Data Engineer INTERN at HACKVEDA LIMITED

AUTHOR : BANDANA PRAKASH

TASK 3 : SALES PREDICTION USING PYTHON

PURPOSE : Predict sales based on advertising expenditure using the given dataset. The dataset contains information about advertising spending on different platforms (TV, Radio, and Newspaper) and the corresponding sales amount.

IMPORTING IMPORTANT LIBRARIES

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

IMPORTING DATASET

```
# Raw URL of the CSV file
url = 'https://raw.githubusercontent.com/bandanaprakash/finalYearProject/main/MarketMinder%7C%20Real-Time%20Market%20Analysi

# Read the CSV file
df = pd.read_csv(url)

# Display the first few rows of the dataset
print(df.head())
```

```
      TV  Radio  Newspaper  Sales
0  230.1   37.8       69.2   22.1
1   44.5   39.3       45.1   10.4
2   17.2   45.9       69.3   12.0
3  151.5   41.3       58.5   16.5
4  180.8   10.8       58.4   17.9
```

Aim:- Sales prediction involves forecasting the amount of a product that customers will purchase, taking into account various factors such as advertising expenditure, target audience segmentation, and advertising platform selection.

Given dataset consist of the advertising platform and the related sales.Let's visulalize each platform

```
df.shape
```

```
(200, 4)
```

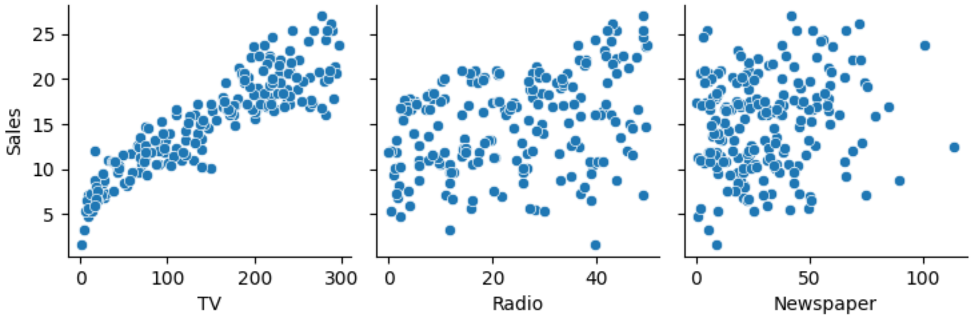
```
df.describe()
```

	TV	Radio	Newspaper	Sales
count	200.000000	200.000000	200.000000	200.000000
mean	147.042500	23.264000	30.554000	15.130500
std	85.854236	14.846809	21.778621	5.283892
min	0.700000	0.000000	0.300000	1.600000
25%	74.375000	9.975000	12.750000	11.000000
50%	149.750000	22.900000	25.750000	16.000000
75%	218.825000	36.525000	45.100000	19.050000
max	296.400000	49.600000	114.000000	27.000000

Basic Observation

Avg expense spend is highest on TV Avg expense spend is lowest on Radio Max sale is 27 and min is 1.6

```
sns.pairplot(df, x_vars=['TV', 'Radio','Newspaper'], y_vars='Sales', kind='scatter')
plt.show()
```

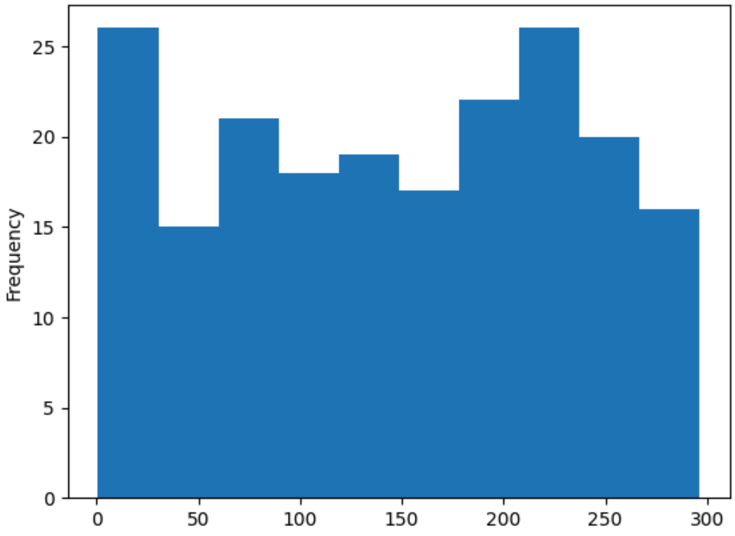


Pair Plot Observation

When advertising cost increases in TV Ads the sales will increase as well. While the for newspaper and radio it is bit unpredictable.

