SALES PREDICTION USING PYTHON

importing libreries

In [34]:

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


from sklearn.model_selection import train_test_split
from sklearn.metrics import mean_absolute_error
from sklearn.linear_model import LinearRegression
```

In [66]:

```
df=pd.read_csv("C:\\Users\\ayith\\OneDrive\\Documents\\data sets\\Advertising.csv")    #
```

data checking

In [67]:

```
df.head()
```

Out[67]:

	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

In [6]:

```
df.tail()
```

Out[6]:

	Unnamed: 0	TV	Radio	Newspaper	Sales
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

Data cleaning

In [13]:

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

In [15]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 4 columns):
 #   Column     Non-Null Count  Dtype  
---  ------     --------------  -----  
 0   TV         200 non-null    float64
 1   Radio      200 non-null    float64
 2   Newspaper  200 non-null    float64
 3   Sales      200 non-null    float64
dtypes: float64(4)
memory usage: 6.4 KB
```

In [40]:

```
df.shape
```

Out[40]:

```
(200, 4)
```

In [17]:

```
df.duplicated().sum()
```

Out[17]:

```
0
```

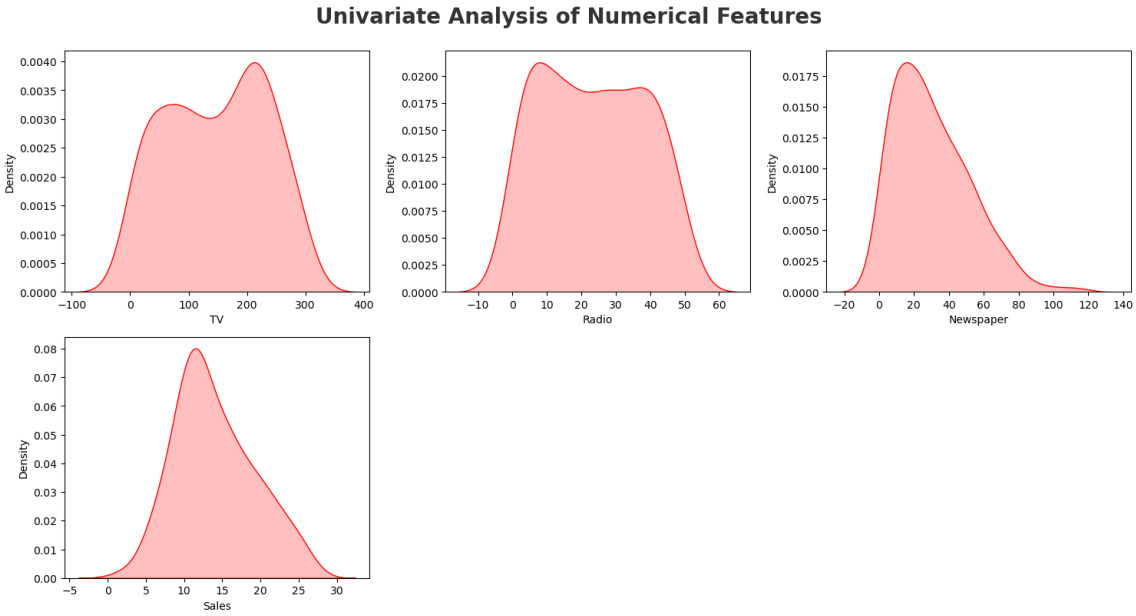
Data graphs

In [22]:

```
num_features=df.columns
```

In [24]:

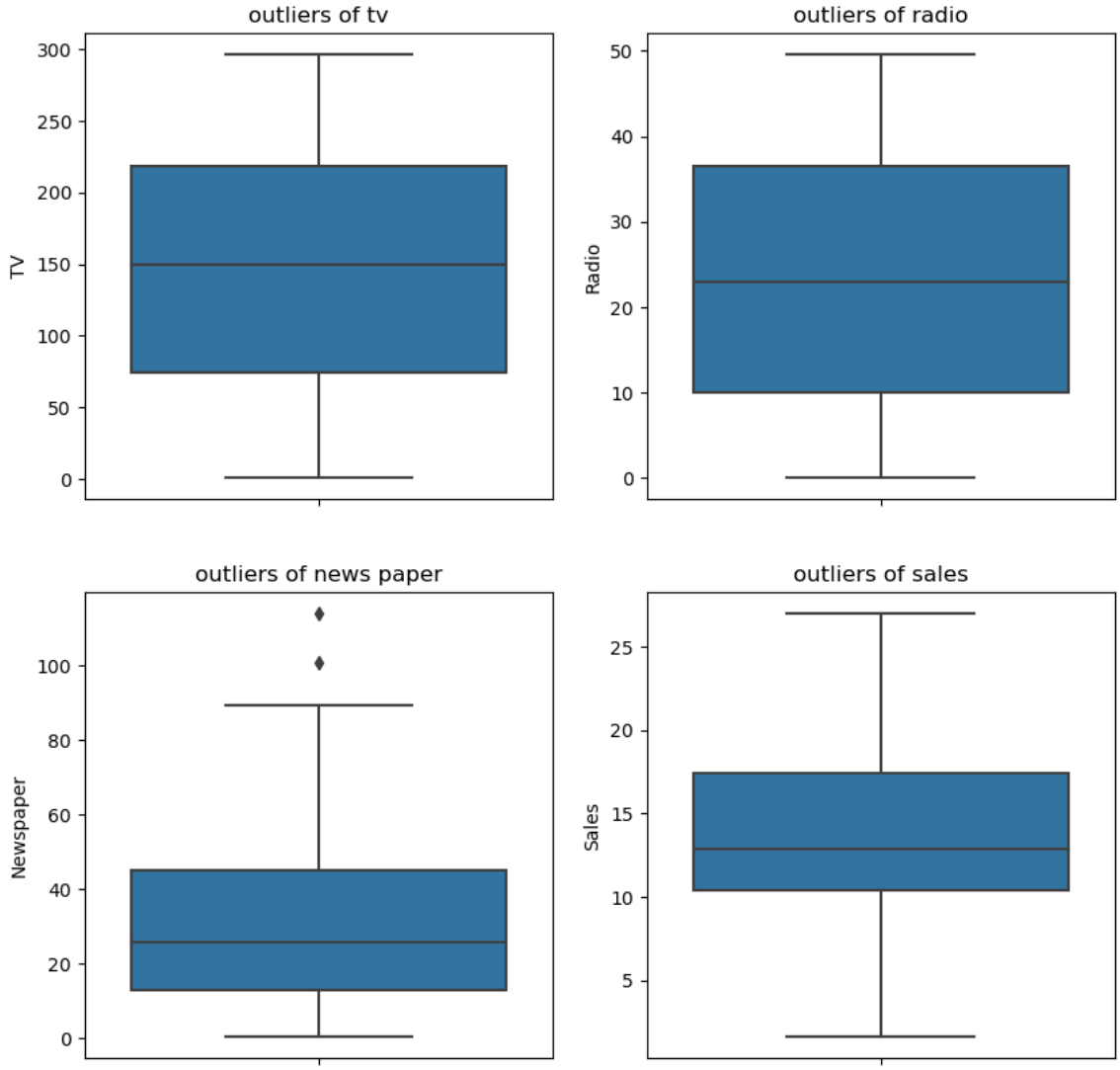
```
plt.figure(figsize=(15, 15))
plt.suptitle('Univariate Analysis of Numerical Features', fontsize=20, fontweight='bold'

for i in range(0, len(num_features)):
    plt.subplot(4, 3, i+1)
    sns.kdeplot(x=df[num_features[i]],shade=True, color='r')
    plt.xlabel(num_features[i])
    plt.tight_layout()
```



checking outliers

In [33]:

```
plt.figure(figsize=(10,10))

plt.subplot(2,2,1)
sns.boxplot( y = df['TV'])
plt.title("outliers of tv")

plt.subplot(2,2,2)
sns.boxplot(y=df['Radio'])
plt.title('outliers of radio')

plt.subplot(2,2,3)
sns.boxplot(y=df['Newspaper'])
plt.title('outliers of news paper')

plt.subplot(2,2,4)
sns.boxplot(y=df['Sales'])
plt.title('outliers of sales')

plt.show()
```



splitting data

In [37]:

```
features = ["TV", "Radio", "Newspaper"]
X = df[features]
target = "Sales"
y = df[target]

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.30, random_state=4
```

In [39]:

```
X_train.shape,X_test.shape, y_train.shape, y_test.shape
```

Out[39]:

```
((140, 3), (60, 3), (140,), (60,))
```

In [50]:

```
y_mean = round(y_train.mean(),2)
print("Mean Error: ", y_mean)
y_pred_baseline = [y_mean] * len(y_train)
print("Baseline Error: ", y_pred_baseline[:5])
mae_baseline = mean_absolute_error(y_train, y_pred_baseline)
print("MAE Baseline: ", mae_baseline)
```

```
Mean Error:  14.5
Baseline Error:  [14.5, 14.5, 14.5, 14.5, 14.5]
MAE Baseline:  4.1414285714285715
```

creating model

In [52]:

```
lrs= LinearRegression().fit(X_train, y_train)
lrs
```

Out[52]:

```
LinearRegression()
```

In [54]:

```
y_pred_training = lrs.predict(X_train)
print("Predicted values after model: ", y_pred_training[:5])
mae_pred_training = mean_absolute_error(y_train, y_pred_training)
print("MAE for training data after prediction: ", mae_pred_training)
```

```
Predicted values after model:  [17.39149783 15.19196153 11.41650701 11.206
10472 16.39256165]
MAE for training data after prediction:  1.1581502948072533
```

In [55]:

```
y_pred_test = lrs.predict(X_test)
print("Predicted values after model: ", y_pred_test[:5])
mae_pred_test = mean_absolute_error(y_test, y_pred_test)
print("MAE for test data after prediction: ", mae_pred_test)
```

```
Predicted values after model:  [16.5653963  21.18822792 21.55107058 10.889
23816 22.20231988]
MAE for test data after prediction:  1.5116692224549084
```

