```
from google.colab import files
import pandas as pd

# Upload the file
uploaded = files.upload()
```

Choose Files advertising.csv

- **advertising.csv**(text/csv) - 4062 bytes, last modified: 8/24/2024 - 100% done

```
Saving advertising.csv to advertising.csv
```

```
# Load the CSV into a DataFrame
df = pd.read_csv('advertising.csv')
df.head()
```

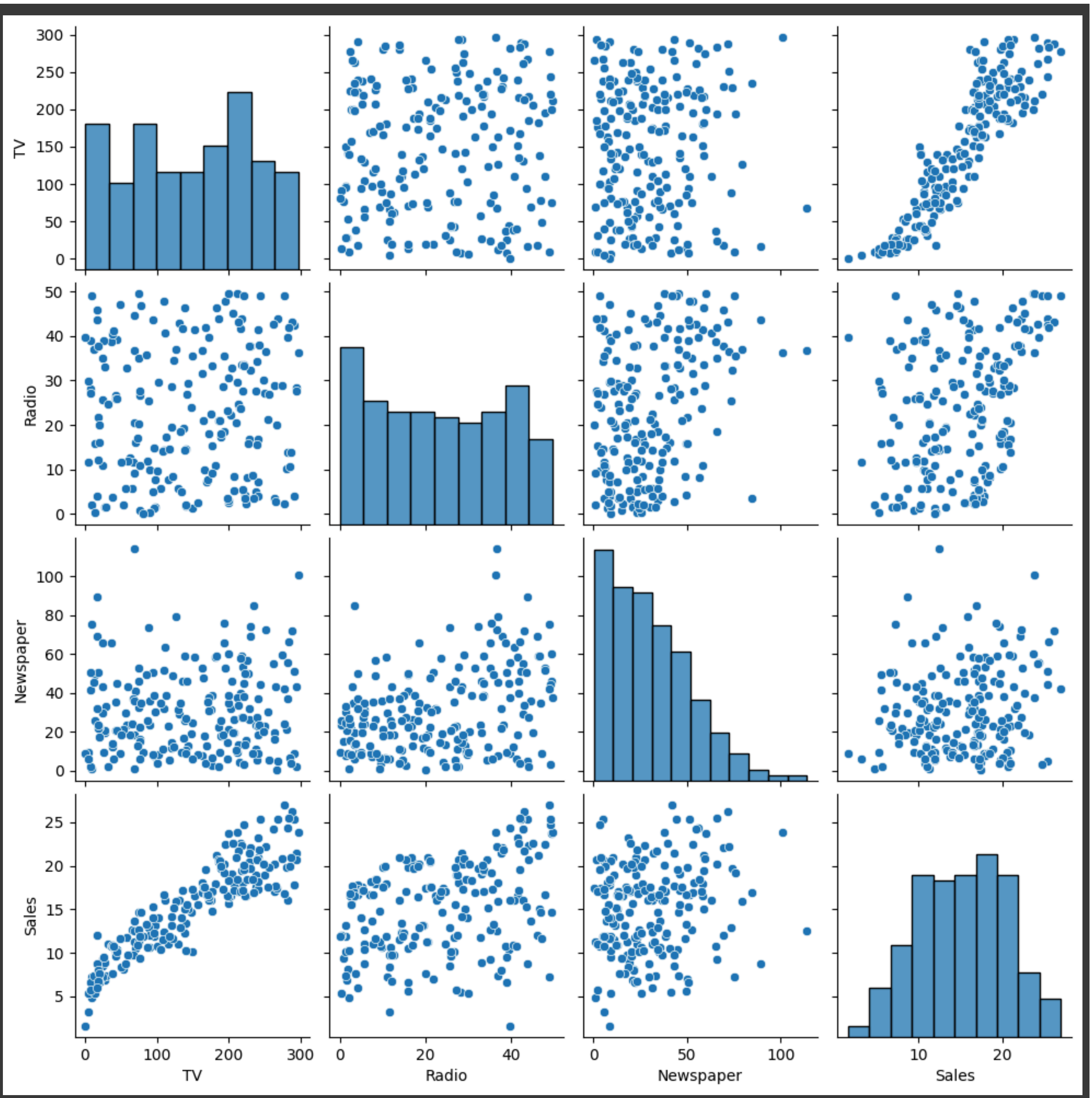
	TV	Radio	Newspaper	Sales
0	230.1	37.8	69.2	22.1
1	44.5	39.3	45.1	10.4
2	17.2	45.9	69.3	12.0
3	151.5	41.3	58.5	16.5
4	180.8	10.8	58.4	17.9