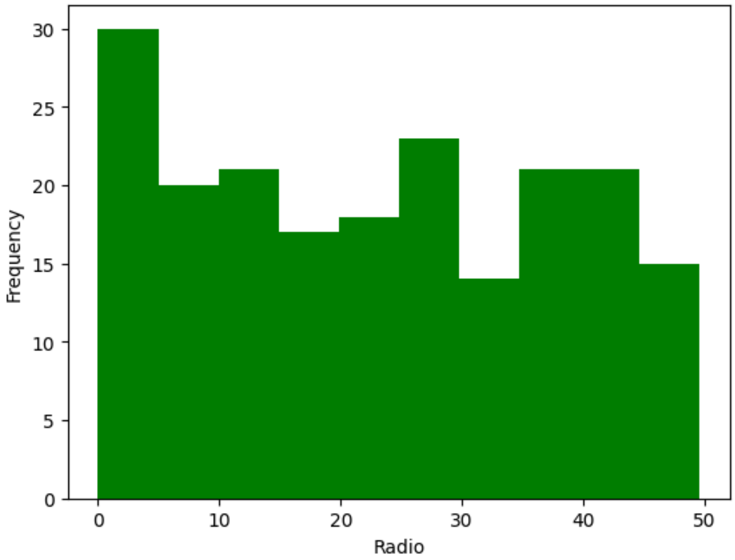
```
df['TV'].plot.hist(bins=10)
```

```
<Axes: ylabel='Frequency'>
```



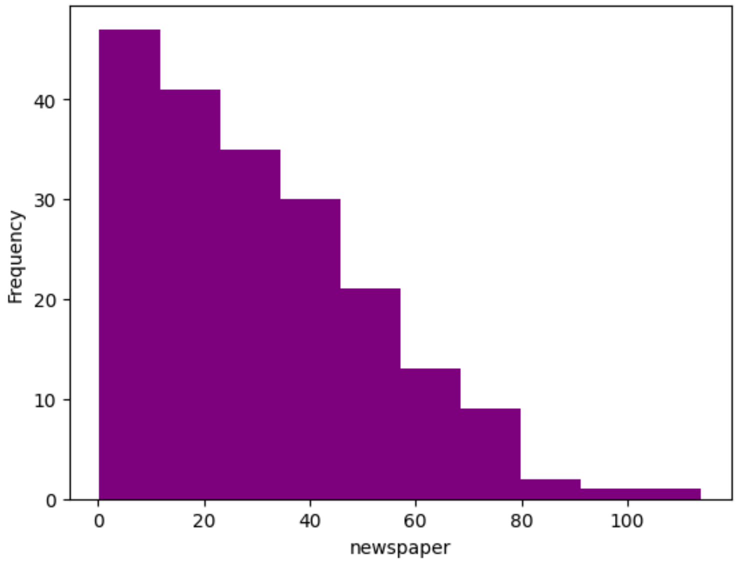
```
df['Radio'].plot.hist(bins=10, color="green", xlabel="Radio")
```

```
<Axes: xlabel='Radio', ylabel='Frequency'>
```



```
df['Newspaper'].plot.hist(bins=10,color="purple", xlabel="newspaper")
```

