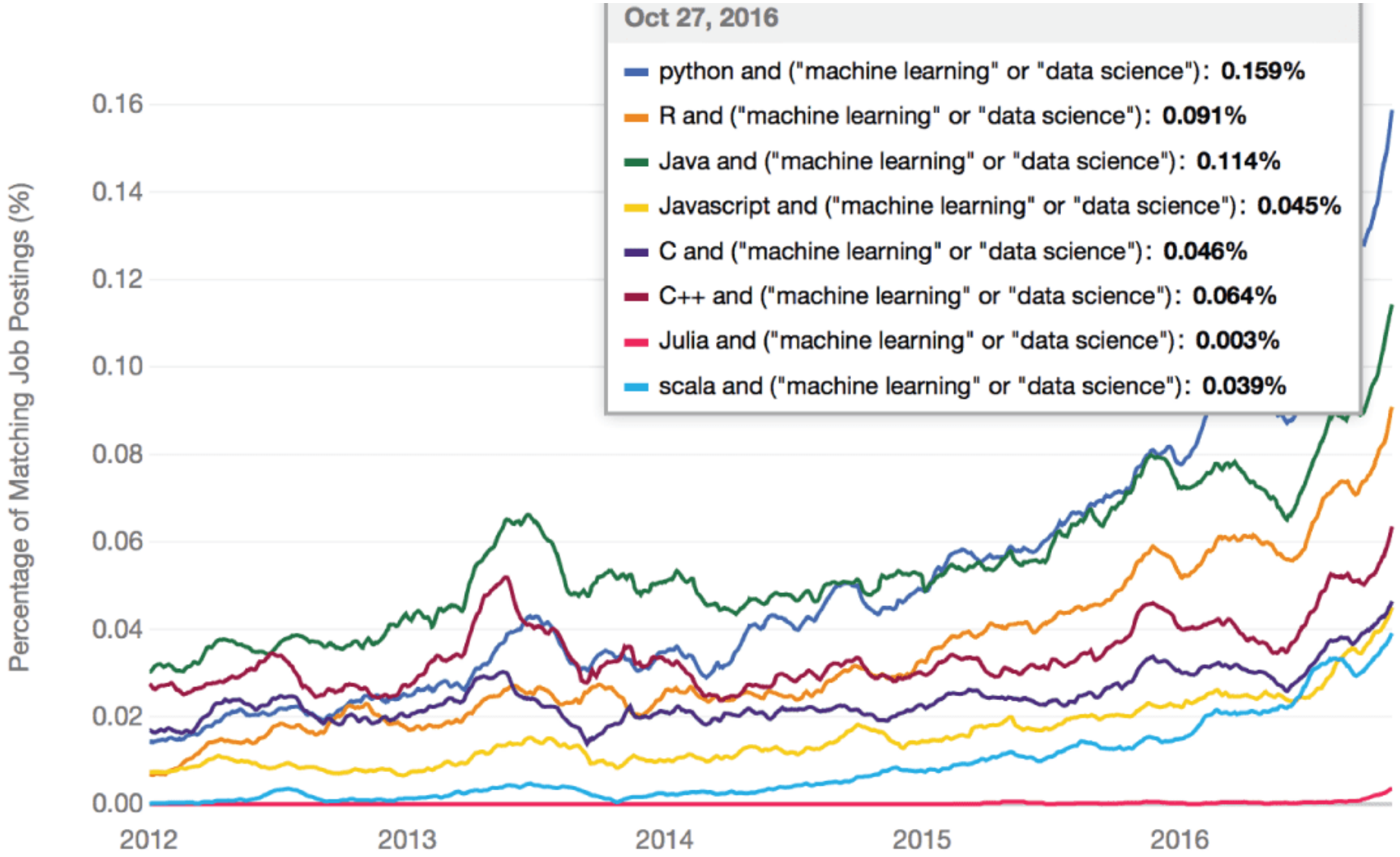
Add or change a value:

```
In [10]:
mw['C8H18'] = 114.23
mw
```

```
Out[10]: {'C8H18': 114.23, 'CH4': 16.04, 'CO2': 44.01, 'H2O': 18.02, 'O2': 32.0}
```

As of Python version 3.7, dictionaries are *ordered*. In Python 3.6 and earlier, dictionaries are *unordered*.

