

Libraries In Python

1. Matplotlib :

Matplotlib is a Python Library used for plotting, this python library provides and objected-oriented APIs for integrating plots into applications. This library helps us to build multiple plots at a time. You can, however, use Matplotlib to manipulate different characteristics of figures as well. You can use Matplotlib with different toolkits such as Python Scripts, IPython Shells, Jupyter Notebook, and many other graphical user interfaces.

- **Installation of Matplotlib:**

Check if your Python environment is already configured:

```
python3 --version
```

```
pip3 --version
```

If you have Python and PIP already installed on a system, install it using this command:

```
pip install matplotlib
```

- **Functionalities:**

1. Basemap: It is a map plotting toolkit with various map projections, coastlines and political boundaries.

2. Cartopy: It is a mapping library featuring object-oriented map projection definitions, and arbitrary point, line, polygon and image transformation capabilities.

3. Excel tools: Matplotlib provides utilities for exchanging data with Microsoft Excel.

4. Mplot3d: It is used for 3-D plots.

5. Natgrid: It is an interface to the natgrid library for irregular gridding of the spaced data.

```
from matplotlib import pyplot as plt
```

```
plt.bar([0.25,1.25,2.25,3.25,4.25],[50,40,70,80,20],
```

```
label="BMW",width=.5)
```

```
plt.bar([.75,1.75,2.75,3.75,4.75],[80,20,20,50,60],
```

```
label="Audi", color='r',width=.5)
```

```
plt.legend()
```

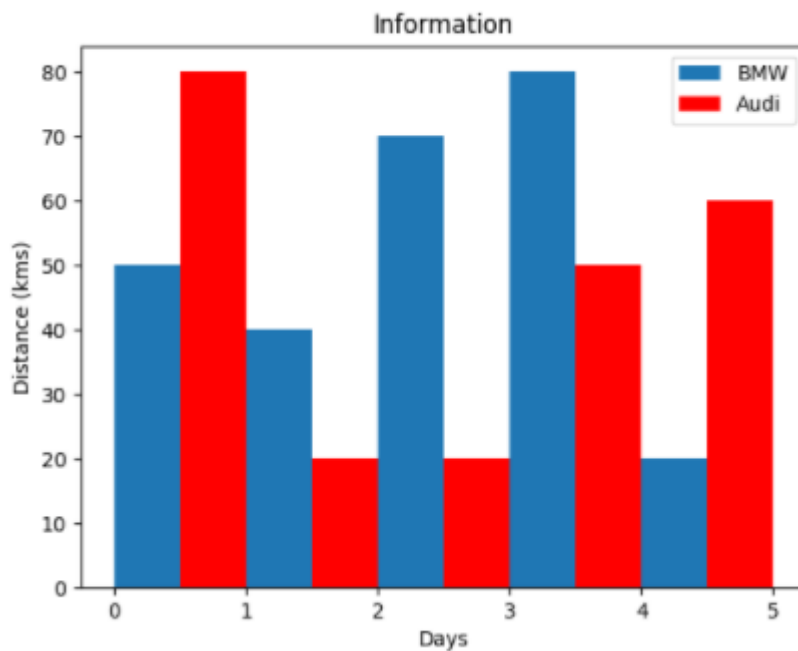
```
plt.xlabel('Days')
```

```
plt.ylabel('Distance (kms)')
```

```
plt.title('Information')
```

```
plt.show()
```

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2. NumPy :

NumPy is a python library used for working with arrays. It also has functions for working in domain of linear algebra, fourier transform, and matrices. NumPy was created in 2005 by Travis Oliphant. It is an open source project and you can use it freely.

NumPy stands for Numerical Python.

- **Installation of NumPy:**

If you have Python and PIP already installed on a system, then installation of NumPy is very easy.

pip install numpy

- **Functionalities:**

1. Checking NumPy Version

```
import numpy as np
print(np.__version__)
```

1.16.3

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2. Access 2-D Arrays

```
import numpy as np
arr = np.array([[1,2,3,4,5], [6,7,8,9,10]])
print('2nd element on 1st dim: ', arr[0, 1])
```

```
2nd element on 1st dim:  2
```

3. Converting Data Type on Existing Arrays

```
import numpy as np
arr = np.array([1.1, 2.1, 3.1])
newarr = arr.astype(int)
print(newarr)
print(newarr.dtype)
```

```
[1 2 3]
int64
```

