SALES PREDICTION ANALYSIS

In [2]:
```
import pandas as pd
```

In [3]:
```
# Load the dataset
data = pd.read_csv("D:\Data Analytics Project\Sales Prediction analysis/adve
```

DATA PREPROCESSING

In [4]:
```
data.head()
```

Out[4]:

	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

In [5]:
```
data.tail(5)
```

Out[5]:

	TV	Radio	Newspaper	Sales
195	38.2	3.7	13.8	7.6
196	94.2	4.9	8.1	14.0
197	177.0	9.3	6.4	14.8
198	283.6	42.0	66.2	25.5
199	232.1	8.6	8.7	18.4

In [6]:
```
# Size of the Table
print('Size of the Table')
print('No. of Rows:',data.shape[0])
print('No. of Columns:',data.shape[1])
```

```
Size of the Table
No. of Rows: 200
No. of Columns: 4
```

In [7]:
```
# Checking null Values
data.isnull().sum()
```

Out[7]:
```
TV           0
Radio        0
Newspaper    0
Sales        0
dtype: int64
```

In [8]:
```
# Info about the dataset
data.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 [9]:
```
# Description of the table
data.describe()
```

Out[9]:

	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

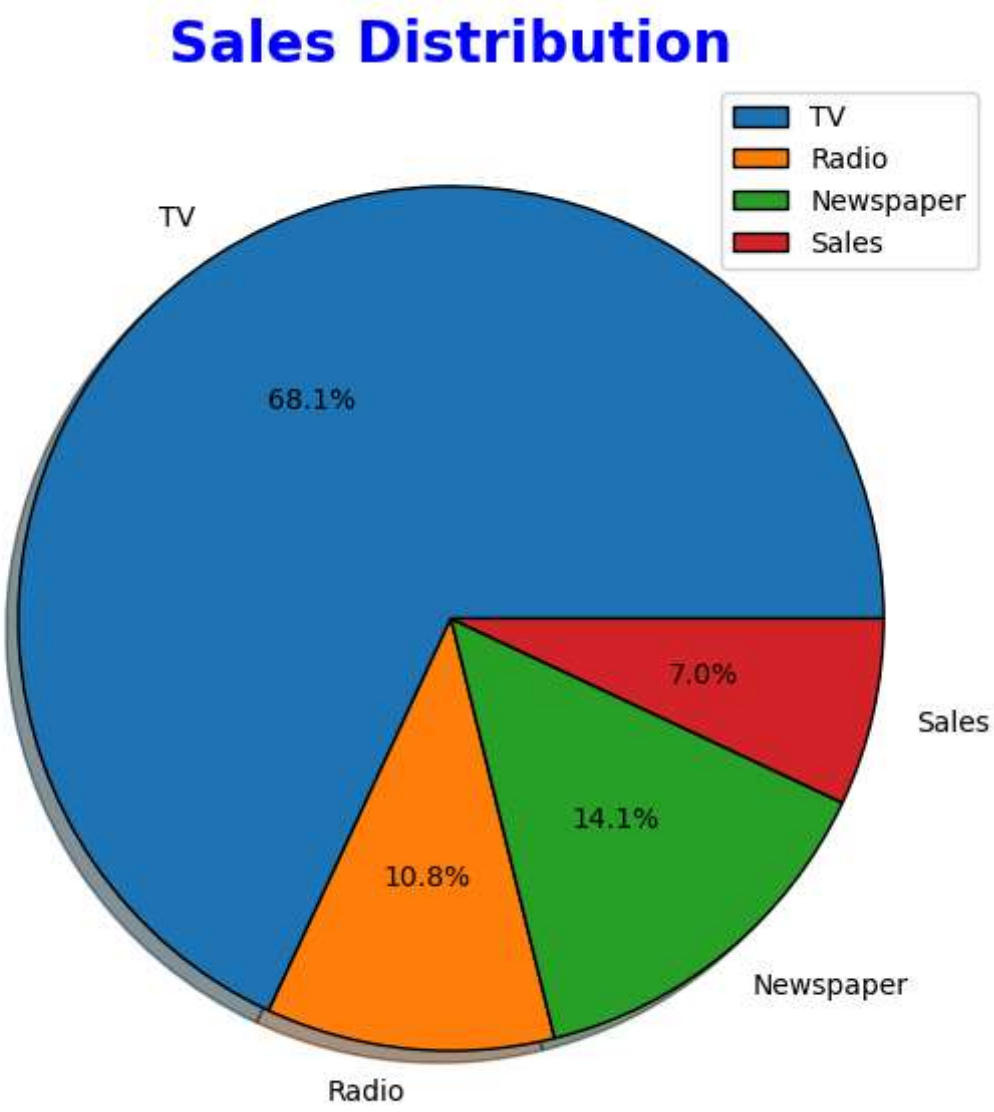
In [10]:
```
# Sales through TV
tv_sale = data.sum()
tv_sale
```

Out[10]:
```
TV           29408.5
Radio         4652.8
Newspaper     6110.8
Sales         3026.1
dtype: float64
```

DATA VISUALIZATION

In [11]:
```
import matplotlib.pyplot as plt