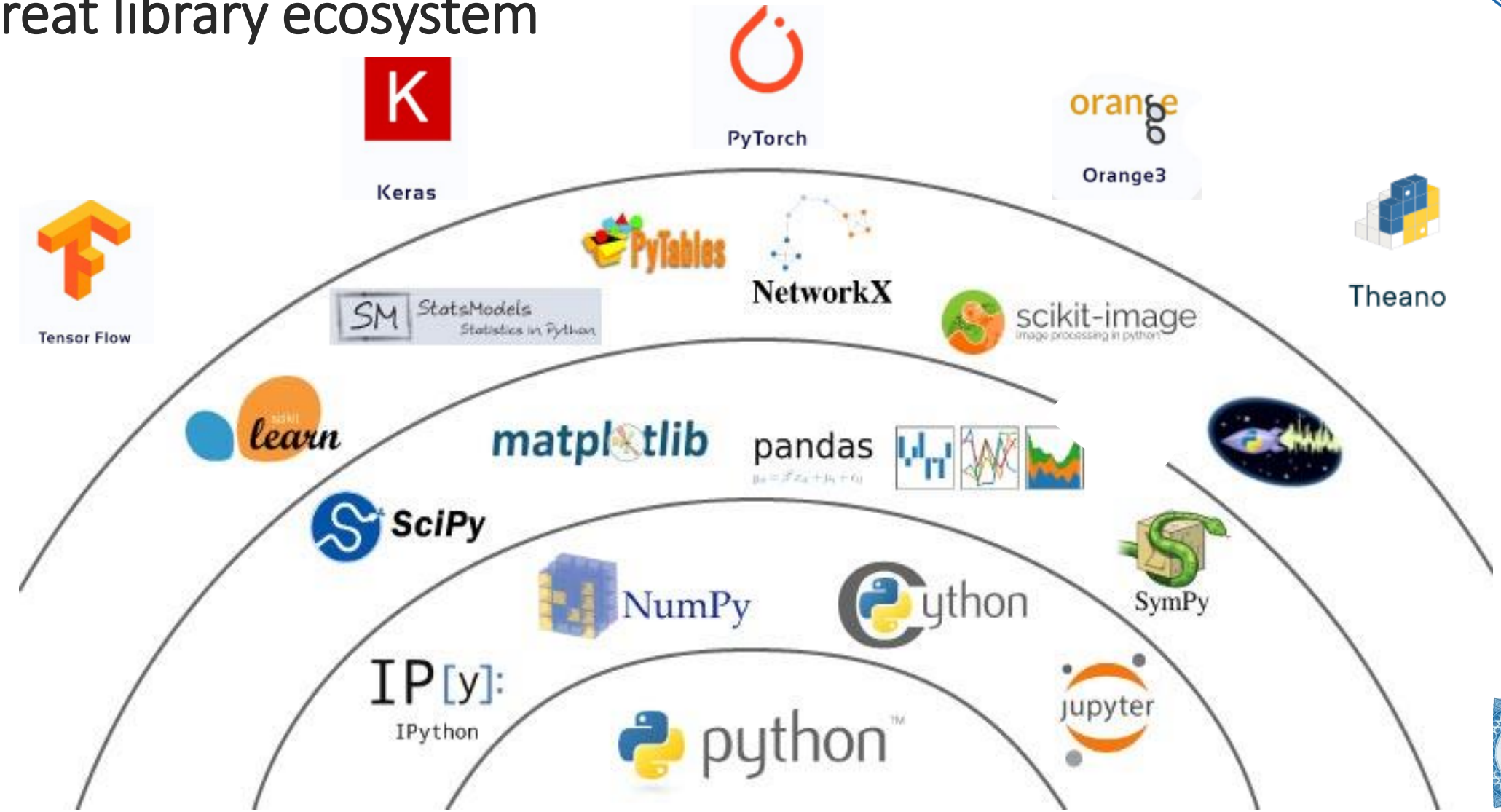
Why Python for Machine Learning?



8 Reasons Why Python is Good for AI and ML| Django Stars

Why Python for Machine Learning?

