

Software tutorial

VSCode

- Install Visual Studio Code
 - Explain the GUI of VSCode
 - Show example of Markdown visualization
 - Show example of installing VSCode extensions

VSCode MarkDown (.md)





Visual Studio Code





EXTENSIONS: MARKETPLACE


markdown


**Markdown All in One** 2.7.0 1.1M ★ 5
All you need to write Markdown (keybo...
Yu Zhang


**Markdown** 1.1.3 10K ★ 3
Markdown Paste Image To Qiniu OSS st...
starkwang


**Markdown Preview ...** 0.5.2 765K ★ 4.5
Markdown Preview Enhanced ported to...
Yiyi Wang


**markdownlint** 0.34.0 1.4M ★ 4.5
Markdown linting and style checking fo...
David Anson

**Markdown PDF** 1.4.1 406K ★ 4.5
Convert Markdown to PDF
yzane

**Markdown Shortcuts** 0.12.0 70K ★ 5
Shortcuts for Markdown editing
mdickin


**docs-markdown** 0.2.44 36K ★ 5
Docs Markdown Extension
Microsoft

**Markdown Preview ...** 0.1.6 178K ★ 4.5
Changes VS Code's built-in markdown ...
Matt Bierner

**Instant Markdown** 1.4.4 109K ★ 3.5
Instant previews of your markdown files...
David Bankier

homework_00.md

Extension: Markdown Preview Enhanced ×



Markdown Preview Enhanced

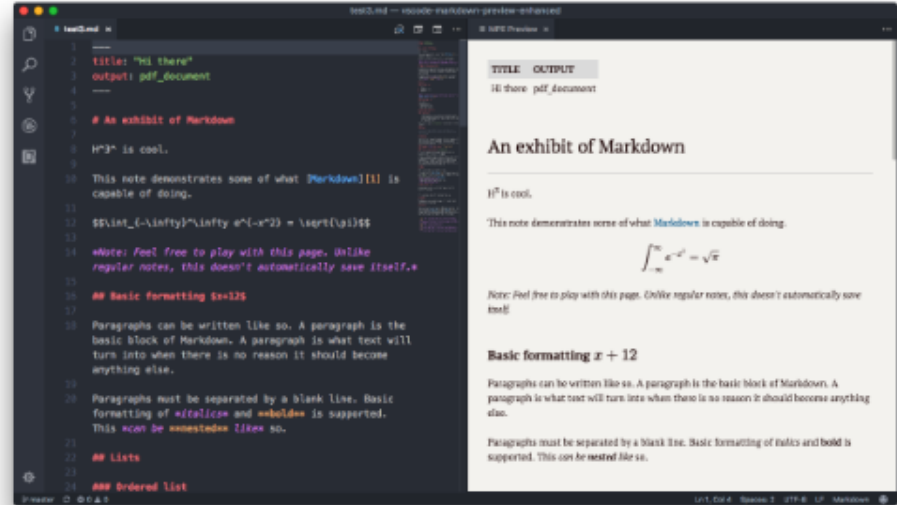
Yiyi Wang | 765,699 | ★★★★★ | Rep...

Markdown Preview Enhanced ported to vscode

[Disable](#) [Uninstall](#) This extension is enabled globally.

[Details](#) [Contributions](#) [Changelog](#)

Markdown Preview Enhanced



Anaconda Python Environments

The screenshot displays the Anaconda Navigator desktop application. The interface includes a top menu bar with 'File' and 'Help', a central header with the 'ANACONDA NAVIGATOR' logo and a 'Sign in to Anaconda Cloud' button, and a left-hand sidebar with navigation options: 'Home', 'Environments', 'Learning', and 'Community'. The main workspace is titled 'Applications on' with a dropdown menu set to 'renv' and a 'Channels' button. A 'Refresh' button is located in the top right of the application grid. The grid contains eight application tiles, each with an icon, name, version number, description, and an action button (either 'Launch' or 'Install').