In [57]:

```
intercept = lrs.intercept_
intercept
```

Out[57]:

```
2.7089490925159083
```

In [58]:

```
coefficient = lrs.coef_
coefficient
```

Out[58]:

```
array([0.04405928, 0.1992875 , 0.00688245])
```

In [59]:

```
print(f"Sales = {intercept} + {coefficient[0]} * TV + {coefficient[1]} * Radio + {coeffi
```

```
Sales = 2.7089490925159083 + 0.04405928095746521 * TV + 0.1992874968989394
6 * Radio + 0.006882452222275457 * Newspaper
```

In [61]:

```
print("Score of training data: ", lrs.score(X_train, y_train))
print("Score of test data: ", lrs.score(X_train, y_train))
```

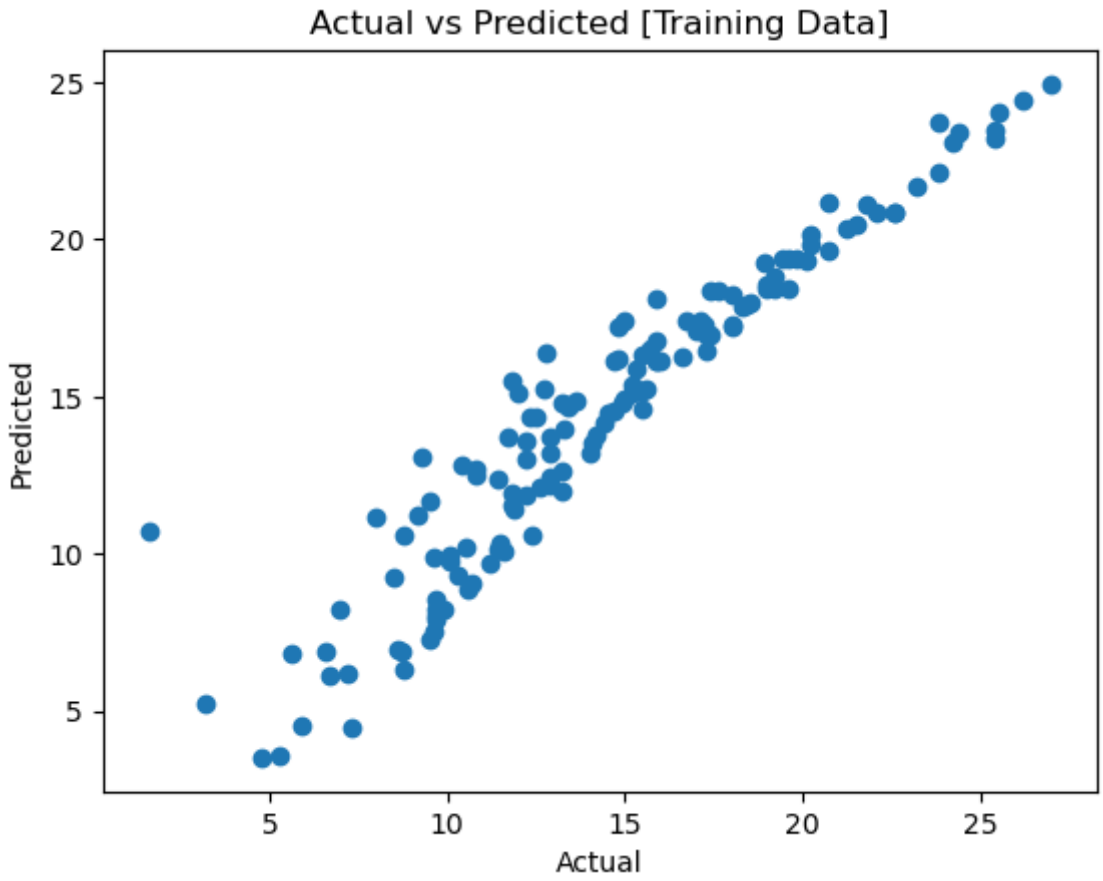
```
Score of training data:  0.9055159502227753
Score of test data:  0.9055159502227753
```

In [62]:

```
plt.scatter(y_train, y_pred_training)
plt.xlabel("Actual")
plt.ylabel("Predicted")
plt.title("Actual vs Predicted [Training Data]")
```

Out[62]:

```
Text(0.5, 1.0, 'Actual vs Predicted [Training Data]')
```



checking predict values

In [65]:

```
predict = lrs.predict(X_test)
compar = pd.DataFrame({'actual':y_test, 'predicted': predict})
compar = compar.reset_index(drop = True)
compar[:10]
```

Out[65]:

	actual	predicted
0	16.9	16.565396
1	22.4	21.188228
2	21.4	21.551071
3	7.3	10.889238
4	24.7	22.202320
5	12.6	13.355569
6	22.3	21.196925
7	8.4	7.350285
8	11.5	13.275471
9	14.9	15.124495

In [ ]:

```

```