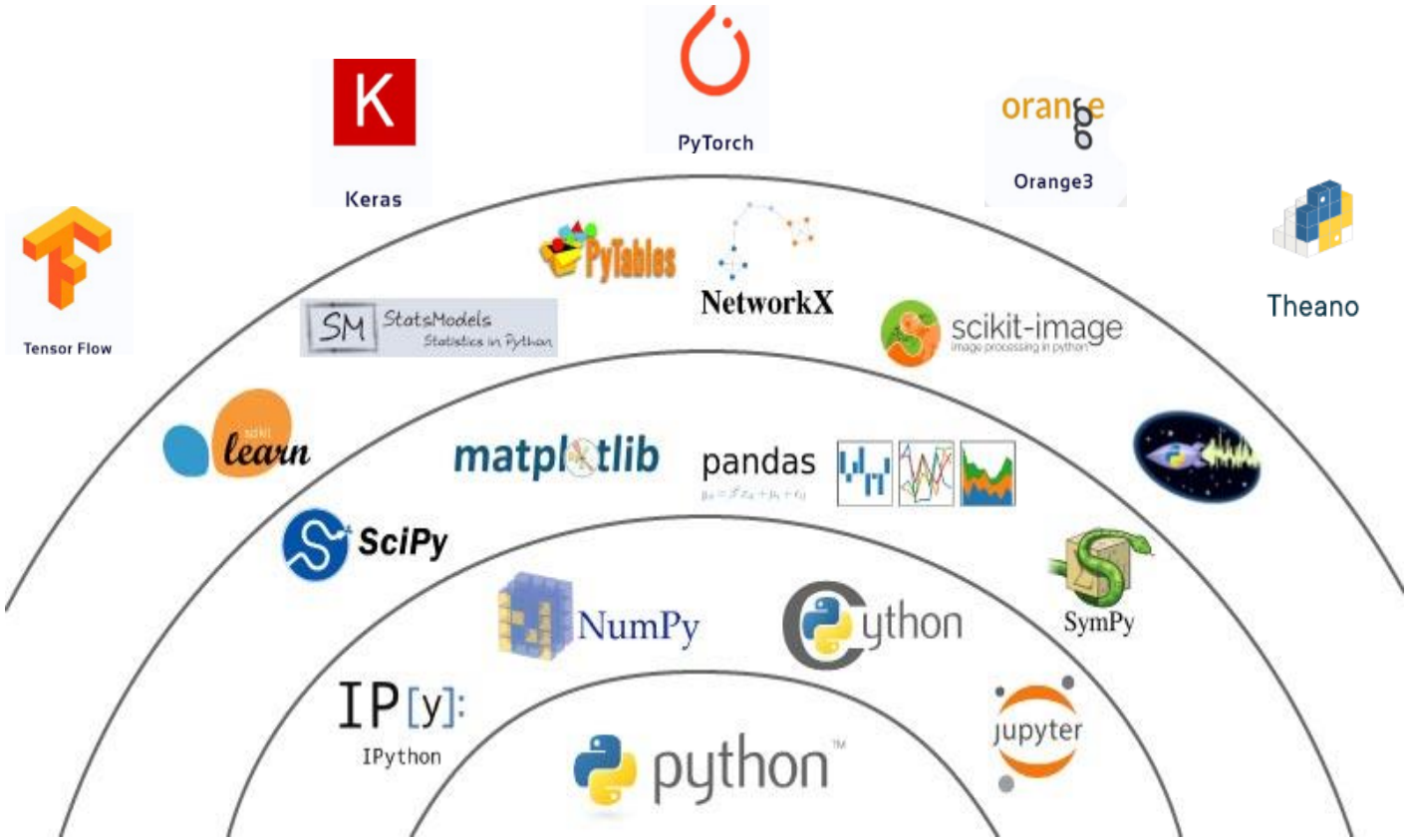
- A great library ecosystem



21 Best Python Libraries for Machine Learning - TechyEverything

Why Python for Machine Learning?

- A great library ecosystem
- A low entry barrier
- Flexibility
- Platform independence
- Good visualization options
- Community support



References

- Dipanjan Sarkar, Raghav Bali, Tushar Sharma, Practical Machine Learning with Python- A Problem-Solver's Guide to Building Real-World Intelligent Systems, Apress, 2018.