Introduction to Python

Katowice, IntQuant 2022

March 22, 2022

Agenda

- Introduction: why Python?
- Python: 15 mins course
- Data: pandas
- Regression: scikit-learn
- Visualization: matplotlib

Section 1

Introduction: why Python?

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- Why Python?

  https://www.python.org/

- Materials
  - Introductory: https://www.py4e.com/, https://www.tutorialspoint.com/python/index.htm
  - Advanced: Fluent Python by Luciano Ramalho

- Programming environment
  - Anaconda

    https://www.anaconda.com/
  - conda

Section 2

Python: 30 minutes course

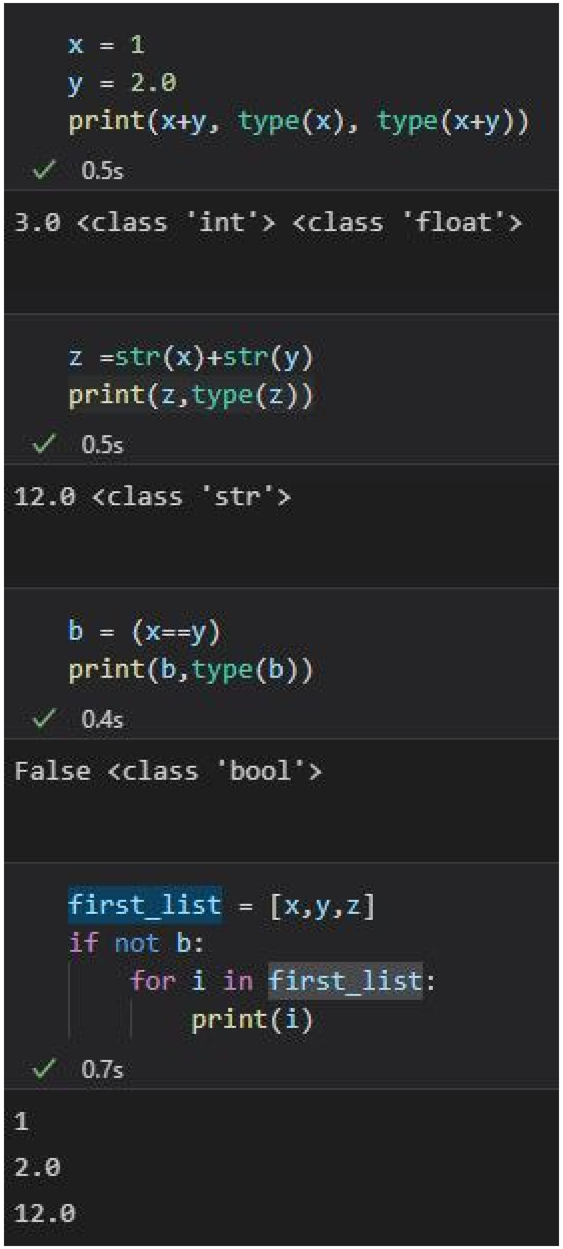
Python: 15 minutes course

Data Types and Operators

- Basic types: str, int, float, bool
- Containers: list, dict, set
- Arithmetic operators: +, -, *, /, **
- Logical operators: ==, !=, >, <, <=, >=

Control Flow

- if condition
- for loop



```
x = 1
y = 2.0
print(x+y, type(x), type(x+y))
```

✓ 0.5s

```
3.0 <class 'int'> <class 'float'>
```

```
z =str(x)+str(y)
print(z,type(z))
```

✓ 0.5s

```
12.0 <class 'str'>
```

```
b = (x==y)
print(b,type(b))
```

✓ 0.4s

```
False <class 'bool'>
```

```
first_list = [x,y,z]
if not b:
    for i in first_list:
        print(i)
```