3. Pandas:

Pandas is used for data manipulation, analysis and cleaning. Python pandas is well suited for different kinds of data, such as:

- Tabular data with heterogeneously-typed columns
- Ordered and unordered time series data
- Arbitrary matrix data with row & column labels
- Unlabelled data
- Any other form of observational or statistical data sets
- **Installation of Pandas:**

If you have Python and PIP already installed on a system, then installation of NumPy is very easy.

```
pip install pandas
```

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Functionalities:

1. Slicing the Data Frame

```
import pandas as pd
XYZ_web= {'Day':[1,2,3,4,5,6], "Visitors":[1000, 700,6000,1000,400,350], "Bounce_Rate":[20,20,23,15,10,34]}
df= pd.DataFrame(XYZ_web)
print(df)
```

Output:

```
      Bounce_Rate Day Visitors
0         20      1    1000
1         20      2     700
2         23      3    6000
3         15      4    1000
4         10      5     400
```

2. Data Munging:

```
import pandas as pd
country= pd.read_csv("D:\Users\Aayushi\Downloads\world-bank-youth-unemploymentAPI_ILO_country_YU.csv",index_col=0)
country.to_html('edu.html')
```

	Country Code	2010	2011	2012	2013	2014
Country Name						
Afghanistan	AFG	20.600000	20.900000	19.700001	21.100000	20.799999
Angola	AGO	10.800000	10.700000	10.700000	10.600000	10.500000
Albania	ALB	25.799999	27.000000	28.299999	28.700001	29.200001
Arab World	ARB	25.022214	28.117516	29.113212	29.335306	29.704569
United Arab Emirates	ARE	9.800000	9.800000	9.800000	9.900000	10.000000
Argentina	ARG	19.500000	18.799999	18.400000	19.700001	21.299999
Armenia	ARM	38.299999	38.700001	35.000000	32.500000	35.099998
Australia	AUS	11.400000	11.400000	11.700000	12.200000	13.100000
Austria	AUT	8.800000	8.200000	8.700000	9.100000	9.200000
Azerbaijan	AZE	14.600000	14.500000	14.300000	13.400000	13.600000
Burundi	BDI	10.800000	10.800000	10.800000	10.800000	10.700000
Belgium	BEL	22.500000	18.600000	19.700001	23.100000	23.600000
Benin	BEN	2.000000	2.000000	2.000000	1.800000	1.700000
Burkina Faso	BFA	5.200000	5.300000	5.200000	5.200000	5.000000
Bangladesh	BGD	8.200000	8.200000	8.200000	8.900000	9.100000

3. Pandas Series :

```
import pandas as pd
import numpy as np
```

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Create a series with 100 random numbers

```
s = pd.Series(np.random.randn(4))  
print (s)
```

```
0    0.967853  
1   -0.148368  
2   -1.395906  
3   -1.758394  
dtype: float64
```

4. SciPy-

SciPy is a scientific computation library that uses NumPy underneath. SciPy stands for Scientific Python. It provides more utility functions for optimization, stats and signal processing. Like NumPy, SciPy is open source so we can use it freely. SciPy was created by NumPy's creator Travis Olliphant.

- **Installation of SciPy:**

If you have Python and PIP already installed on a system, then installation of SciPy is very easy.

```
pip install scipy
```

- **Functionalities:**

1. To Check for SciPy Version

```
import scipy  
print(scipy.__version__)
```

```
0.18.1
```

2. Time

```
from scipy import constants  
print(constants.minute)  
print(constants.hour)  
print(constants.day)  
print(constants.week)  
print(constants.year)  
print(constants.Julian_year)
```

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```
60.0
3600.0
86400.0
604800.0
3153600.0
31557600.0
```

3. Compressed Sparse Row Matrix

For fast row slicing, faster matrix vector products

```
import numpy as np
from scipy.sparse import csr_matrix
arr = np.array([0, 0, 0, 0, 0, 1, 1, 0, 2])
print(csr_matrix(arr))
```