plt.figure(figsize=(7,7))
tv_sale.plot.pie(autopct='%1.1f%%',wedgeprops={'edgecolor':'black'},shadow=
plt.title('Sales Distribution',fontsize=20,fontweight='bold',color='blue')
plt.legend()
plt.show()
```



PREDICTION USING CLASSIFICATION MODEL

In [12]:
```
from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeClassifier
from sklearn.linear_model import LogisticRegression
from sklearn.svm import SVC
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import accuracy_score, classification_report, confusio
```

In [13]:
```
data['SalesCategory'] = (data['Sales'] > 15).astype(int)
```

In [14]:
```
# Features and target
x = data[['TV','Radio','Newspaper']]
y = data['SalesCategory']

# Split the data
x_train,x_test,y_train,y_test = train_test_split(x,y,random_state=42,test_s
```

Decision Tree Classifier

In [17]:
```
dtc = DecisionTreeClassifier()
dtc.fit(x_train,y_train)
y_pred = dtc.predict(x_test)
print('Accuracy:',(accuracy_score(y_test,y_pred)*100),'%')
print('Classification Report:')
print(classification_report(y_test,y_pred))
conf_matrix = confusion_matrix(y_test,y_pred)
print('Confusion Matrix:')
print(conf_matrix)
```

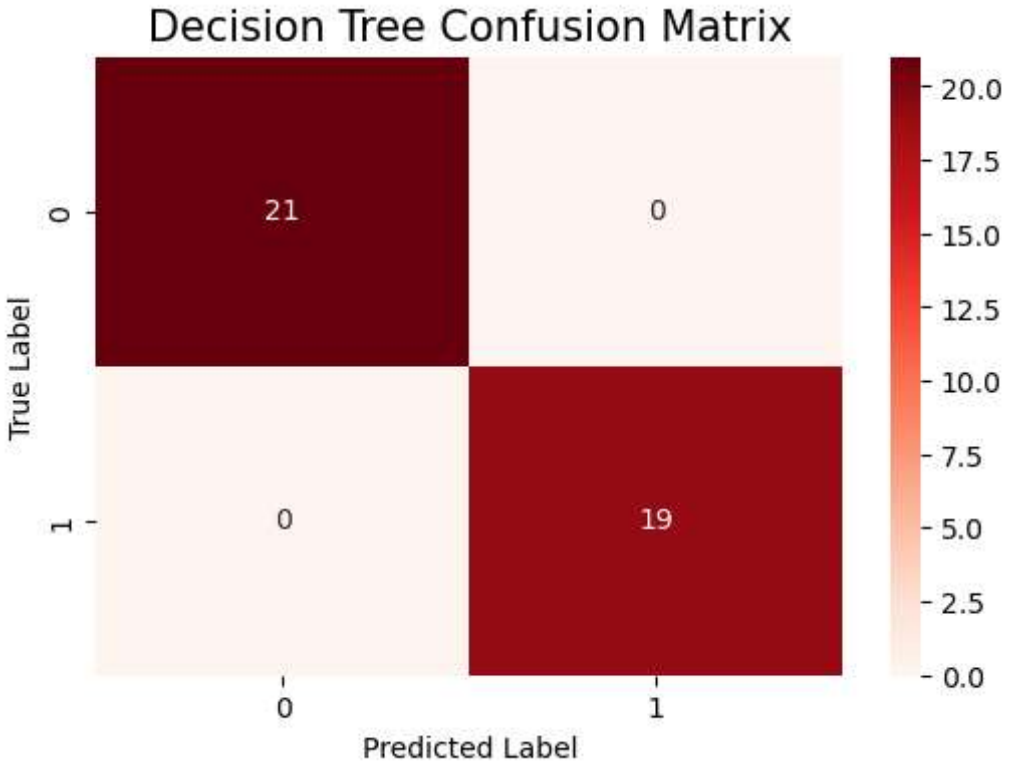
```
Accuracy: 100.0 %
Classification Report:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        21
           1       1.00      1.00      1.00        19