Next steps: Generate code with df | View recommended plots | New interactive sheet

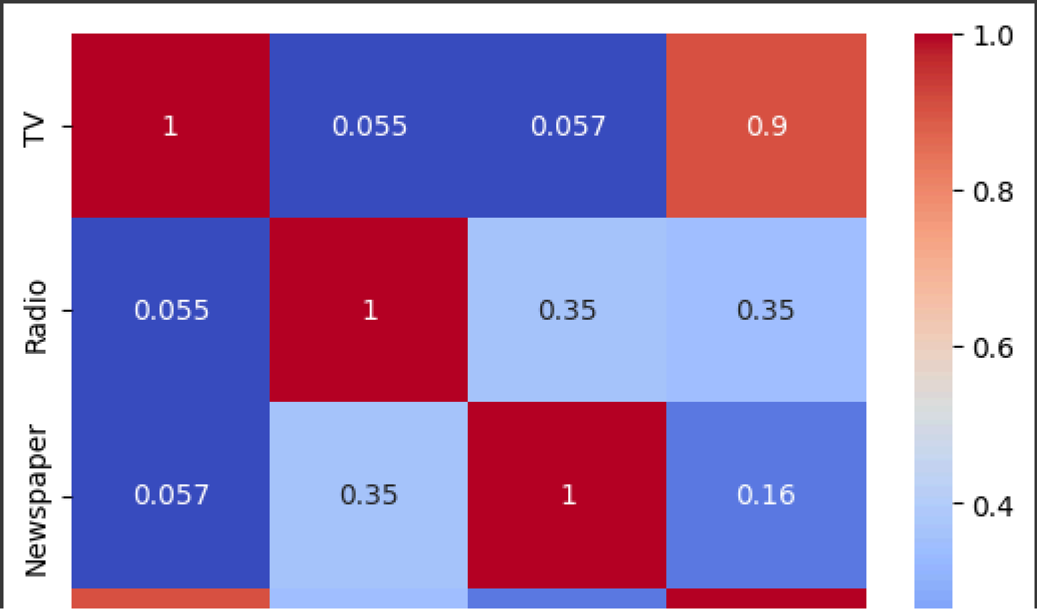
```
df.info()
```

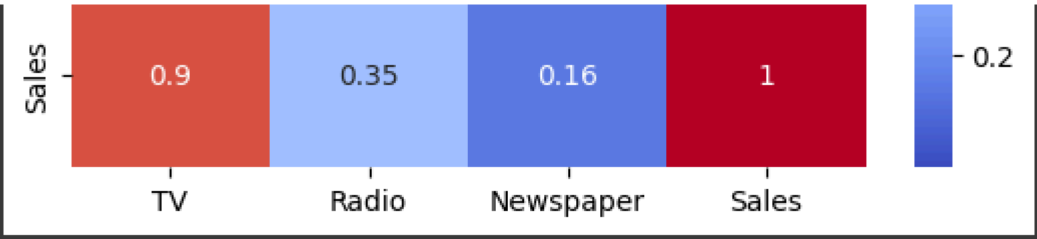
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 4 columns):
 #   Column     Non-Null Count  Dtype  
---  ------     --------------  -----  
 0   TV         200 non-null    float64
 1   Radio      200 non-null    float64
 2   Newspaper  200 non-null    float64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