Application	Version	Description	Action
Jupyter Notebook	5.6.0	Web-based, interactive computing notebook environment. Edit and run human-readable docs while describing the data analysis.	Launch
Glueviz	0.15.2	Multidimensional data visualization across files. Explore relationships within and among related datasets.	Install
JupyterLab	1.1.4	An extensible environment for interactive and reproducible computing, based on the Jupyter Notebook and Architecture.	Install
Orange 3	3.23.1	Component based data mining framework. Data visualization and data analysis for novice and expert. Interactive workflows with a large toolbox.	Install
RStudio	1.1.456	A set of integrated tools designed to help you be more productive with R. Includes R essentials and notebooks.	Install
Spyder	3.3.6	Scientific PYTHON Development Environment. Powerful Python IDE with advanced editing, interactive testing, debugging and introspection features	Install
VS Code	1.39.2	Streamlined code editor with support for development operations like debugging, task running and version control.	Install

Home

Environments

Projects (beta)

Learning

Community

[Documentation](#)

[Developer Blog](#)

[Feedback](#)



root

Installed

Channels

Update index...

python

Name	T	Description	Version
<input checked="" type="checkbox"/> pycrypto		Cryptographic modules for python	2.6.1
<input checked="" type="checkbox"/> pycurl		A python interface to the curl library	7.43.0
<input checked="" type="checkbox"/> python		General purpose programming language	3.6.3
<input checked="" type="checkbox"/> python-dateutil		Extensions to the standard python datetime module	2.6.1
<input checked="" type="checkbox"/> python.app		Proxy on os x letting python libraries hook into the gui event loop	2
<input checked="" type="checkbox"/> pyyaml		Yaml parser and emitter for python	3.12
<input checked="" type="checkbox"/> pyzmq		Zeromq bindings for python	16.0.2
<input checked="" type="checkbox"/> requests		Python http for humans	2.18.4

Create new environment

Name:

Location: /Applications/anaconda/envs/Tensorflow

Packages: ☒ Python

3.6

☐ R

Cancel

Create



Create



Clone



Import



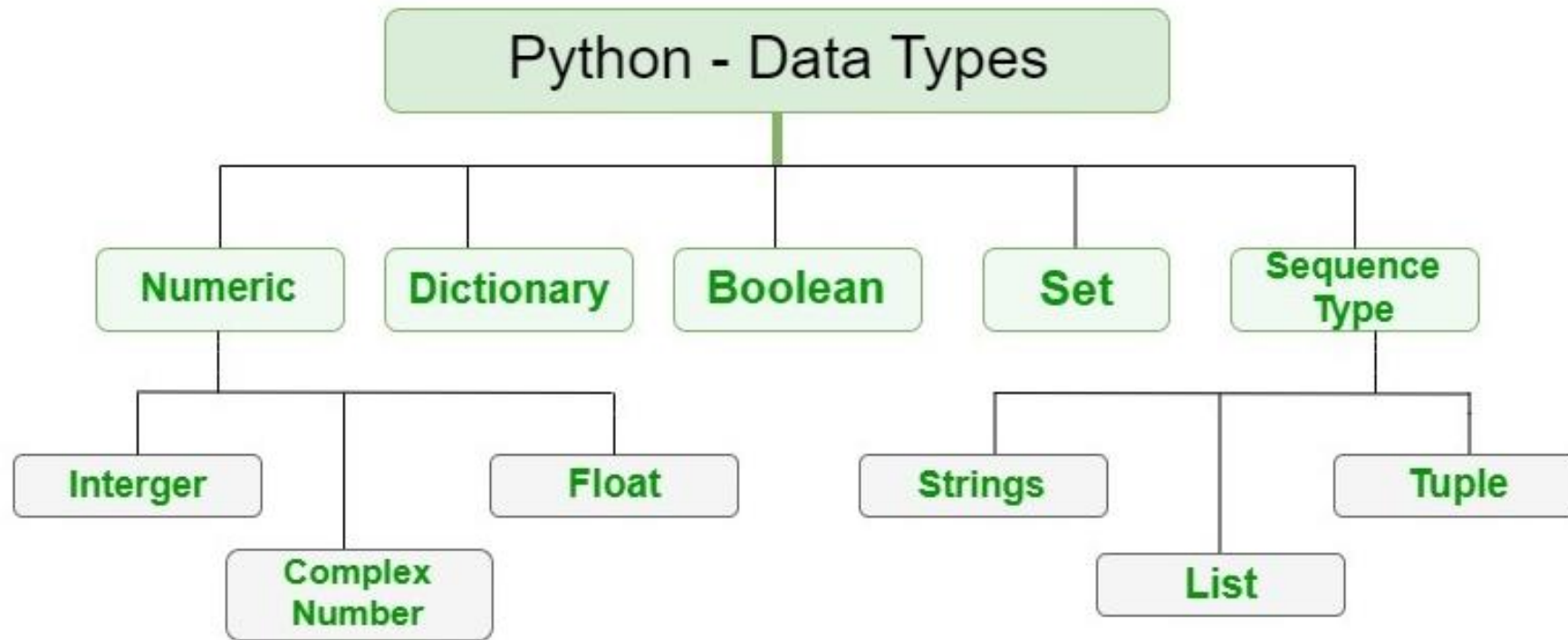
Remove

88 packages available matching "python"

Python



Python



Python (Data Types/Structures)

```
# THIS IS A COMMENT

# NUMBERS
a = 5 # Integers
print("Type of a: ", type(a))
b = 5.0 # Numbers on the real line
(float)
print("\nType of b: ", type(b))
```

>_ Code



python™

Python (Data Types/Structures)

```
# TEXT
my_string = "My 1st string"
print(my_string)
my_string = 'My 2nd string'
print(my_string)
my_string[0]
my_string[-3]
my_string[4:]
my_string[:4]
my_string[-3:]
my_string[:-3]
```

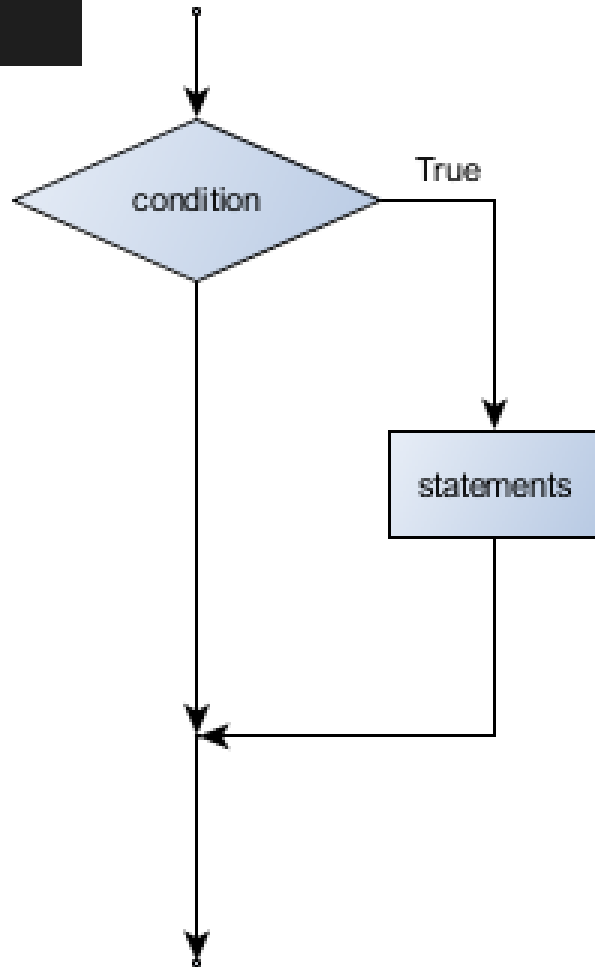
M	y		2	n	d		s	t	r	i	n	g
0	1	2	3	4	5	6	7	8	9	10	11	12
-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1

Python (Data Types/Structures)