✓ 0.7s

```
1
2.0
12.0
```

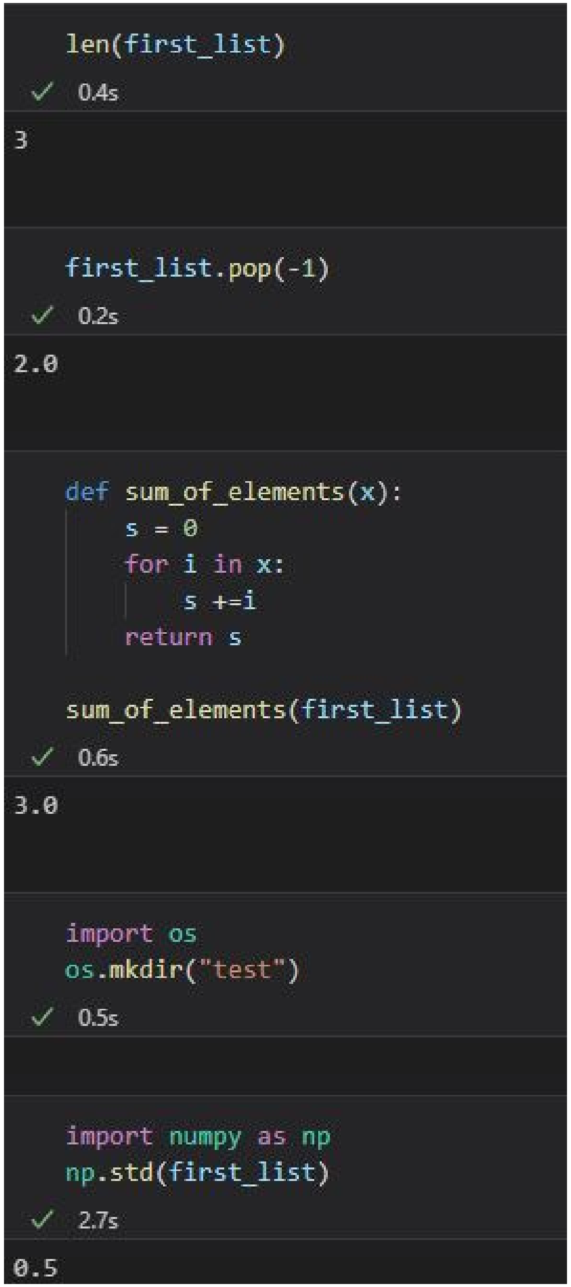
Python: 15 minutes course

Functions

- built-in functions
- methods
- def key word

Modules

- import statement
- Python standard library
- Externals modules: numpy



```
len(first_list)
```
✓ 0.4s

```
3
```

```
first_list.pop(-1)
```
✓ 0.2s

```
2.0
```

```
def sum_of_elements(x):
    s = 0
    for i in x:
        s +=i
    return s

sum_of_elements(first_list)
```
✓ 0.6s

```
3.0
```

```
import os
os.mkdir("test")
```
✓ 0.5s

```
import numpy as np
np.std(first_list)
```
✓ 2.7s

