aiml-exp-1-1

August 19, 2024

Experiment-1

Part 1 − **Implement Basic Data Structures using Numpy, Pandas** 1. Lists 2. Arrays 3. Identify their type using type()

```python
import numpy as np
l1 = [1,5,6]
ar1 = np.array(l1)
ar1
```

```
array([1, 5, 6])
```

```python
type(l1)
```

```
list
```

```python
type(ar1)
```

```
numpy.ndarray
```

Perform mathematical operations on these datasets created - multiplication, division, powerof

```python
ar2 = np.array([3,4,8])
ar2
```

```
array([3, 4, 8])
```

Perform mathematical operations on these datasets created - multiplication, division, powerof

```python
print("ar2 multiplied by ar1: ",ar2*ar1)
print("ar2 divided by ar1: ", ar2/ar1)
print("ar2 raised to the power of ar1: ",ar2**ar1)
```

```
ar2 multiplied by ar1:  [ 3 20 48]
ar2 divided by ar1:  [3.         0.8        1.33333333]
ar2 raised to the power of ar1:  [     3   1024 262144]
```

Combine text with Numpy fuction to generate a textual output - "Addition of Two: array1 +array 2"

```
print('array1 added to array2: ',ar1+ar2)
print("Adding two numpy arrays {array1} and {array2} together:", ar1+ar2)
print(f"Adding two numpy arrays {ar1} and {ar2} together: {ar1+ar2}")
```

```
array1 added to array2:  [ 4  9 14]
Adding two numpy arrays {array1} and {array2} together: [ 4  9 14]
Adding two numpy arrays [1 5 6] and [3 4 8] together: [ 4  9 14]
```

Implementing np.sin(), log(), log2(), np.exp()

```
# Sine function
print('sine of ar1: ',np.sin(ar1))

# Logirithm function
print("Natural logarithm: ",np.log(ar1))
print("Base-10 logarithm: ",np.log10(ar2))
print("Base-2 logarithm: ",np.log2(ar1))

# Exponential function
print('Exponential: ',np.exp(ar2))
```

```
sine of ar1:  [ 0.84147098 -0.95892427 -0.2794155 ]
Natural logarithm:  [0.         1.60943791 1.79175947]
Base-10 logarithm:  [0.47712125 0.60205999 0.90308999]
Base-2 logarithm:  [0.         2.32192809 2.5849625 ]
Exponential:  [  20.08553692   54.59815003 2980.95798704]
```