```
(0, 5)      1
(0, 6)      1
(0, 8)      2
```

5. Seaborn:

Seaborn is a library that uses Matplotlib underneath to plot graphs. It can be used to visualize random distributions.

- **Installation of Seaborn:**

If you have Python and PIP already installed on a system, install it using this command:

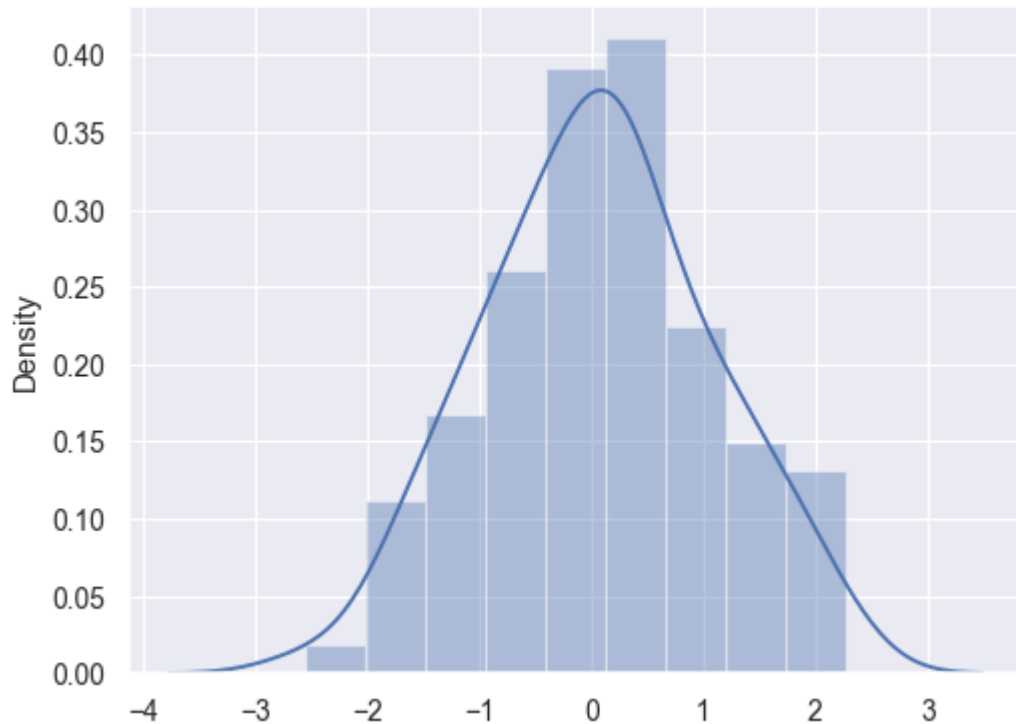
```
pip install seaborn
```

- **Functionalities:**

1. distplot()
2. set_theme()
3. random.seed()
4. random.randn()

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```
import seaborn as sns, numpy as np
sns.set_theme(); np.random.seed(0)
x = np.random.randn(100)
ax = sns.distplot(x)
```



6. NLTK (Natural Language Toolkit)-

NLTK is a set of language processing libraries and other programs that cumulatively provide a numerical and symbolic language processing solution for English only. It is written in Python. With NLTK, natural language processing with python has become more standard and ideal.

- **Installation of NLTK:**

If you have Python and PIP already installed on a system, install it using this command:

```
pip install nltk
```

- **Functionalities:**

1. NLTK Word Tokenizer

```
nltk.word_tokenize("Last night, I went to Mrs. Martinez's housewarming. It was a disaster.")
```

```
['Last', 'night', ',', 'I', 'went', 'to', 'Mrs.', 'Martinez', "'s", 'housewarming', '.', 'It', 'was', 'a', 'disaster', '.']
```

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2. Stopwords:

```
from nltk.corpus import stopwords
stop_words=set(stopwords.words("english"))
print(stop_words)
```

```
{'their', 'then', 'not', 'ma', 'here', 'other', 'won', 'up', 'weren', 'being', 'we', 'those', 'an',
```

3. Stemming:

```
from nltk.stem import PorterStemmer
from nltk.tokenize import sent_tokenize, word_tokenize
ps = PorterStemmer()
stemmed_words=[]
for w in filtered_sent:
    stemmed_words.append(ps.stem(w))
print("Filtered Sentence:",filtered_sent)
print("Stemmed Sentence:",stemmed_words)
```

```
Filtered Sentence: ['Hello', 'Mr.', 'Smith', ',', 'today', '?']
Stemmed Sentence: ['hello', 'mr.', 'smith', ',', 'today', '?']
```