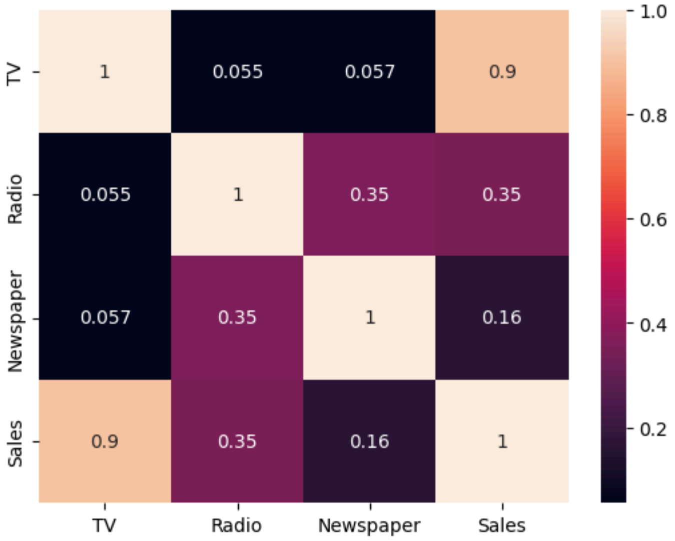
```
<Axes: xlabel='newspaper', ylabel='Frequency'>
```



Histogram Observation

The majority sales is the result of low advertising cost in newspaper

```
sns.heatmap(df.corr(),annot = True)
plt.show()
```



SALES IS HIGHLY COORELATED WITH THE TV

Lets train our model using linear regression as it is coorelated with only one variable TV

```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(df[['TV']], df[['Sales']], test_size = 0.3,random_state=0)
```

```
print(X_train)
```

```
        TV
131  265.2
96   197.6
181  218.5
19   147.3
153  171.3
..     ...
67   139.3
192   17.2
117   76.4
47   239.9
172   19.6

[140 rows x 1 columns]
```

```
print(y_train)
```

```
     Sales
131   17.7
96    16.7
181   17.2
19    14.6
153   16.0
..     ...
67    13.4
192    5.9
117    9.4
47    23.2
172    7.6

[140 rows x 1 columns]
```

```
print(X_test)
```

```
107   90.4
98   289.7
177  170.2
182   56.2
5      8.7
146  240.1
12    23.8
152  197.6
61   261.3
125   87.2
180  156.6
154  187.8
80    76.4
7    120.2
33   265.6
130    0.7
37    74.7
74   213.4
183  287.6
145  140.3
45   175.1
159  131.7
60    53.5
123  123.1
179  165.6
185  205.0
122  224.0
44    25.1
16    67.8
55   198.9
150  280.7
111  241.7
22    13.2
189   18.7
129   59.6
4    180.8
83    68.4
106   25.0
134   36.9
66    31.5
26   142.9
113  209.6
168  215.4
63   102.7
8      8.6
75    16.9
118  125.7
143  104.6
71   109.8
124  229.5
184  253.8
97   184.9
149   44.7
24    62.3
30   292.9
160  172.5
40   202.5
56     7.3
```

```
print(y_test)
```

```
107   12.0
98    25.4
177   16.7
182    8.7
5      7.2
```

```
61     24.2
125    10.6
180    15.5
154    20.6
80     11.8
7      13.2
33     17.4
130     1.6
37     14.7
74     17.0
183    26.2
145    10.3
45     16.1
159    12.9
60      8.1
123    15.2
179    17.6
185    22.6
122    16.6
44      8.5
16     12.5
55     23.7
150    16.1
111    21.8
22      5.6
189     6.7
129     9.7
4      17.9
83     13.6
106     7.2
134    10.8
66     11.0
26     15.0
113    20.9
168    17.1
63     14.0
8       4.8
75      8.7
118    15.9
143    10.4
71     12.4
124    19.7
184    17.6
97     20.5
149    10.1
24      9.7
30     21.4
160    16.4
40     16.6
56      5.5
```

```
from sklearn.linear_model import LinearRegression
model = LinearRegression()
model.fit(X_train,y_train)
```

```
▾ LinearRegression ⓘ ?
LinearRegression()
```

```
res= model.predict(X_test)
print(res)
```

```
[12.09159447]
[22.99968079]
[16.45920756]
[10.21976029]
[ 7.6199906 ]
[20.28497391]
[ 8.4464437 ]
[17.95886418]
[21.44529217]
[11.91645209]
[15.71485245]
[17.42249065]
[11.32534656]
[13.72260788]
[21.68063975]
[ 7.18213465]
[11.23230217]
[18.82362968]
[22.88474361]
[14.82272095]
[16.72739433]
[14.35202581]
[10.07198391]
[13.88133066]
```

```
 [19.40378881]
 [ 8.51759529]
 [10.85465142]
 [18.03001578]
 [22.50709285]
 [20.3725451 ]
 [ 7.86628457]
 [ 8.16731053]
 [10.40584907]
 [17.03936669]
 [10.88749061]
 [ 8.51212209]
 [ 9.16343282]
 [ 8.86788005]
 [14.96502414]
 [18.61564811]
 [18.93309367]
 [12.76479799]
 [ 7.6145174 ]
 [ 8.06879294]
 [14.02363385]
 [12.86878878]
 [13.15339515]
 [19.70481478]
 [21.03480222]
 [17.26376787]
 [ 9.59034237]
 [10.55362545]
 [23.17482317]
 [16.58509115]
 [18.22705095]
 [ 7.54336581]]
```

```
model.coef_
```

```
array([[0.05473199]])
```

```
model.intercept_
```

