∨ Lab01- Implement basic data structures of Numpy, Pandas, Matplotlib and Access Data from sources

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∨ Part 01: Lab Task is implement the following data structures using Numpy and Pandas.**

1. Lists
2. Arrays
3. Identify their type using type()
4. Perform mathematical operations on these datasets created - multiplication, division, poweroff
5. Combine text with Numpy fuction to generate a textual output - "Addition of Two: array1 +array 2
6. Implement np.sin(), log(), log2(), np.exp())

```
import numpy as np
lst1=[1,2,3]
array1 = np.array(lst1)
array1
```

```
type(lst1)
```

```
type(array1)
```

Perform Mathematical Operations on these datasets - Multiplication, Division, Poweroff

```
print("array2 multiplied by array1: ",array1*array2)
print("array2 divided by array1: ",array2/array1)
print("array2 raised to the power of array1: ",array2**array1)
```

```
# sine function
print("Sine: ",np.sin(array1))
# logarithm
print("Natural logarithm: ",np.log(array1))
print("Base-10 logarithm: ",np.log10(array1))
print("Base-2 logarithm: ",np.log2(array1))
# Exponential
print("Exponential: ",np.exp(array1))
```

```
list2=[3,2,1]
array2=np.array(list2)
array2
```

```
print("Adding two numpy arrays {array1} and {array2} together:", array1+array2)
```

```
print(f"Adding two numpy arrays {array1} and {array2} together: {array1+array2}")
```

Part-02: Lab Task is to visualize the datasets or data using Matplotlib builtin function Graphs

⌄ Generate Scatterplot

Let's suppose we collected age (in years), height (in cm), and weight (in kilograms) information from few patients visitng a clinic.

```
people = ['Ann','Brandon','Chen','David','Emily','Farook',
          'Gagan','Hamish','Imran','Julio','Katherine','Lily']
age = [21,12,32,45,37,18,28,52,5,40,48,15]
weight = [55,35,77,68,70,60,72,69,18,65,82,48]
height = [160,135,170,165,173,168,175,159,105,171,155,158]


import matplotlib.pyplot as plt


plt.scatter(weight, height)
plt.title("Relationship between Weight and Height of Patients")
plt.ylabel("Height in Meters")
plt.xlabel("Weight of Patients in Kgs")
plt.show()
```
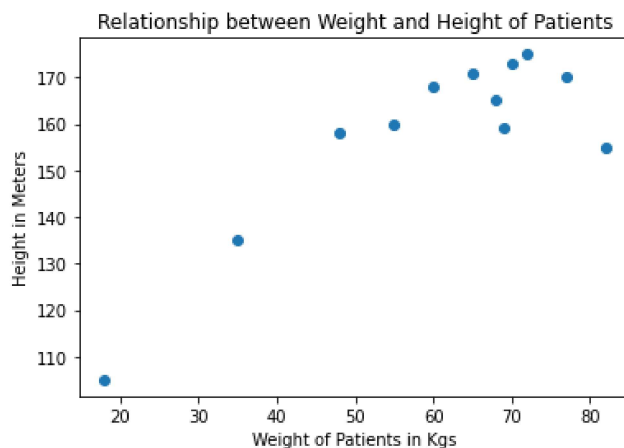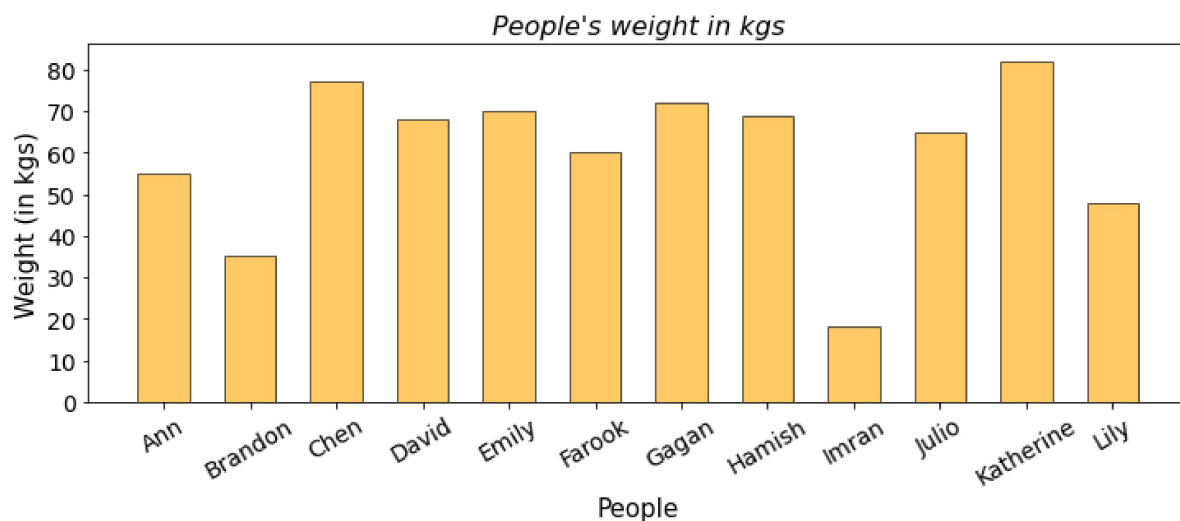