    accuracy                           1.00        40
   macro avg       1.00      1.00      1.00        40
weighted avg       1.00      1.00      1.00        40

Confusion Matrix:
[[21  0]
 [ 0 19]]
```

In [19]:
```
import seaborn as sns
plt.figure(figsize=(6,4))
sns.heatmap(conf_matrix,annot=True,fmt='d',cmap='Reds')
plt.title('Decision Tree Confusion Matrix',fontsize=15)
plt.xlabel('Predicted Label')
plt.ylabel('True Label')
plt.show()
```



Logistic Regression

In [23]:
```
lr = LogisticRegression()
lr.fit(x_train,y_train)
lr_y_pred = lr.predict(x_test)
lr_accuracy = accuracy_score(y_test,lr_y_pred)
lr_classi_rep = classification_report(y_test,lr_y_pred)
lr_conf_matrix = confusion_matrix(y_test,lr_y_pred)
print('Accuracy:',lr_accuracy*100,'%')
print('Classification Report:')
print(lr_classi_rep)
print('Confusion Matrix:')
print(lr_conf_matrix)
```

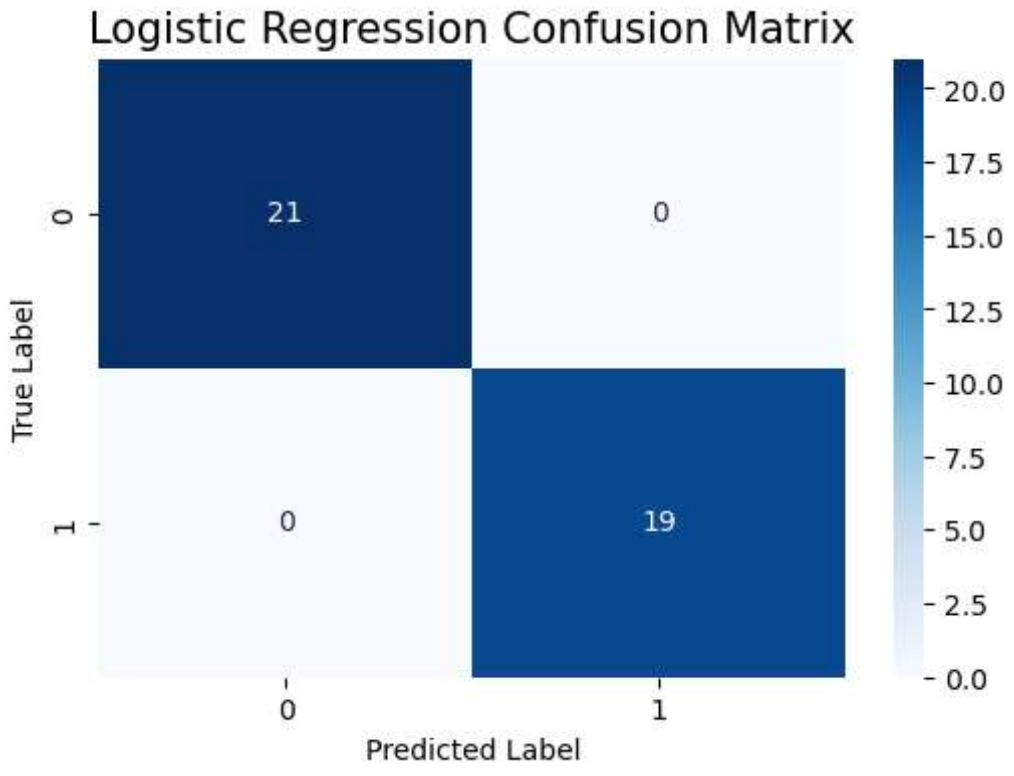
```
Accuracy: 100.0 %
Classification Report:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        21
           1       1.00      1.00      1.00        19

    accuracy                           1.00        40
   macro avg       1.00      1.00      1.00        40
weighted avg       1.00      1.00      1.00        40