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

# Plot pairwise relationships
sns.pairplot(df)
plt.show()

# Check correlation matrix
correlation_matrix = df.corr()
print(correlation_matrix)

# Heatmap of correlation matrix
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm')
plt.show()
```



```
                   TV     Radio  Newspaper     Sales
TV         1.000000  0.054809   0.056648  0.901208
Radio      0.054809  1.000000   0.354104  0.349631
Newspaper  0.056648  0.354104   1.000000  0.157960
Sales      0.901208  0.349631   0.157960  1.000000
```



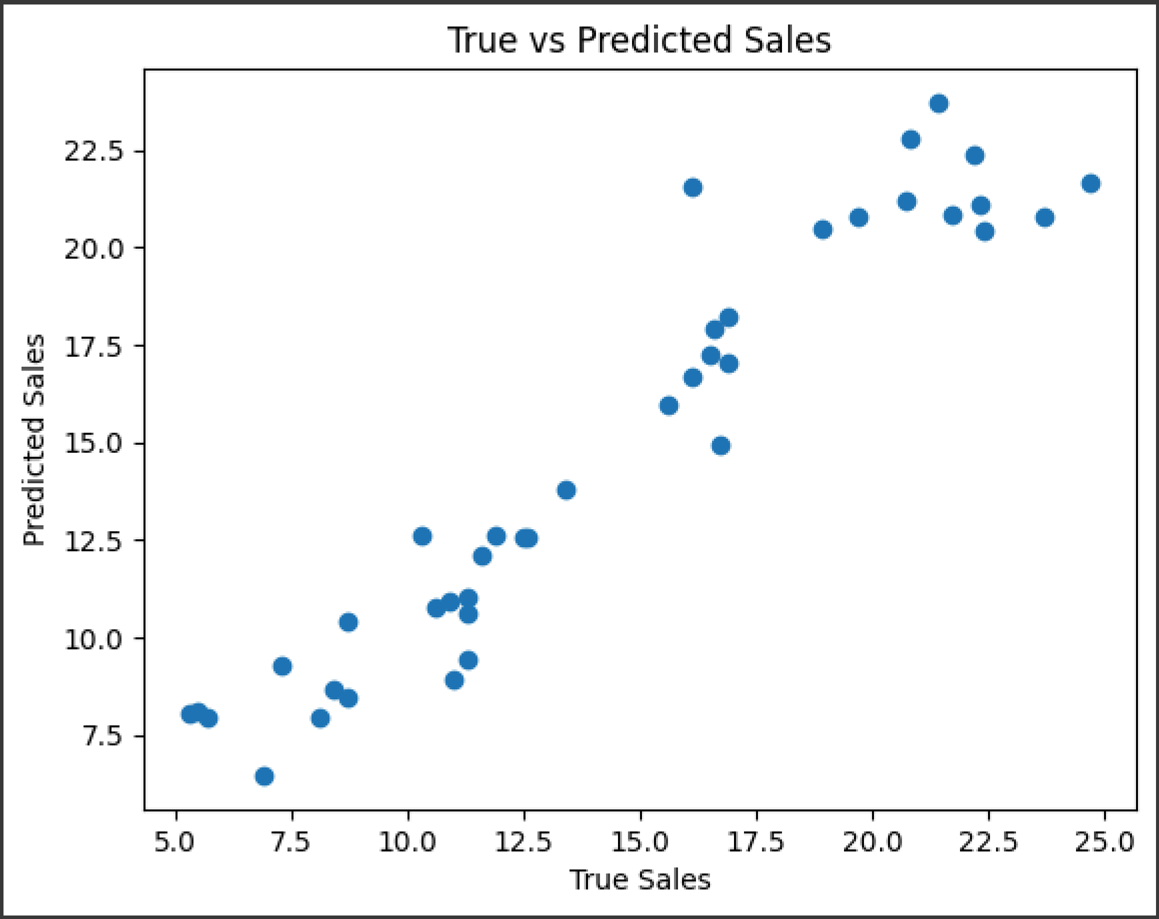


```python
from sklearn.model_selection import train_test_split

# Features and target variable
X = df[['TV', 'Radio', 'Newspaper']]
y = df['Sales']

# Split into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_sta
```

```python
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score

# Initialize and train the model
model = LinearRegression()
model.fit(X_train, y_train)

# Make predictions
y_pred = model.predict(X_test)

# Evaluate the model
mse = mean_squared_error(y_test, y_pred)
r2 = r2_score(y_test, y_pred)

print(f"Mean Squared Error: {mse}")
print(f"R-squared: {r2}")
```

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

```
plt.scatter(y_test, y_pred)
plt.xlabel('True Sales')
plt.ylabel('Predicted Sales')
plt.title('True vs Predicted Sales')
plt.show()
```



```
# Display coefficients
coefficients = pd.DataFrame(model.coef_, X.columns, columns=['Coefficient'])
print(coefficients)
```

```
           Coefficient
TV            0.054509
Radio         0.100945
Newspaper     0.004337
```

```
# Calculate residuals
residuals = y_test - y_pred

# Plot residuals
plt.scatter(y_pred, residuals)
plt.xlabel('Predicted Sales')
plt.ylabel('Residuals')
plt.title('Residuals vs Predicted Sales')
plt.axhline(y=0, color='r', linestyle='--')
plt.show()

# Histogram of residuals
plt.hist(residuals, bins=30)
plt.xlabel('Residuals')
plt.ylabel('Frequency')
plt.title('Histogram of Residuals')
plt.show()
```