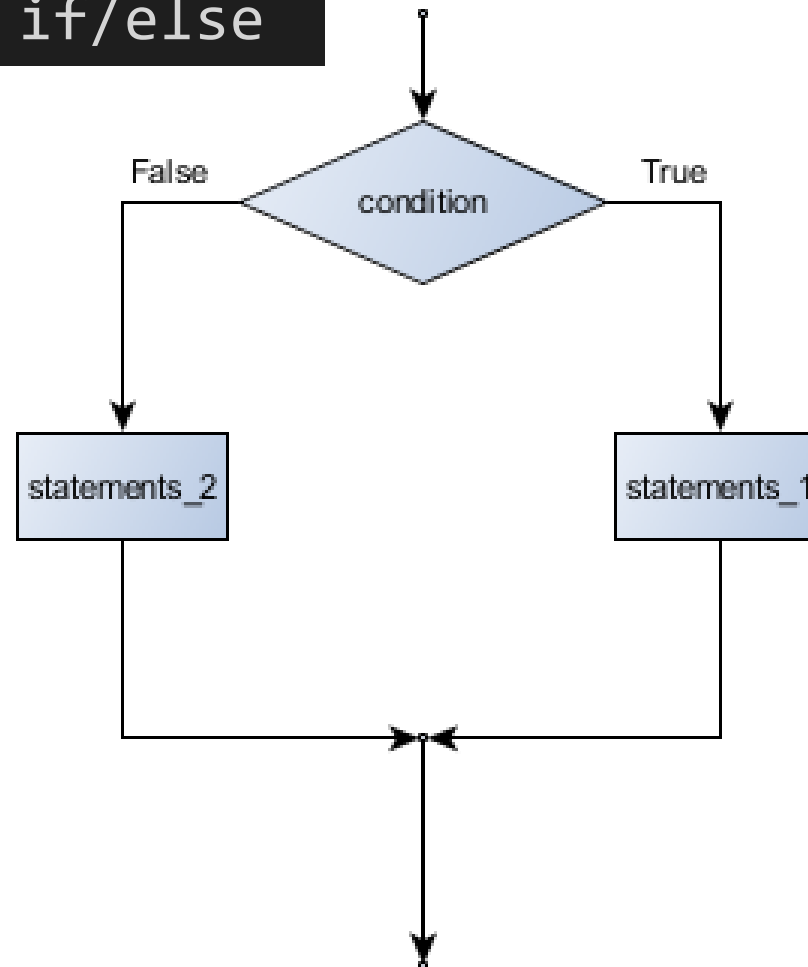
```
('a', 5) # tuple  
['a', 5, True] # list  
{2, 'a'} # set  
mydict={'a':['Professor', 'Students'], 'x':[111,555]}# Dictionary  
mydict.keys()
```

Python (Co)conditionals and loops

if



if/else



for

Python Exceptions

```
x=6,denominator=4
try:
    y=x/denominator
    # print('d2i0 removed')
except Exception as e:
    print("Error. Division by 0")
    print(e)
```

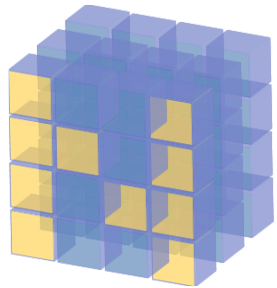
Python function definition

```
def hw(x, a="aaaa", b=4, mylist=[5, 'KKK', 'PPP']):  
    y=5*b  
    return(a)
```

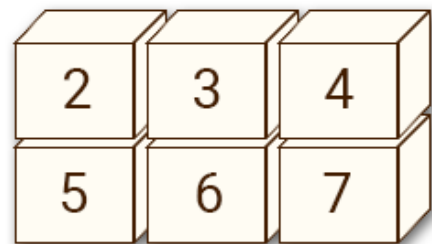
```
hw(x=3)
```

Exercise

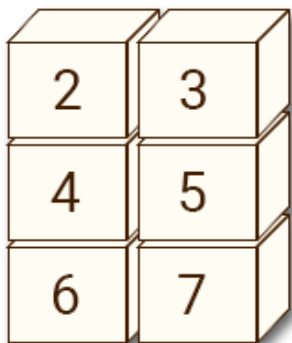
- Create a function that return the sum of 3 numbers
- Create a function `is_even()` that checks if a number is divisible by 2
- Create a for loop that prints only even numbers ($5\%2$)
- Create a function that prints only the last 3 characters of a string, one-by-one



NumPy Arrays



np.reshape(3, 2)



```
import numpy as np
a=np.array([7.,2.,9.,10.])
x=np.array([[2,3,4],[5,6,7]])
x.shape
X[,-1];      X[,-1:]
x.reshape(3,2)
x.reshape(3,-1)
```

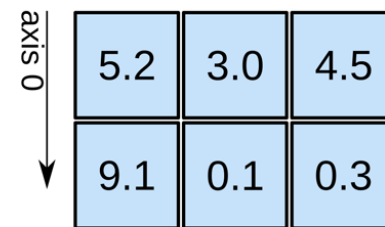
1D array



axis 0 →

shape: (4,)