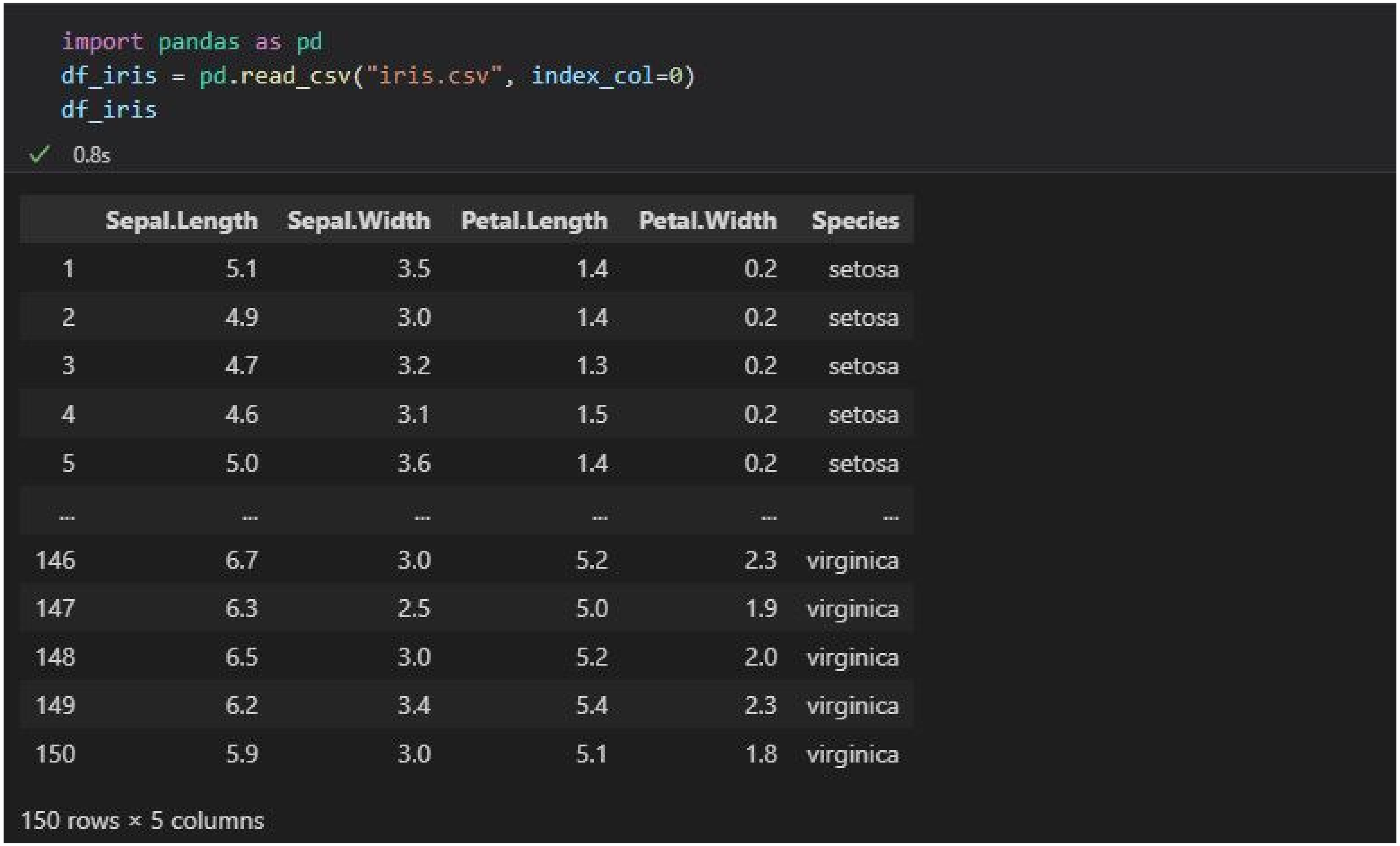
```
0.5
```

Section 3

Data: pandas

Data: pandas

https://pandas.pydata.org/



```
import pandas as pd
df_iris = pd.read_csv("iris.csv", index_col=0)
df_iris
```

✓ 0.8s

	Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
1	5.1	3.5	1.4	0.2	setosa
2	4.9	3.0	1.4	0.2	setosa
3	4.7	3.2	1.3	0.2	setosa
4	4.6	3.1	1.5	0.2	setosa
5	5.0	3.6	1.4	0.2	setosa
...	...	...	...	...	...
146	6.7	3.0	5.2	2.3	virginica
147	6.3	2.5	5.0	1.9	virginica
148	6.5	3.0	5.2	2.0	virginica
149	6.2	3.4	5.4	2.3	virginica
150	5.9	3.0	5.1	1.8	virginica