Confusion Matrix:
[[21  0]
 [ 0 19]]
```

In [24]:
```
plt.figure(figsize=(6,4))
sns.heatmap(lr_conf_matrix,annot=True,fmt='d',cmap='Blues')
plt.title('Logistic Regression Confusion Matrix',fontsize=15)
plt.xlabel('Predicted Label')
plt.ylabel('True Label')
plt.show()
```



Support Vector Machine

In [25]:
```
svm = SVC()
svm.fit(x_train,y_train)
svm_y_pred = svm.predict(x_test)
svm_accuracy = accuracy_score(y_test,svm_y_pred)
svm_classi_rep = classification_report(y_test,svm_y_pred)
svm_conf_matrix = confusion_matrix(y_test,svm_y_pred)
print('Accuracy :',svm_accuracy*100,'%')
print('Classification Report :')
print(svm_classi_rep)
print('Confusion Matrix :')
print(svm_conf_matrix)
```

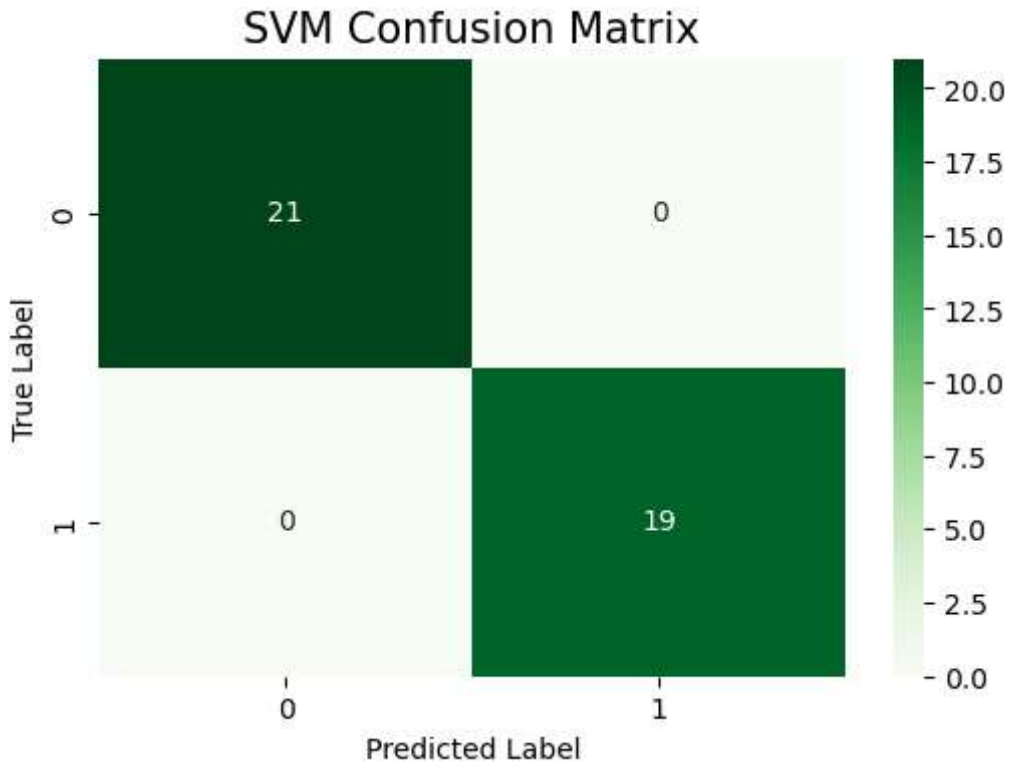
```
Accuracy : 100.0 %
Classification Report :
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        21
           1       1.00      1.00      1.00        19

    accuracy                           1.00        40
   macro avg       1.00      1.00      1.00        40
weighted avg       1.00      1.00      1.00        40