Part 2 – Visualization of Data using matplotlib, pyplots Packages

Generate Scatter Plot

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

```
people = ['Arun','Barath','Chen','Dhoni','Emily','Farook',
          'Gagan','Hero','Root','Julio','Virat','Lily']
age = [23,15,42,24,33,20,34,52,5,40,48,15]
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
import pandas as pd

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

Relationship between Weight and Height of Patients
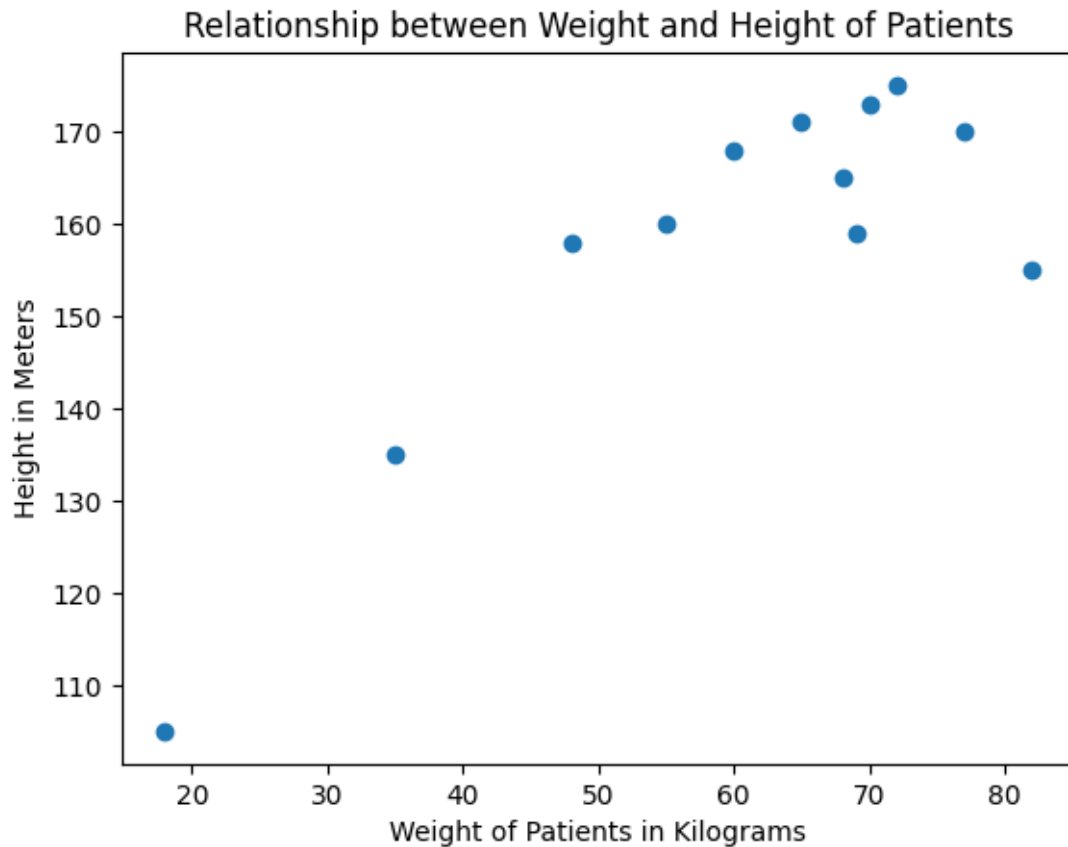
Bar Chart Generation