⌄ Generate Bar Plot

```
plt.figure(figsize=(12,4))
plt.title("People's weight in kgs",fontsize=16,
          fontstyle='italic')

# Main plot function 'bar'
plt.bar(x=people,height=weight, width=0.6,
        color='orange',edgecolor='k',alpha=0.6)

plt.xlabel("People",fontsize=15)
plt.xticks(fontsize=14,rotation=30)
plt.yticks(fontsize=14)
plt.ylabel("Weight (in kgs)",fontsize=15)
plt.show()
```
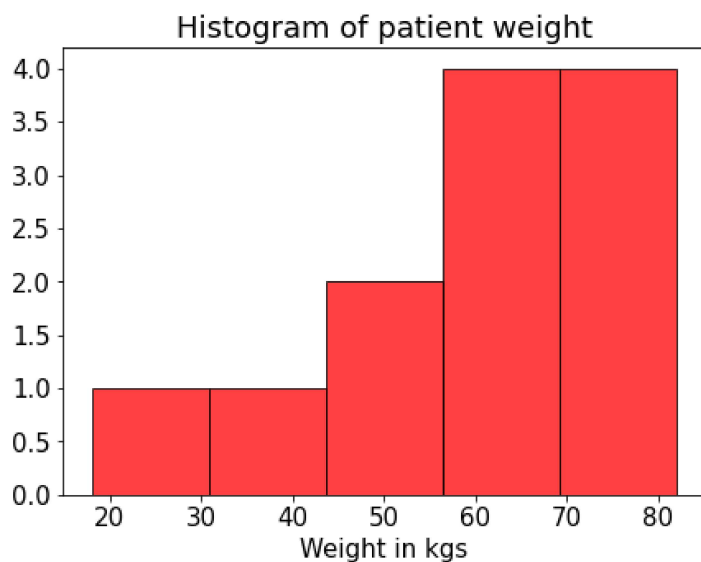
People's weight in kgs

Generate Histogram

```
import numpy as np
plt.figure(figsize=(7,5))

# Main plot function 'hist'
plt.hist(weight,color='red',edgecolor='k', alpha=0.75,bins=5)

plt.title("Histogram of patient weight",fontsize=18)
plt.xlabel("Weight in kgs",fontsize=15)
plt.xticks(fontsize=15)
plt.yticks(fontsize=15)
plt.show()
```


Histogram of patient weight

Part-03: Access Data from various sources and formats

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

```python
df1 = pd.read_table("Lab01-Text.txt")
```

```python
df1
```

```python
data2 = pd.read_csv("Lab01-Text.csv")
```

```python
data2
```

```python
data3 = pd.read_excel("Height_weight.xlsx")
```

```python
data3
```