codsoft-ds-3

August 13, 2024

TASK-3 SALES PREDICTION

[1]:
```
import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)
import matplotlib.pyplot as plt
import seaborn as sns
sns.set()
```

[2]:
```
df = pd.read_csv("/content/advertising (1).csv")
```

[3]:
```
df.head()
```

[3]:

	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

[4]:
```
df.shape
```

[4]:
```
(200, 4)
```

[5]:
```
df.columns
```

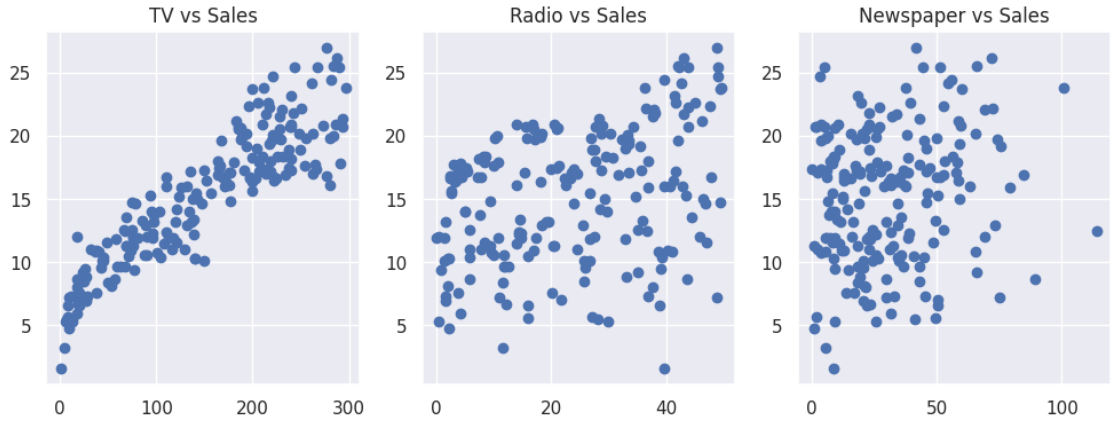
[5]:
```
Index(['TV', 'Radio', 'Newspaper', 'Sales'], dtype='object')
```

[6]:
```
df.describe()
```

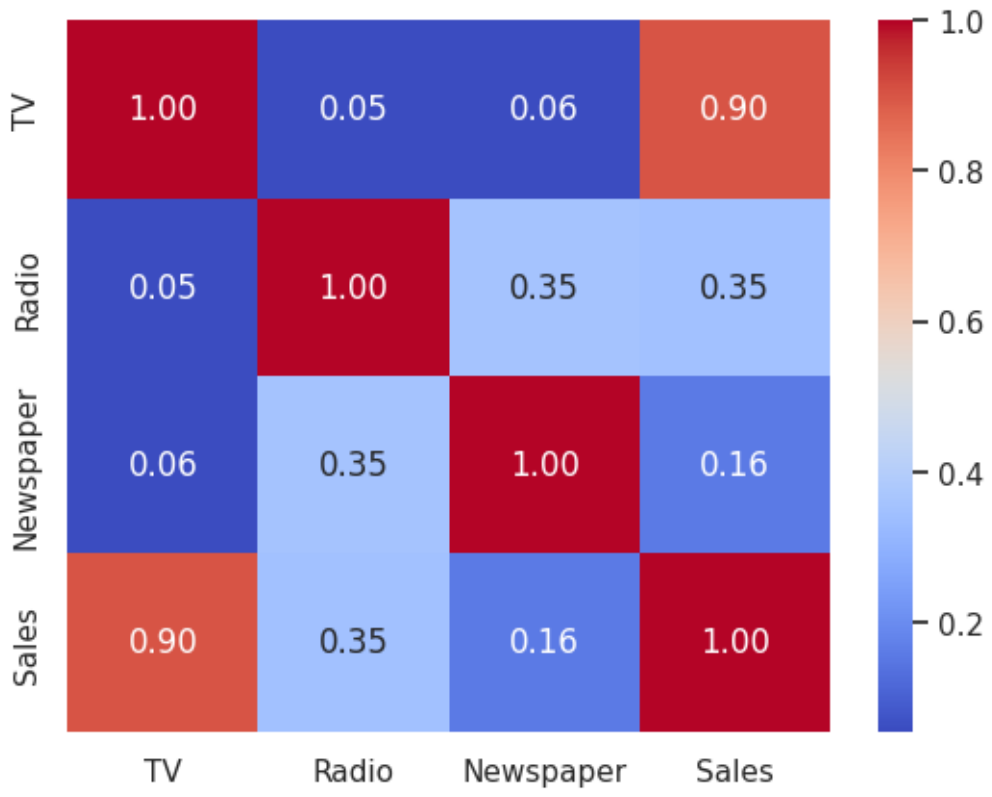
[6]:

	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

[7]:
```
plt.figure(figsize=(12, 4))
plt.subplot(1, 3, 1)
plt.scatter(df['TV'], df['Sales'])
plt.title('TV vs Sales')
plt.subplot(1, 3, 2)
plt.scatter(df['Radio'], df['Sales'])
plt.title('Radio vs Sales')
plt.subplot(1, 3, 3)
plt.scatter(df['Newspaper'], df['Sales'])
plt.title('Newspaper vs Sales')
plt.show()
```



[8]:
```
corr_matrix = df.corr()
sns.heatmap(corr_matrix, annot=True, cmap='coolwarm', fmt='.2f')
plt.show()
```



