MIT World Peace University

Python Programming
Second Year B. Tech, Semester 4

Learning Basics of the *Numpy library*

Assignment No. 8

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Contents

1 Aim

Write a python code to read a .csv file using panda's module and print the first and last five records of the file. Using Matplotlib shows data analysis.

2 Objectives

1. To learn and implement Function of Pandas and Matplotlib modules.

3 Problem Statement

Use of Pandas module for data analysis and Matplotlib for data visualization.

4 Theory

4.1 Pandas

4.2 Matplotlib

4.3 Different types of Data Structures in Pandas

4.4 Reading data from csv file

5 Platform

Operating System: Arch Linux x86-64
IDEs or Text Editors Used: Visual Studio Code with Jupyter
Interpreter: python 3.10.8

6 Input and Output

6.1 Input

Reading data from 'csv file' for data analysis operation.

6.2 Output

Data analysis and visualization of data.

7 Requirements

1. Python 3.7 or above
2. Pandas
3. Matplotlib

8 Code

[2]:
```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
```

[3]:
```
# Create a simple dataframe
toyota_df = pd.read_csv('../Lab/Assignment 7/Toyota.csv')
```

8.0.1 Reading First few Values

[4]:
```
toyota_df.head()
```

[4]:
```
   Unnamed: 0  Price   Age     KM FuelType  HP  MetColor  Automatic    CC  \
0           0  13500  23.0  46986   Diesel  90       1.0          0  2000
1           1  13750  23.0  72937   Diesel  90       1.0          0  2000
2           2  13950  24.0  41711   Diesel  90       NaN          0  2000
3           3  14950  26.0  48000   Diesel  90       0.0          0  2000
4           4  13750  30.0  38500   Diesel  90       0.0          0  2000

  Doors  Weight
0  three    1165
1      3    1165
2      3    1165
3      3    1165
4      3    1170
```

[5]:
```
toyota_df.tail()
```

[5]:
```
      Unnamed: 0  Price   Age     KM FuelType   HP  MetColor  Automatic    CC ␣
↪\
1431        1431   7500   NaN  20544   Petrol   86       1.0          0 ␣
↪1300
1432        1432  10845  72.0     ??   Petrol   86       0.0          0 ␣
↪1300
1433        1433   8500   NaN  17016   Petrol   86       0.0          0 ␣
↪1300
1434        1434   7250  70.0     ??      NaN   86       1.0          0 ␣
↪1300
1435        1435   6950  76.0      1   Petrol  110       0.0          0 ␣
↪1600

     Doors  Weight
1431     3    1025
1432     3    1015
1433     3    1015
1434     3    1015
```

```
1435     5    1114
```

[6]:
```
automobile_df = pd.read_csv('../Lab/Assignment 7/Automobile_data.csv')
```

[7]:
```
automobile_df.head()
```

[7]:
```
   index      company   body-style  wheel-base  length engine-type  \
0      0  alfa-romero  convertible        88.6   168.8        dohc
1      1  alfa-romero  convertible        88.6   168.8        dohc
2      2  alfa-romero    hatchback        94.5   171.2        ohcv
3      3         audi        sedan        99.8   176.6         ohc
4      4         audi        sedan        99.4   176.6         ohc

  num-of-cylinders  horsepower  average-mileage    price
0             four         111               21  13495.0
1             four         111               21  16500.0
2              six         154               19  16500.0
3             four         102               24  13950.0
4             five         115               18  17450.0
```

[8]:
```
automobile_df.tail()
```

[8]:
```
    index     company body-style  wheel-base  length engine-type  \
56     81  volkswagen      sedan        97.3   171.7         ohc
57     82  volkswagen      sedan        97.3   171.7         ohc
58     86  volkswagen      sedan        97.3   171.7         ohc
59     87       volvo      sedan       104.3   188.8         ohc
60     88       volvo      wagon       104.3   188.8         ohc

   num-of-cylinders  horsepower  average-mileage    price
56             four          85               27   7975.0
57             four          52               37   7995.0
58             four         100               26   9995.0
59             four         114               23  12940.0
60             four         114               23  13415.0
```