2D array

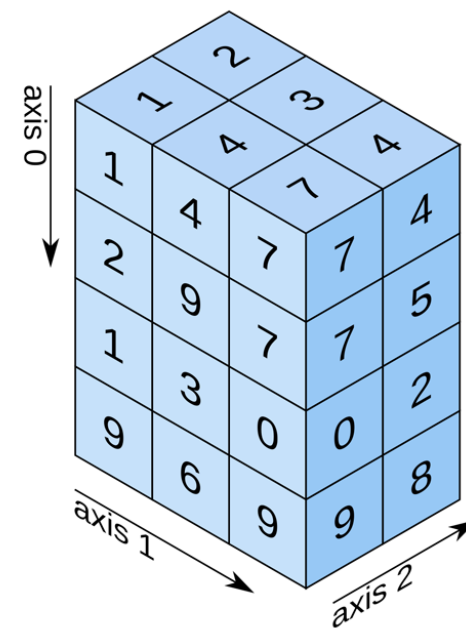


axis 0 ↓

axis 1 →

shape: (2, 3)

3D array



axis 0 ↓

axis 1 ↘

axis 2 ↗

shape: (4, 3, 2)



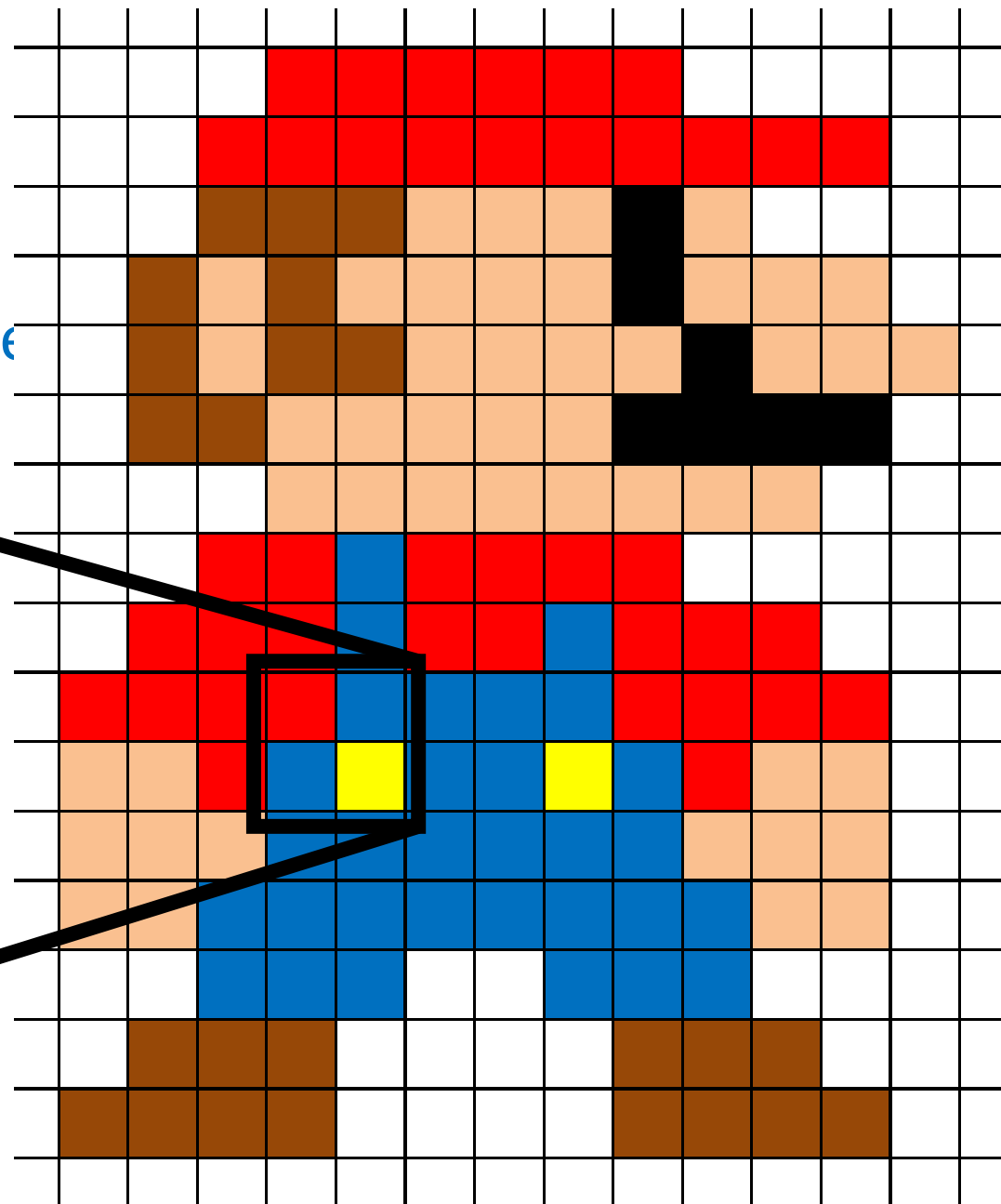
```
import numpy as np
import matplotlib.pyplot as plt
x=np.random.rand(100)
y=np.random.normal(0,2,(100,1))
graph=plt.plot(x,y,'b. ')
plt.axhline(0.5)
plt.axvline(0.5,c='r')
plt.axis('equal')
plt.show()

plt.scatter(x=x, y=y, c='g')
plt.show()
```