150 rows × 5 columns

Section 4

Regression: scikit-learn

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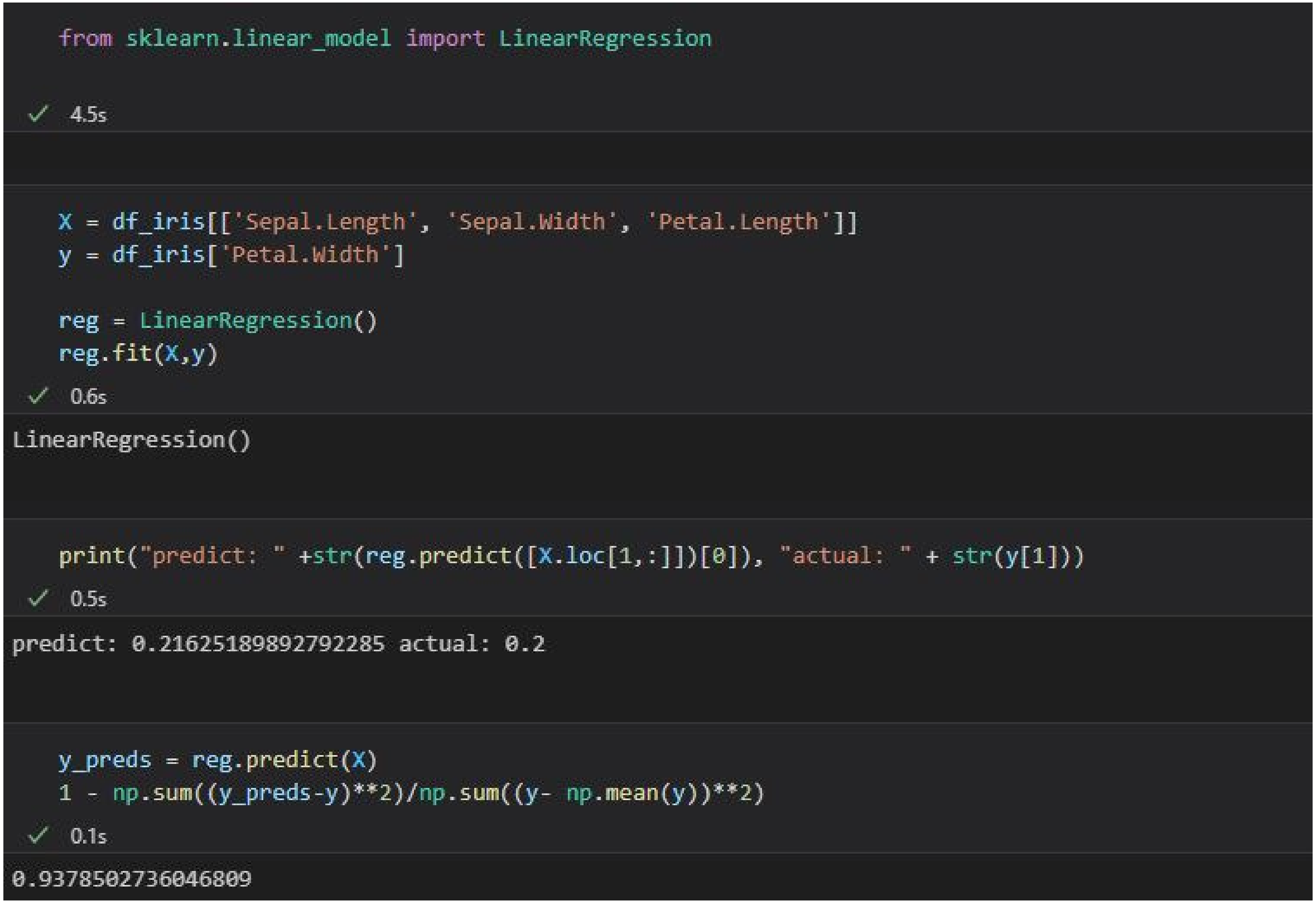
https://scikit-learn.org/stable/



```
from sklearn.linear_model import LinearRegression
```

✓ 4.5s

```
X = df_iris[['Sepal.Length', 'Sepal.Width', 'Petal.Length']]
y = df_iris['Petal.Width']

reg = LinearRegression()
reg.fit(X,y)
```

✓ 0.6s

```
LinearRegression()
```

```
print("predict: " +str(reg.predict([X.loc[1,:]])[0]), "actual: " + str(y[1]))
```

✓ 0.5s

```
predict: 0.21625189892792285 actual: 0.2
```

```
y_preds = reg.predict(X)
1 - np.sum((y_preds-y)**2)/np.sum((y- np.mean(y))**2)
```