8.0.2 Simple Series

[9]:
```
s = pd.Series([1,2,3,4,5])
```

[10]:
```
s
```

[10]:
```
0    1
1    2
2    3
3    4
4    5
```

```
dtype: int64
```

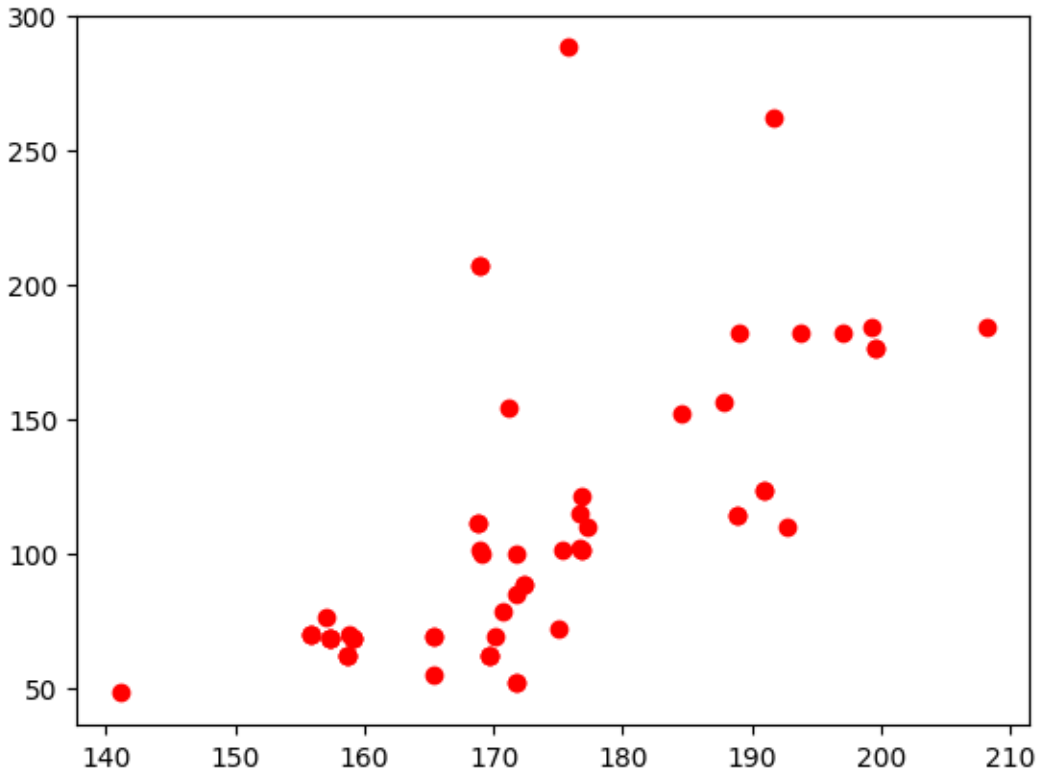
8.0.3 Slicing

[11]:
```
toyota_df['Price'][:10]
```

[11]:
```
0    13500
1    13750
2    13950
3    14950
4    13750
5    12950
6    16900
7    18600
8    21500
9    12950
Name: Price, dtype: int64
```