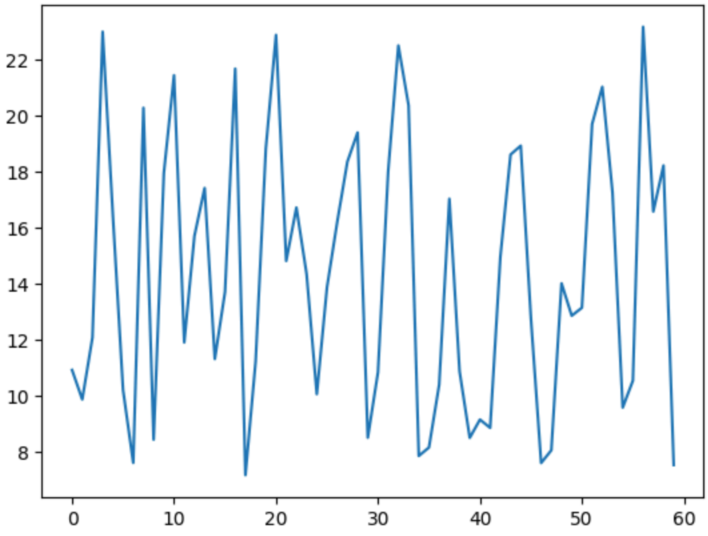
```
array([7.14382225])
```

```
0.05473199* 69.2 + 7.14382225
```

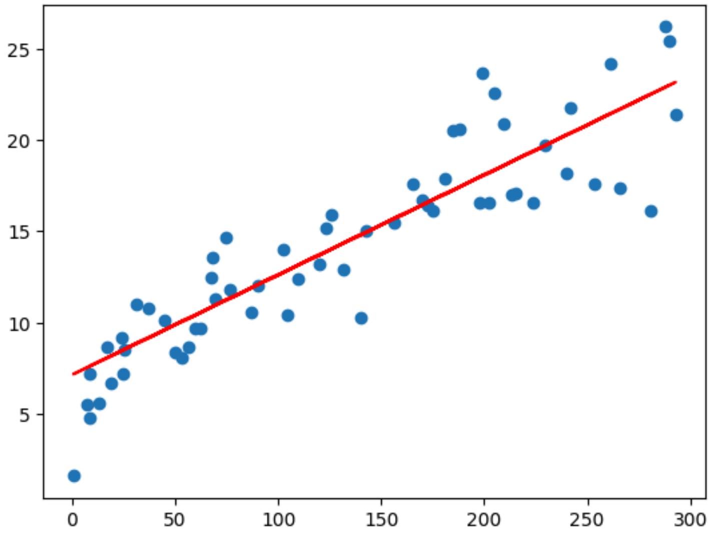
```
10.931275958
```

```
plt.plot(res)
```

```
[<matplotlib.lines.Line2D at 0x7ef74a4f3ad0>]
```



```
plt.scatter(X_test, y_test)
plt.plot(X_test, 7.14382225 + 0.05473199 * X_test, 'r')
plt.show()
```



Concluding with saying that above mention solution is successfully able to predict the sales using advertising platform datasets