Confusion Matrix :
[[21  0]
 [ 0 19]]
```

In [28]:
```
plt.figure(figsize=(6,4))
sns.heatmap(svm_conf_matrix,annot=True,fmt='d',cmap='Greens')
plt.title('SVM Confusion Matrix',fontsize=15)
plt.xlabel('Predicted Label')
plt.ylabel('True Label')
plt.show()
```



Random Forest Classifier

In [29]:
```
rfc = RandomForestClassifier()
rfc.fit(x_train,y_train)
rfc_y_pred = rfc.predict(x_test)
rfc_accuracy = accuracy_score(y_test,rfc_y_pred)
rfc_classi_rep = classification_report(y_test,rfc_y_pred)
rfc_conf_matrix = confusion_matrix(y_test,rfc_y_pred)
print('Accuracy :',rfc_accuracy*100,'%')
print('Classification Report :')
print(rfc_classi_rep)
print('Confusion Matrix :')
print(rfc_conf_matrix)
```

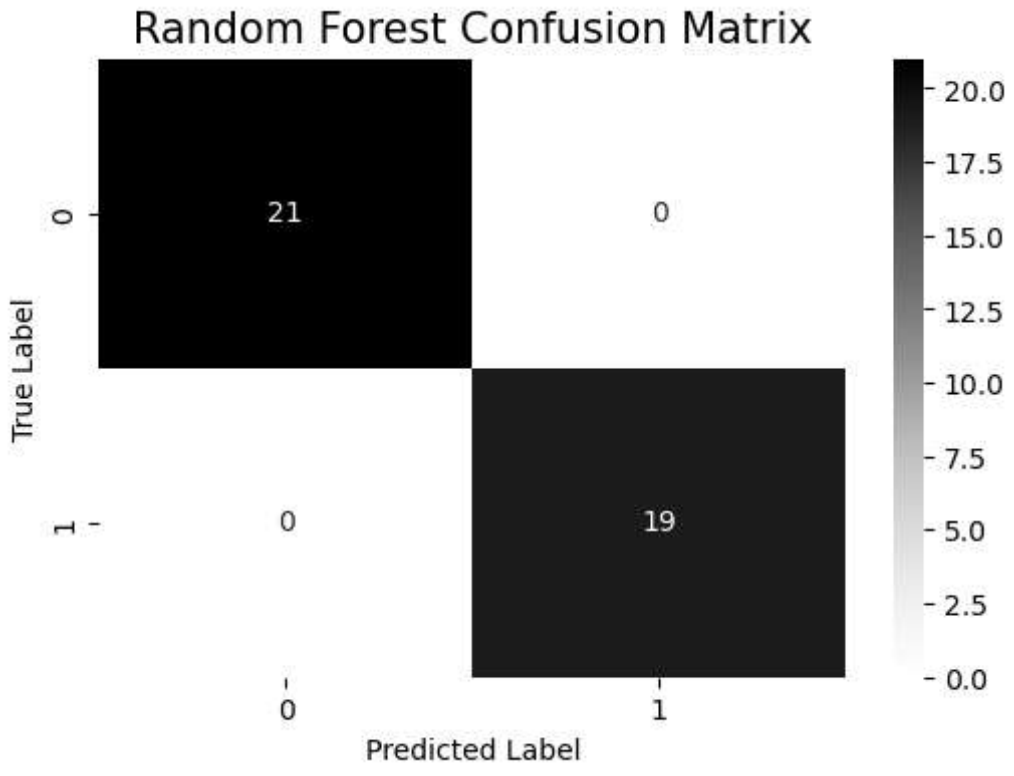
```
Accuracy : 100.0 %
Classification Report :
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        21
           1       1.00      1.00      1.00        19

    accuracy                           1.00        40
   macro avg       1.00      1.00      1.00        40
weighted avg       1.00      1.00      1.00        40

Confusion Matrix :
[[21  0]
 [ 0 19]]
```

In [34]:
```
plt.figure(figsize=(6,4))
sns.heatmap(rfc_conf_matrix,annot=True,fmt='d',cmap='Greys')
plt.title('Random Forest Confusion Matrix',fontsize=15)
plt.xlabel('Predicted Label')
plt.ylabel('True Label')
plt.show()
```



In [37]:
```
plt.figure()
plt.text(0.5,0.6,'Thank You',fontsize=30,ha='center',va='center')
plt.text(0.5,0.4,'CodSoft',fontsize=45,fontweight='bold',color='Blue')
plt.axis('off')
plt.show()
```