Task-5:

Sales Prediction Using Python:

Sales prediction means predicting how much of a product people will buy based on factors, a product and service-based business always need their Data Scientist to predict their future sales with every step they take to manipulate the cost of advertising their product.

by Mouli Nahal

In [2]:

```
#Import required libraries

import numpy as np
import pandas as pd

from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
from sklearn.metrics import mean_absolute_error,r2_score,mean_squared_error

import seaborn as sns
import matplotlib.pyplot as plt
```

In [3]:

```
df = pd.read_csv("Advertising.csv")
df
```

Out[3]:

	Unnamed: 0	TV	Radio	Newspaper	Sales
0	1	230.1	37.8	69.2	22.1
1	2	44.5	39.3	45.1	10.4
2	3	17.2	45.9	69.3	9.3
3	4	151.5	41.3	58.5	18.5
4	5	180.8	10.8	58.4	12.9
...	...	...	...	...	...
195	196	38.2	3.7	13.8	7.6
196	197	94.2	4.9	8.1	9.7
197	198	177.0	9.3	6.4	12.8
198	199	283.6	42.0	66.2	25.5
199	200	232.1	8.6	8.7	13.4

200 rows × 5 columns

In [4]:

```
df.shape
```

Out[4]:

```
(200, 5)
```

In [5]:

```
df.columns
```

Out[5]:

```
Index(['Unnamed: 0', 'TV', 'Radio', 'Newspaper', 'Sales'], dtype='object')
```

In [6]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 5 columns):
 #   Column      Non-Null Count  Dtype  
---  ------      --------------  -----  
 0   Unnamed: 0  200 non-null    int64  
 1   TV          200 non-null    float64
 2   Radio       200 non-null    float64
 3   Newspaper   200 non-null    float64
 4   Sales       200 non-null    float64
dtypes: float64(4), int64(1)
memory usage: 7.9 KB
```

In [7]:

```
#Checking gthe numbeer of missing values

df.isnull().sum()
```

Out[7]:

```
Unnamed: 0    0
TV            0
Radio         0
Newspaper     0
Sales         0
dtype: int64
```

In [8]:

```
df.describe()
```

Out[8]:

	Unnamed: 0	TV	Radio	Newspaper	Sales
count	200.000000	200.000000	200.000000	200.000000	200.000000
mean	100.500000	147.042500	23.264000	30.554000	14.022500
std	57.879185	85.854236	14.846809	21.778621	5.217457
min	1.000000	0.700000	0.000000	0.300000	1.600000
25%	50.750000	74.375000	9.975000	12.750000	10.375000
50%	100.500000	149.750000	22.900000	25.750000	12.900000
75%	150.250000	218.825000	36.525000	45.100000	17.400000
max	200.000000	296.400000	49.600000	114.000000	27.000000

In [9]:

```
df.corr()
```

Out[9]:

	Unnamed: 0	TV	Radio	Newspaper	Sales
Unnamed: 0	1.000000	0.017715	-0.110680	-0.154944	-0.051616
TV	0.017715	1.000000	0.054809	0.056648	0.782224
Radio	-0.110680	0.054809	1.000000	0.354104	0.576223
Newspaper	-0.154944	0.056648	0.354104	1.000000	0.228299
Sales	-0.051616	0.782224	0.576223	0.228299	1.000000

In [10]:
```
df.drop("Unnamed: 0",axis=1,inplace=True)
```

In [11]:
```
x=df.drop("Sales",axis=1)
y=df["Sales"]
```

In [12]:
```
x
```

Out[12]:

	TV	Radio	Newspaper
0	230.1	37.8	69.2
1	44.5	39.3	45.1
2	17.2	45.9	69.3
3	151.5	41.3	58.5
4	180.8	10.8	58.4
...	...	...	...
195	38.2	3.7	13.8
196	94.2	4.9	8.1
197	177.0	9.3	6.4
198	283.6	42.0	66.2
199	232.1	8.6	8.7

200 rows × 3 columns

In [13]:
```
y
```

Out[13]:
```
0      22.1
1      10.4
2       9.3
3      18.5
4      12.9
       ...
195     7.6
196     9.7
197    12.8
198    25.5
199    13.4
Name: Sales, Length: 200, dtype: float64
```

In [14]:
```
x_train,x_test,y_train,y_test= train_test_split(x,y,test_size=0.2,random_st
```

In [15]:

```
x_train
```

Out[15]:

	TV	Radio	Newspaper
159	131.7	18.4	34.6
62	239.3	15.5	27.3
166	17.9	37.6	21.6
45	175.1	22.5	31.5
23	228.3	16.9	26.2
...	...	...	...
73	129.4	5.7	31.3
144	96.2	14.8	38.9
118	125.7	36.9	79.2
189	18.7	12.1	23.4
99	135.2	41.7	45.9

160 rows × 3 columns

In [16]:

```
model=LinearRegression()
model
```

Out[16]:

```
LinearRegression()
```

In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

In [17]:

```
model.fit(x_train,y_train)
```

Out[17]:

```
LinearRegression()
```

In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

In [18]:

```
y_pred_test=model.predict(x_test)
y_pred_test
```

Out[18]:

```
array([ 6.72296139, 13.75631244, 12.04517877,  9.69967488, 15.5690964 ,
       10.05604087, 13.84462636, 11.57199727, 19.50132767, 10.63532913,
       18.86878088,  7.66094904, 14.95238223, 16.44076381, 21.16915592,
       20.34689481, 17.4717922 , 20.44501887,  6.6345129 , 11.59504468,
       10.73339912, 14.9550131 , 20.47462735, 14.4053483 , 19.82336217,
       21.23329569, 13.95616746, 23.25585899,  8.33169334, 20.72918361,
       15.86252542, 15.18601062, 21.74577286, 18.34562985, 12.80653699,
        9.38349318,  5.37438571, 12.02365628, 19.26275296,  8.12044348])
```

In [19]:

```
y_test
```

Out[19]:

```
119     6.6
77     14.2
148    10.9
149    10.1
154    15.6
151    11.6
122    11.6
6      11.8
28     18.9
71     12.4
188    15.9
34      9.5
21     12.5
40     16.6
55     23.7
104    20.7
3      18.5
39     21.5
117     9.4
134    10.8
180    10.5
26     15.0
54     20.2
165    11.9
53     21.2
93     22.2
174    11.5
17     24.4
56      5.5
84     21.7
25     12.0
156    15.3
42     20.7
141    19.2
50     11.4
51     10.7
195     7.6
116    12.2
142    20.1
24      9.7
Name: Sales, dtype: float64
```

In [20]:

```
MSE = mean_squared_error(y_test,y_pred_test)
print("Mean squared is : ", MSE)
```

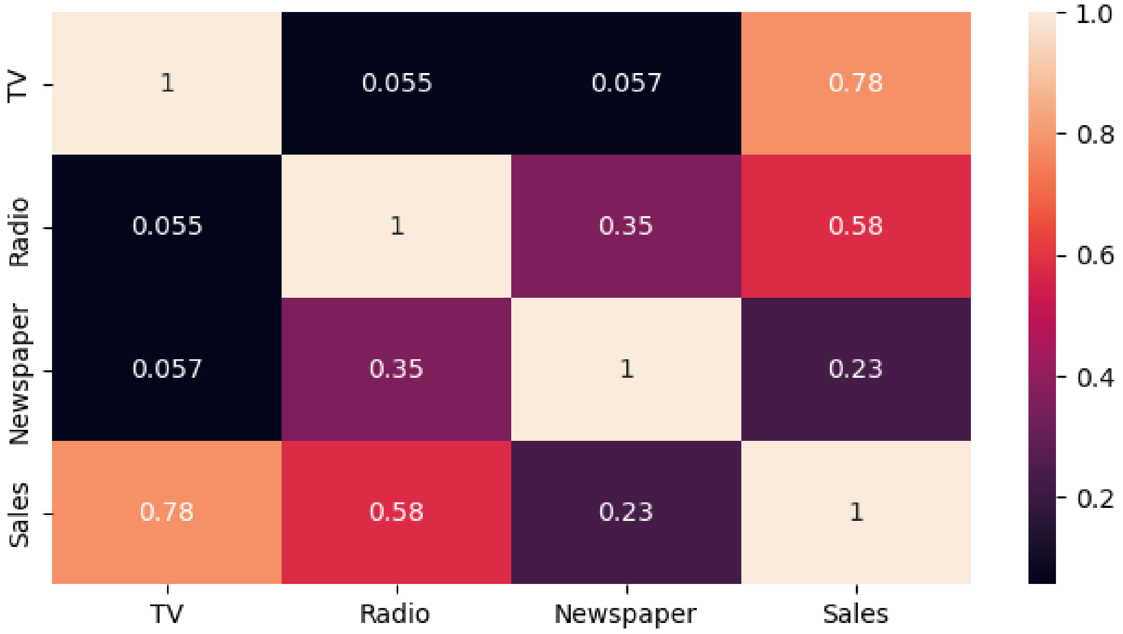
```
Mean squared is :  2.550964615953105
```

In [21]:

```
MSE = mean_squared_error(y_pred_test,y_test)
print("Mean squared is : ", MSE)
```

```
Mean squared is :  2.550964615953105
```

```
In [22]: RMSE = np.sqrt(MSE)
         print("Root mean squared error : ", RMSE)

         Root mean squared error :  1.5971739466799177

In [23]: mean_absolute_error(y_pred_test,y_test)

Out[23]: 1.2673937159929238

In [24]: r2score=r2_score(y_pred_test,y_test)
         r2score

Out[24]: 0.8927421354788029

In [25]: r2score=r2_score(y_test,y_pred_test)
         r2score

Out[25]: 0.8984204533332628

In [26]: plt.figure(figsize=(8,4))
         sns.heatmap(df.corr(),annot=True)

Out[26]: <Axes: >
```



```
In [ ]:

In [ ]:

In [ ]:
```