

10. Python - NumPy and Pandas

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Outline

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- NumPy
- Up and running with Numpy
- NumPy arithmetic
- Numpy slicing
- Pandas
- Importing data as a DataFrame into Pandas
- Exploring DataFrame in Pandas
- Objectives Reviewed
- Gist of the day
- Q&A

Objectives

- Understand why we need NumPy
- Explore NumPy
- Understand why we need Pandas
- Know how to import data with Pandas
- Understanding DataFrames

NumPy

- Why Numpy?
 - It all leads to tensors... scalars, vectors, matrices, tensors
- A new data type - NumPy arrays

- Complex computation

Up and running with Numpy

- Importing

```
import numpy as np
```

- Creating your first numpy arrays

```
scalar = np.array(3)
vector = np.array([12, 5, 7])
matrix = np.array([[3, 1, 2], [7, 5, 8]])

#creating a zero numpy array
onedim = np.zeros([1])
twodim = np.zeros([3, 3])
threedim = np.zeros([4, 3, 2])

#you can do something similar with ones
#most of what we will deal with are matrices (2-dimensional arrays)
```

NumPy arithmetic

- You can add NumPy arrays without concatenating

```
a = [1, 2, 3]
b = [5, 7, 8]
print(a + b)

c = np.array(a)
d = np.array(b)
print(c + d)

print(c/2)
print(d**3)
```

Numpy slicing

```
board = np.random.randint(64, size=[8, 8])
board[0, 5]
board[:, :]
board[0:3, 0:3]
board[:, 3]
board[3, :]
```

Pandas

- This is python's answer to handling data
- Another new data type - Data Frames

- Think spreadsheets when you think data frames
- Think of a combination of lists (columns) and dictionaries (rows)
- Pandas is built off NumPy
- Importing Pandas

```
import pandas as pd
```

Importing data as a DataFrame into Pandas

```
csv_file = pd.read_csv('some_file.csv')
web_table = pd.read_html('http://www.website.com') #this returns a collection of pandas data frames
excel_file = pd.read_excel('excel_file.xlsx', sheet='specify_sheet_else_first')
```

Exploring DataFrame in Pandas

```
csv_file.info()
csv_file.columns
csv_file.shape
csv_file.head()
csv_file.tail()
```

Objectives Reviewed

- Understand why we need NumPy
- Explore NumPy
- Understand why we need Pandas
- Know how to import data with Pandas
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Gist of the day

- Get the pdf version
- Get the gist
- The Jupyter Notebook will be uploaded

Q&A

Thanks for being here!