✓ 0.1s

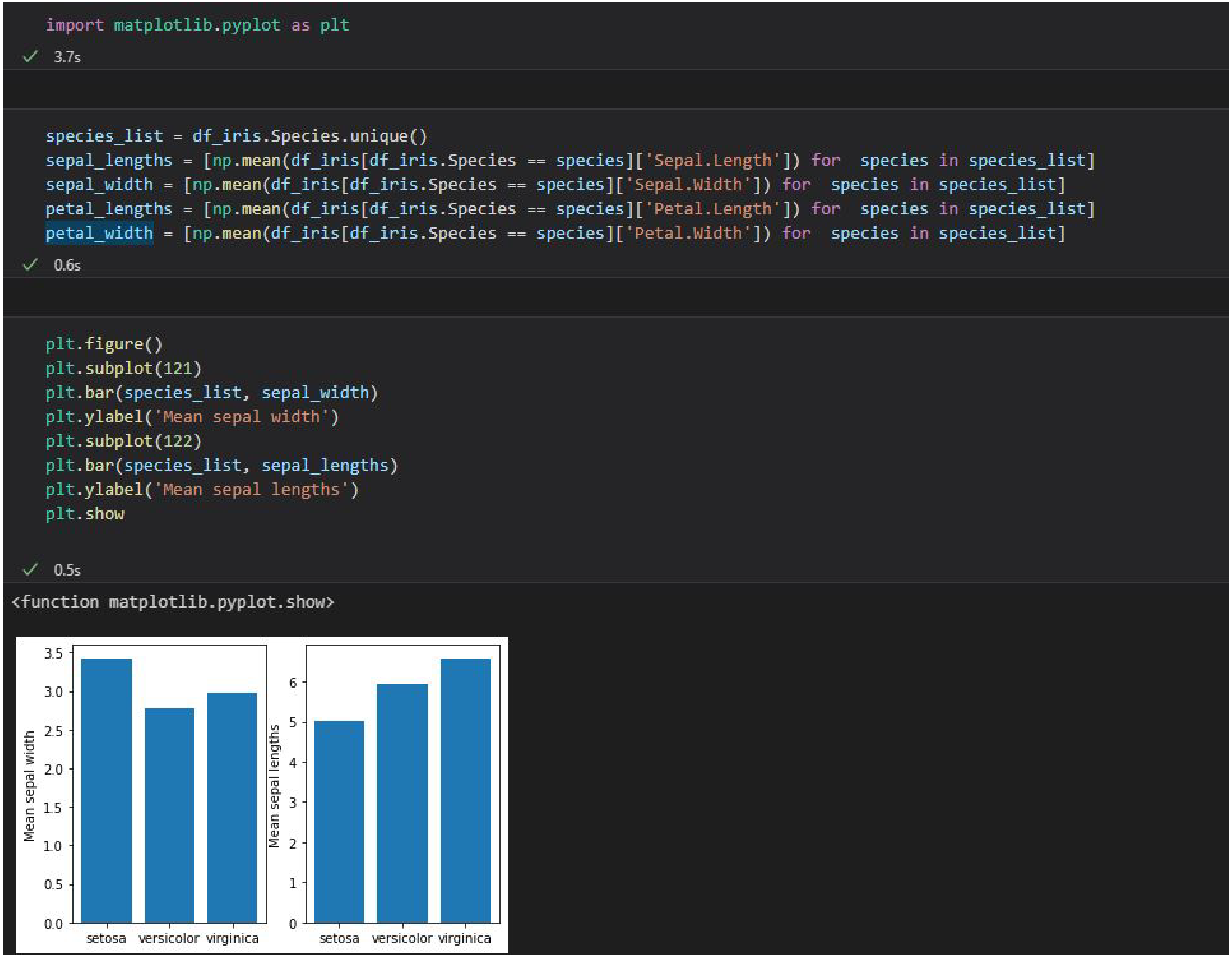
```
0.9378502736046809
```

Section 5

Visualization: matplotlib

Visualization: matplotlib

https://matplotlib.org/



```
import matplotlib.pyplot as plt
```

✓ 3.7s

```
species_list = df_iris.Species.unique()
sepal_lengths = [np.mean(df_iris[df_iris.Species == species]['Sepal.Length']) for  species in species_list]
sepal_width = [np.mean(df_iris[df_iris.Species == species]['Sepal.Width']) for  species in species_list]
petal_lengths = [np.mean(df_iris[df_iris.Species == species]['Petal.Length']) for  species in species_list]
petal_width = [np.mean(df_iris[df_iris.Species == species]['Petal.Width']) for  species in species_list]
```

✓ 0.6s

```
plt.figure()
plt.subplot(121)
plt.bar(species_list, sepal_width)
plt.ylabel('Mean sepal width')
plt.subplot(122)
plt.bar(species_list, sepal_lengths)
plt.ylabel('Mean sepal lengths')
plt.show
```

✓ 0.5s

```
<function matplotlib.pyplot.show>
```