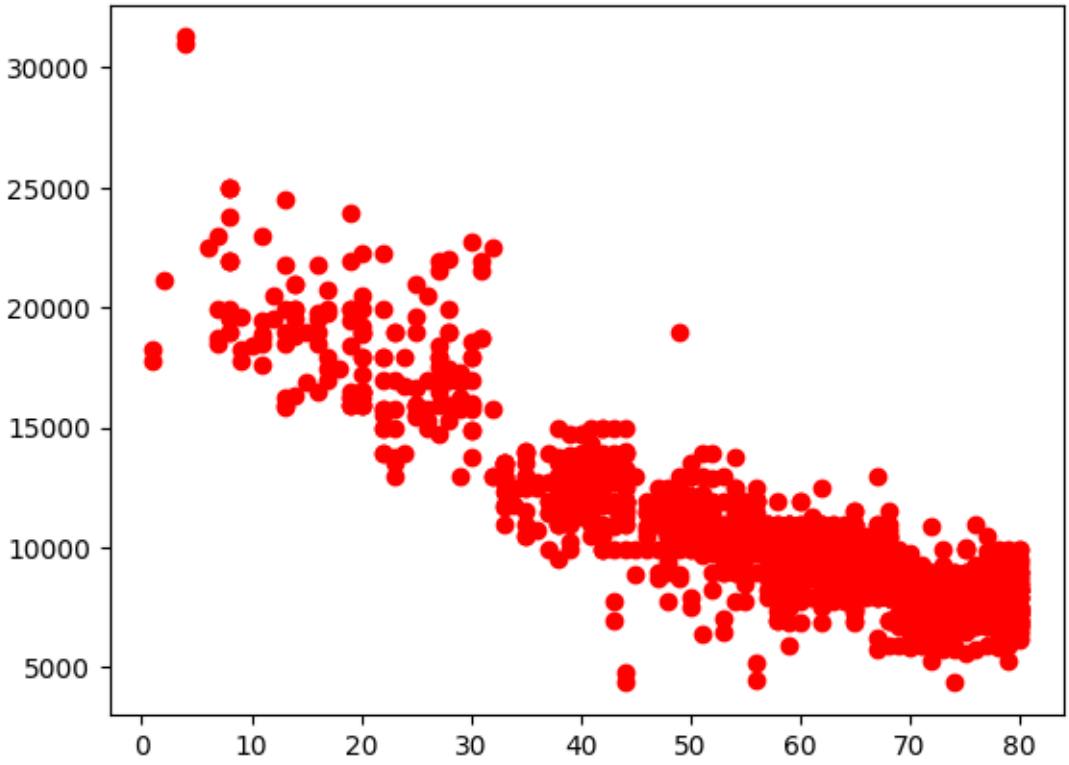
[12]:
```
plt.plot(automobile_df['length'], automobile_df['horsepower'], 'ro')
```

[12]:
```
[<matplotlib.lines.Line2D at 0x7f72240276d0>]
```



[13]:
```
plt.plot(toyota_df['Age'], toyota_df['Price'], 'ro')
```

[13]:
```
[<matplotlib.lines.Line2D at 0x7f7221f50bb0>]
```



[14]:
```
plt.ylabel("Price")
plt.xlabel("Age")
plt.title("Price vs. Age")
plt.bar(toyota_df['Age'], toyota_df['Price'])
```

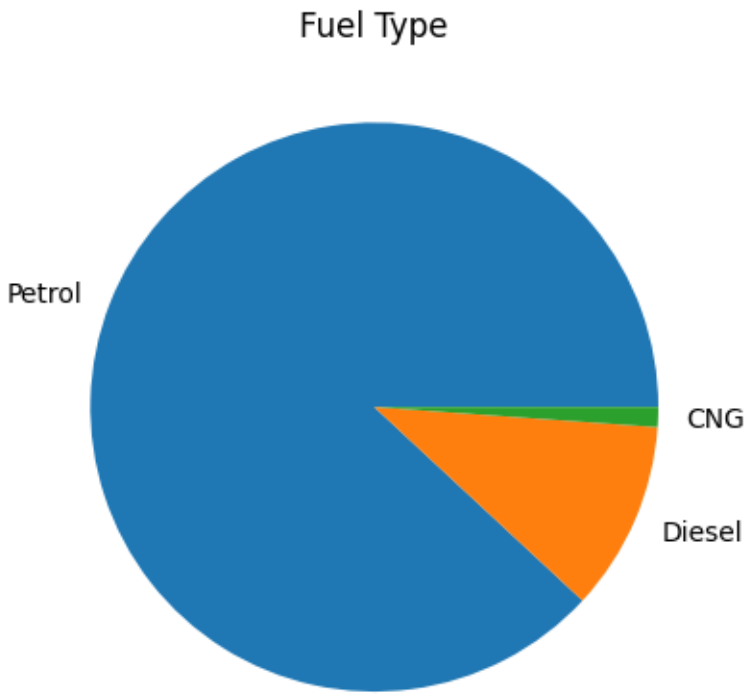
[14]:
```
<BarContainer object of 1436 artists>
```