```
[ ]: plt.figure(figsize=(10,4))
     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='red',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()
```
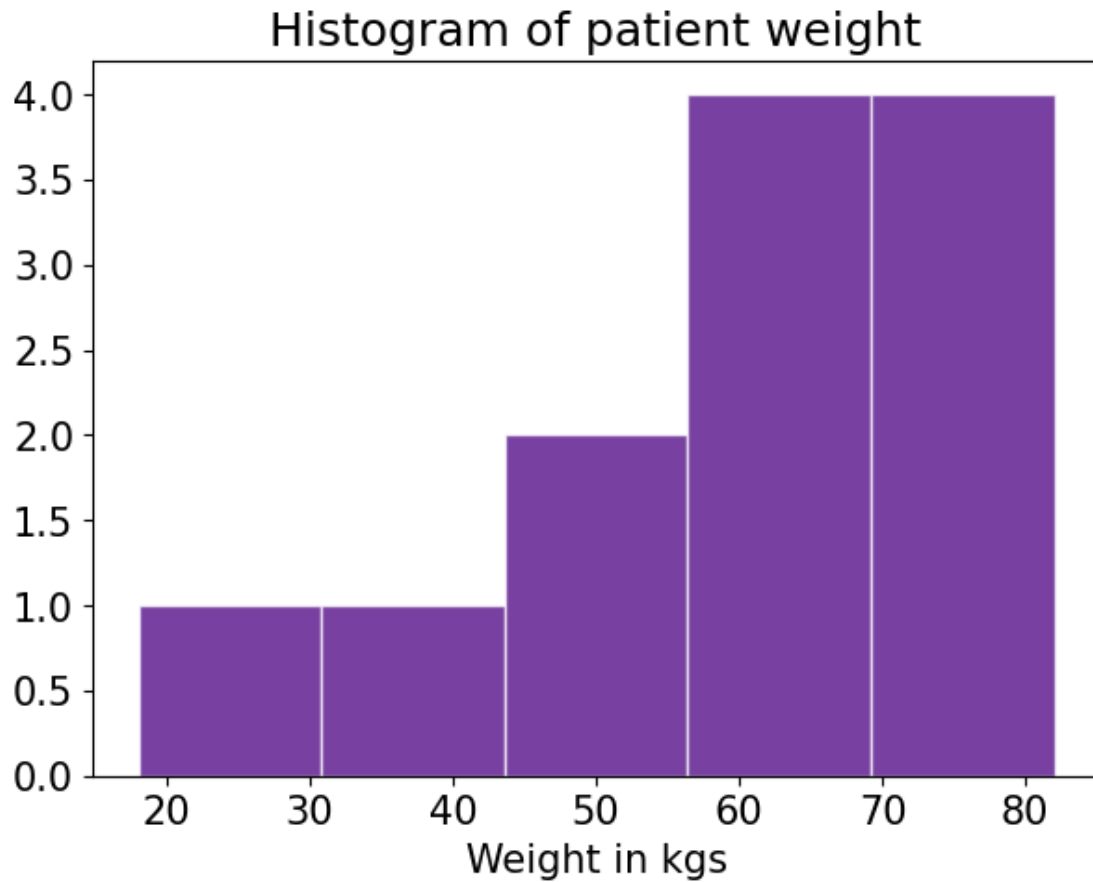
People's weight in kgs
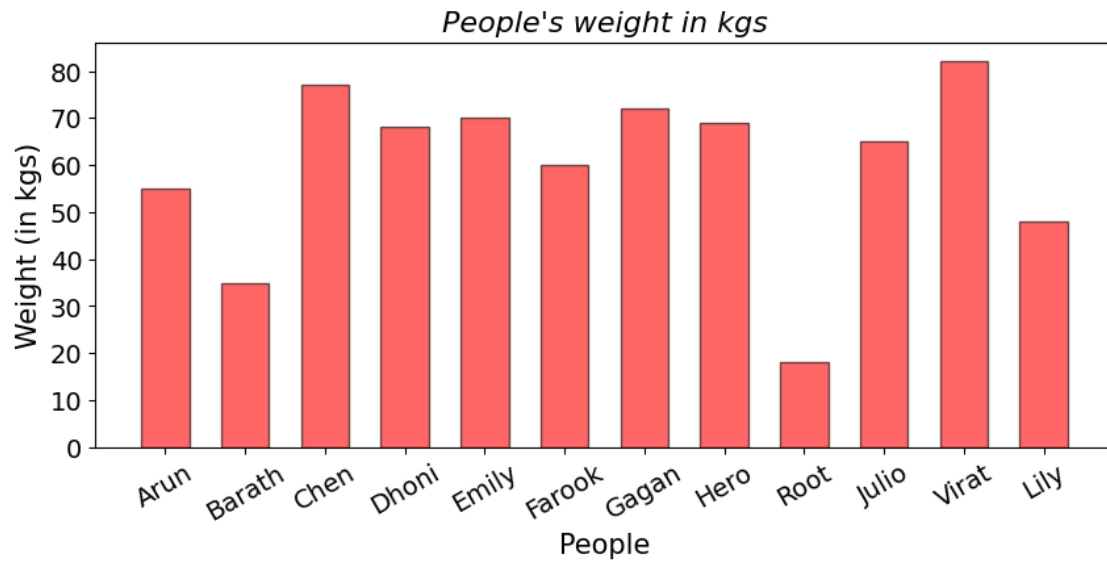
Histogram Generation

```
[ ]: plt.figure(figsize=(7,5))