3D Array RGB colors

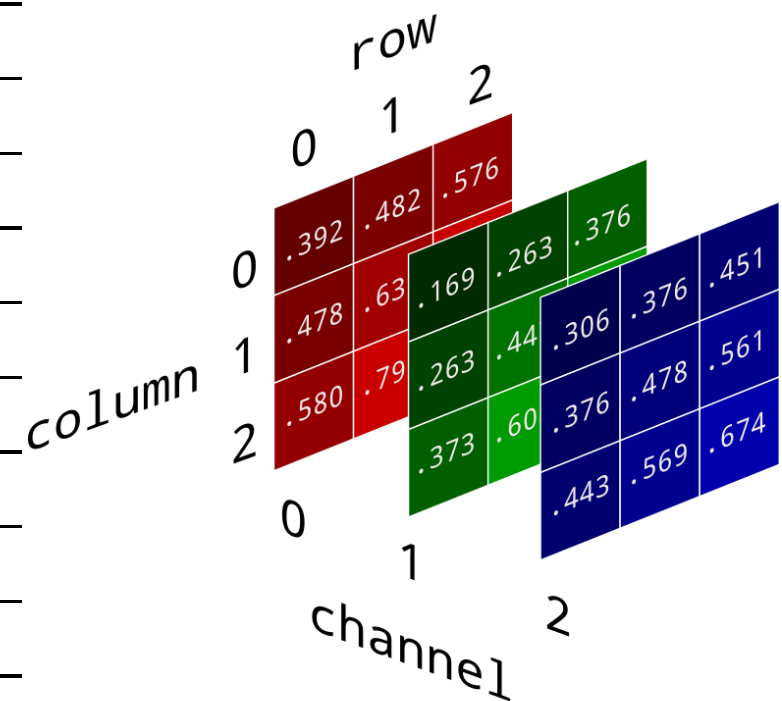
- Red, Green, Blue

R = 255	R = 0
G = 0	G = 112
B = 0	B = 192
R = 0	R = 255
G = 112	G = 255
B = 192	B = 0



>_ Code

Numpy Array:



Python (Pandas)



python™



pandas

Pandas Data Structures

Series

A one-dimensional labeled array capable of holding any data type

	A	3
	B	-5
	C	7
	D	4

Index

```
>>> s = pd.Series([3, -5, 7, 4], index=['a', 'b', 'c', 'd'])
```

DataFrame

Columns

	Country	Capital	Population
1	Belgium	Brussels	11190846
2	India	New Delhi	1303171035
3	Brazil	Brasília	207847528

A two-dimensional labeled data structure with columns of potentially different types

Index

```
>>> data = {'Country': ['Belgium', 'India', 'Brazil'],  
           'Capital': ['Brussels', 'New Delhi', 'Brasília'],  
           'Population': [11190846, 1303171035, 207847528]}
```