[15]:
```
fuel_type = pd.Series(toyota_df['FuelType'].values).value_counts()
print(fuel_type)
```

```
Petrol    1177
Diesel     144
CNG         15
dtype: int64
```

[16]:
```
plt.title('Fuel Type')
plt.pie(fuel_type, labels=fuel_type.index)
```

[16]:
```
([<matplotlib.patches.Wedge at 0x7f72212137c0>,
        <matplotlib.patches.Wedge at 0x7f72213d7670>,
        <matplotlib.patches.Wedge at 0x7f72212340d0>],
[Text(-1.024006089442147, 0.40176053662026306, 'Petrol'),
        Text(1.0092010076630402, -0.4376223556125809, 'Diesel'),
        Text(1.0993157876137665, -0.038791740140453064, 'CNG')])
```



[19]:
```
tony_image = plt.imread('tony.jpg')
```

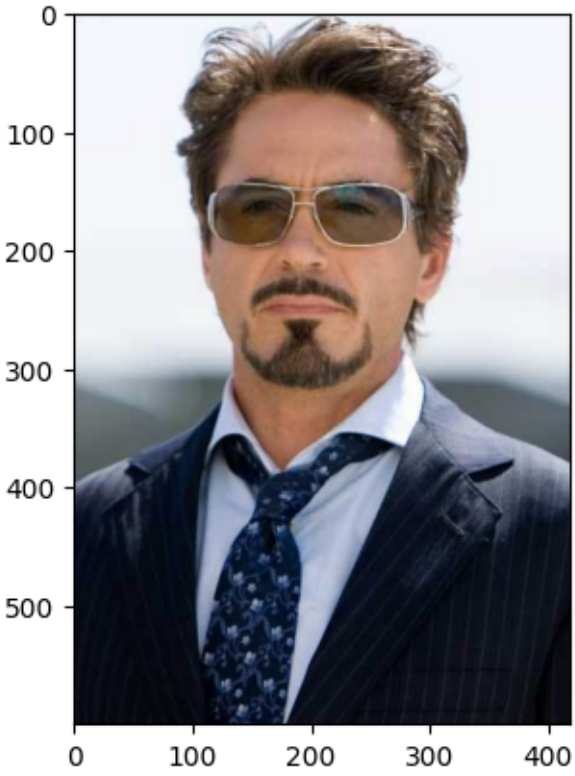
[20]:
```
tony_image
```

[20]:
```
array([[[243, 243, 251],
        [243, 243, 251],
        [243, 243, 251],
        ...,
        [245, 245, 253],
        [245, 245, 253],
        [245, 245, 253]],

       [[243, 243, 251],
        [243, 243, 251],
        [243, 243, 251],
        ...,
        [245, 245, 253],
        [245, 245, 253],
        [245, 245, 253]],

       [[243, 243, 251],
        [243, 243, 251],
```

```
        [243, 243, 251],
        ...,
        [245, 245, 253],
        [245, 245, 253],
        [245, 245, 253]],

...,

[[  9,   9,  17],
        [ 11,  11,  19],
        [ 14,  14,  22],
        ...,
        [ 15,  15,  23],
        [ 17,  17,  25],
        [ 20,  20,  28]],

[[  9,   9,  17],
        [ 11,  11,  19],
        [ 14,  14,  22],
        ...,
        [ 15,  15,  23],
        [ 17,  17,  25],
        [ 20,  20,  28]],

[[  9,   9,  17],
        [ 11,  11,  19],
        [ 14,  14,  22],
        ...,
        [ 15,  15,  23],
        [ 17,  17,  25],
        [ 20,  20,  28]]], dtype=uint8)
```

[21]:
```
plt.imshow(tony_image)
```

[21]:
```
<matplotlib.image.AxesImage at 0x7f72213461a0>
```



[ ]:

9 Conclusion

The Numpy was studied and understood. The functions of the Numpy library were also studied and implemented.

10 FAQ

1. 1. List out the key features of Panda Library?
2. 2. What are the different applications of Pandas.
3. 3. List down the different types of graphs are supported by Matplot library.