[9]:
```
#Split the dataset
X = df[['TV', 'Radio', 'Newspaper']]
y = df['Sales']
```

[10]:
```
#Spliting into training and testig part
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,␣
 ↪random_state=42)
```

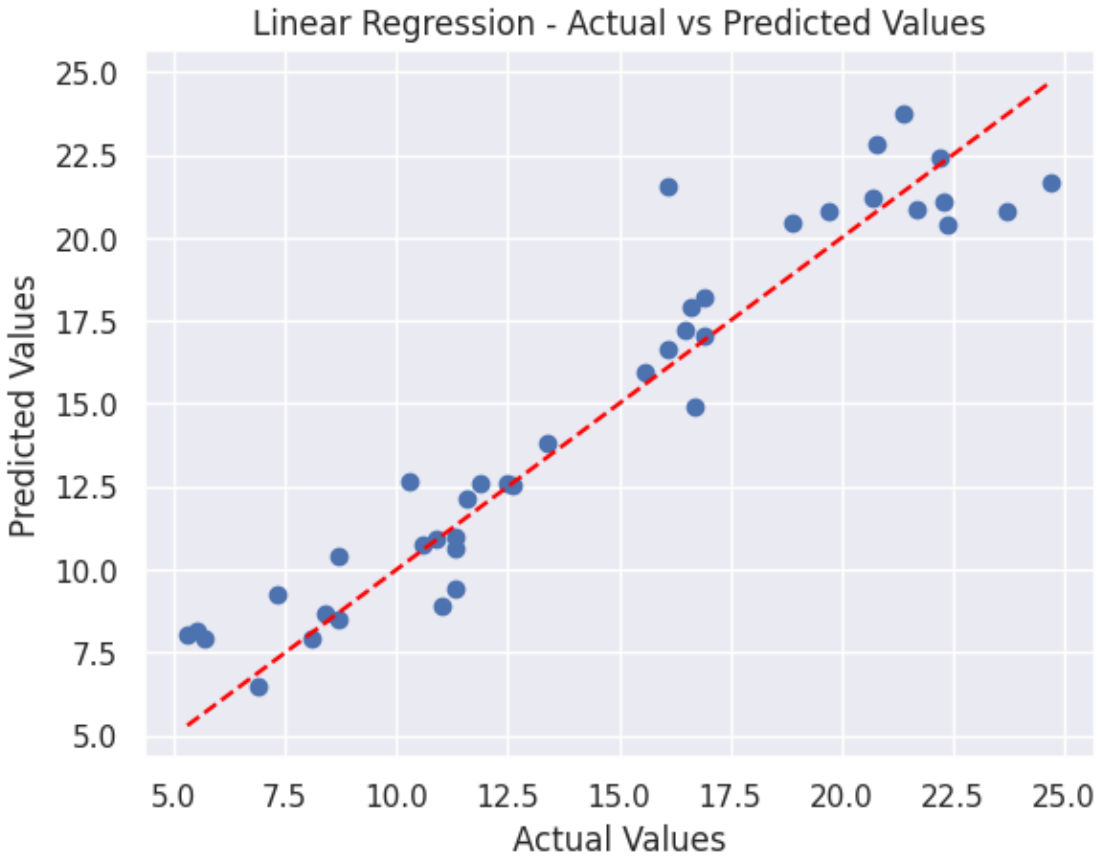
[11]:
```
from sklearn.linear_model import LinearRegression
from sklearn.ensemble import RandomForestRegressor, GradientBoostingRegressor
from sklearn.metrics import mean_squared_error, r2_score
```

[12]:
```
#Train a Linear Regression Model
linear_model = LinearRegression()
linear_model.fit(X_train, y_train)
linear_pred = linear_model.predict(X_test)
#Evaluate Linear Regression Model
linear_mse = mean_squared_error(y_test, linear_pred)
linear_r2 = r2_score(y_test, linear_pred)
print("Linear Regression:")
```

```
print(f'Mean Squared Error: {linear_mse}')
print(f'R-squared: {linear_r2}')
```

```
Linear Regression:
Mean Squared Error: 2.9077569102710896
R-squared: 0.9059011844150826
```

[13]:
```
plt.scatter(y_test, linear_pred)
plt.xlabel('Actual Values')
plt.ylabel('Predicted Values')
plt.title('Linear Regression - Actual vs Predicted Values')
plt.plot([min(y_test), max(y_test)], [min(y_test), max(y_test)], color='red',␣
 ↪linestyle='--')  # Regression line
plt.show()
```



[14]:
```
#Train a Gradiant Boost Model
gb_model = GradientBoostingRegressor()
gb_model.fit(X_train, y_train)
gb_pred = gb_model.predict(X_test)
```

```
#Evaluate Gradiant Boost Model
gb_mse = mean_squared_error(y_test, gb_pred)
gb_r2 = r2_score(y_test, gb_pred)
print("\nGradient Boosting Regression:")
print(f'Mean Squared Error: {gb_mse}')
print(f'R-squared: {gb_r2}')
```

```
Gradient Boosting Regression:
Mean Squared Error: 1.2408765049102364
R-squared: 0.9598436138224776
```

[15]:
```
plt.scatter(y_test, gb_pred)
plt.xlabel('Actual Sales')
plt.ylabel('Predicted Sales')
plt.title('Gradient Boosting Regression - Actual vs Predicted Sales')
plt.show()
```