     # Main plot function 'hist'
     plt.hist(weight,color='indigo',edgecolor='white', 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()
```
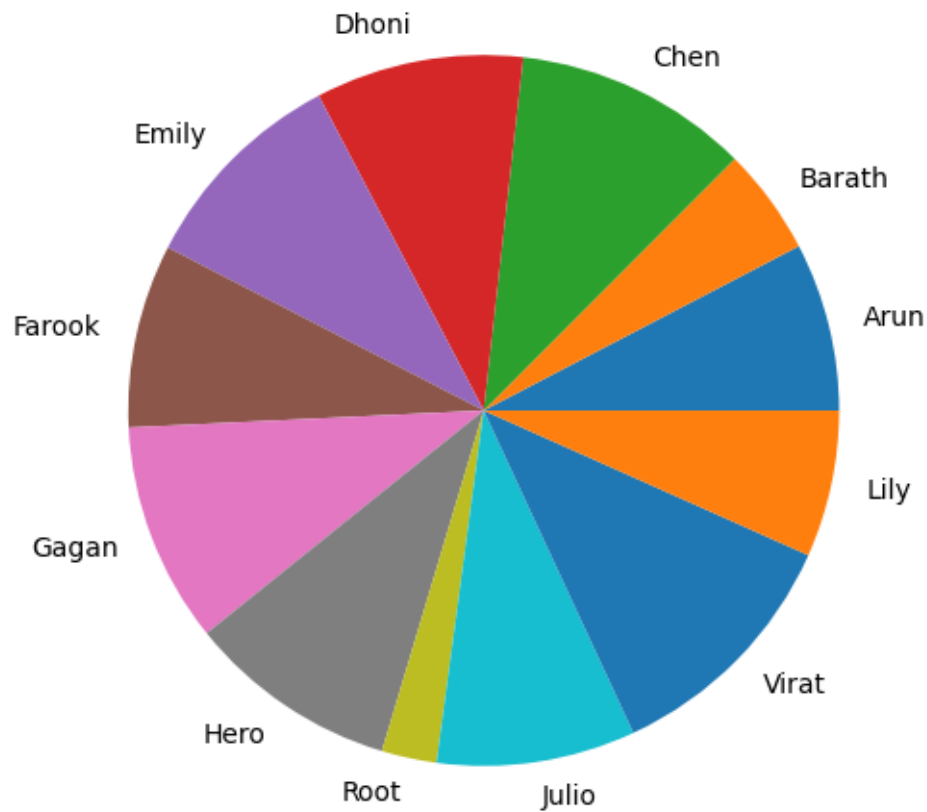
Histogram of patient weight

Pie Chart Generation

```
# creating pie char and Main plot function "pie"
fig = plt.figure(figsize=(6,6))
plt.pie(weight,labels=people)
plt.show()

# pd[['Age',
#      'weight',
#      'height']].plot.pie(subplots = True,
#                                 legend= False,
#                                 figsize =(6,6),)
```

Part 3 - Access Data from various sources and formats

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

# Text file
df1 = pd.read_table("AIML Exp txt.txt")
df1
```

```
    How to Generate Subplots With Python's Matplotlib
0   Data visualization plays a pivotal role in the…
```

```python
# CSV file
df2 = pd.read_csv("AIML Exp-1.csv")
df2
```

```
    Age
0   23
1   54
```

```
2    76
3    32
4    18
5    20
```

```python
# Excel file
df3 = pd.read_excel("AIML Exp-1.xlsx")
df3
```

```
   Unnamed: 0
0         Age
1          23
2          54
3          76
4          32
5          18
6          20
```

```python
# URL file
df4 = pd.read_table("https://www.w3schools.com/")
df4
```

```
                                           <!DOCTYPE html>
0                                      <html lang="en-US">
1                                                   <head>
2          <title>W3Schools Online Web Tutorials</title>
3                                  <meta charset="utf-8">
4      <meta name="viewport" content="width=device-wi…
…                                                        …
8977   <script src="https://oss.maxcdn.com/libs/html5…
8978   <script src="https://oss.maxcdn.com/libs/respo…
8979                                        <![endif]-->
8980                                              </body>
8981                                              </html>

[8982 rows x 1 columns]
```