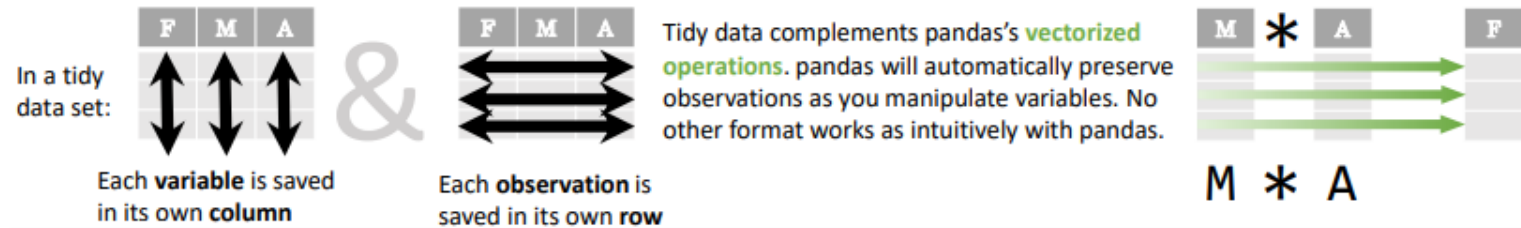
```
>>> df = pd.DataFrame(data,  
                      columns=['Country', 'Capital', 'Population'])
```

```
import pandas as pd  
x=pd.DataFrame({'a':['Professor', 'Students'], 'b':[111,555]},index=[2,15])  
print(x)  
print(type(x))  
#Slicing  
x.iloc[15,]  
x.loc[15,]#index-based  
x.y  
x['y']  
x[['y']]
```

Data Wrangling with pandas Cheat Sheet

<http://pandas.pydata.org>

Tidy Data – A foundation for wrangling in pandas



Syntax – Creating DataFrames

	a	b	c
1	4	7	10
2	5	8	11
3	6	9	12

```
df = pd.DataFrame(
    {"a" : [4 ,5, 6],
     "b" : [7, 8, 9],
     "c" : [10, 11, 12]},
    index = [1, 2, 3])
```

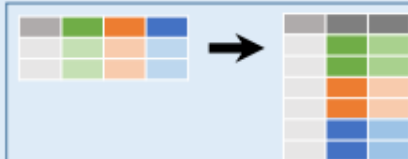
Specify values for each column.

```
df = pd.DataFrame(
    [[4, 7, 10],
     [5, 8, 11],
     [6, 9, 12]],
    index=[1, 2, 3],
    columns=['a', 'b', 'c'])
```

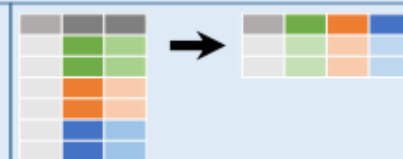
Specify values for each row.

	a	b	c
n			
d	1	4	7
	2	5	8
e	2	6	9

Reshaping Data – Change the layout of a data set



`pd.melt(df)`
Gather columns into rows.



`df.pivot(columns='var', values='val')`
Spread rows into columns.



`pd.concat([df1, df2])`
Append rows of DataFrames



`pd.concat([df1, df2], axis=1)`
Append columns of DataFrames

`df.sort_values('mpg')`
Order rows by values of a column (low to high).

`df.sort_values('mpg', ascending=False)`
Order rows by values of a column (high to low).

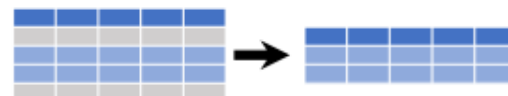
`df.rename(columns = {'y':'year'})`
Rename the columns of a DataFrame

`df.sort_index()`
Sort the index of a DataFrame

`df.reset_index()`
Reset index of DataFrame to row numbers, moving index to columns.

`df.drop(columns=['Length', 'Height'])`
Drop columns from DataFrame

Subset Observations (Rows)



Subset Variables (Columns)





```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
timestamp=pd.date_range("2020-02-01","2020-02-25",freq="d")
n=len(timestamp)
x=np.random.randn(n)
y=np.random.randn(n)
a = np.random.choice(['N', 'Y'],size=n)
df=pd.DataFrame(data={'x':x,'y':y,'a':a},index=timestamp)

df['y'].plot(kind='hist')
plt.show()
df['y'].plot()
plt.show()
df.plot(x='x',y='y',kind='scatter')
plt.show()
```

Jupyter Lab Notebooks



VSCode Extensions

- Markdown
- Python
- Dash/Zeal
 - Ctrl+H

Homework assignment 01