0.1 Aim: Support Vector Regression

Dataset: https://www.kaggle.com/datasets/devzohaib/tvmarketingcsv

[ ]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.svm import SVR
import warnings
warnings.simplefilter(action='ignore')
```

[ ]:
```
# Importing data
df = pd.read_csv('./tvmarketing.csv')
df.head()
```

[ ]:

	TV	Sales
0	230.1	22.1
1	44.5	10.4
2	17.2	9.3
3	151.5	18.5
4	180.8	12.9

[ ]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 2 columns):
 #   Column  Non-Null Count  Dtype  
---  ------  --------------  -----  
 0   TV      200 non-null    float64
 1   Sales   200 non-null    float64
dtypes: float64(2)
memory usage: 3.2 KB
```

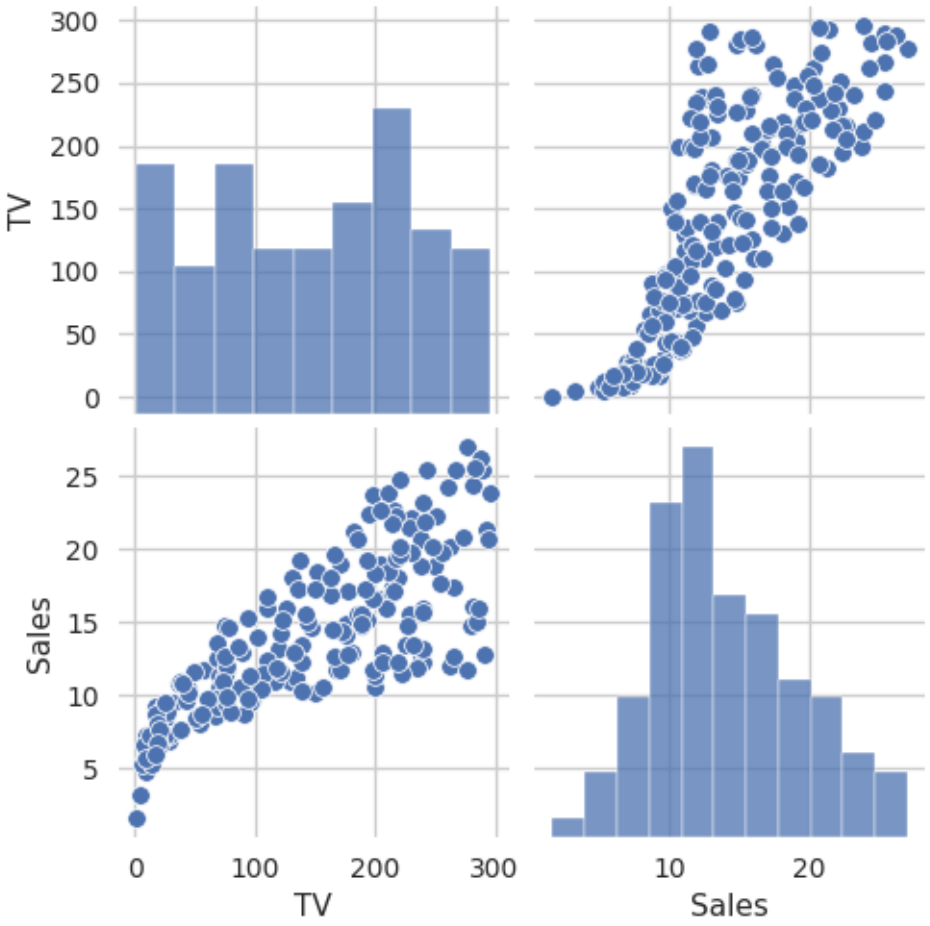
[ ]:
```
df.describe()
```

[ ]:

	TV	Sales
count	200.000000	200.000000
mean	147.042500	14.022500
std	85.854236	5.217457
min	0.700000	1.600000
25%	74.375000	10.375000
50%	149.750000	12.900000
75%	218.825000	17.400000
max	296.400000	27.000000

[ ]:
```
sns.pairplot(df)
```

[ ]:
```
<seaborn.axisgrid.PairGrid at 0x7c5d063d9de0>
```



[ ]:
```
df[target_variable] = transformed_data
```

[ ]:
```
X = np.array(df['TV']).reshape(-1, 1)
y = df['Sales']
```

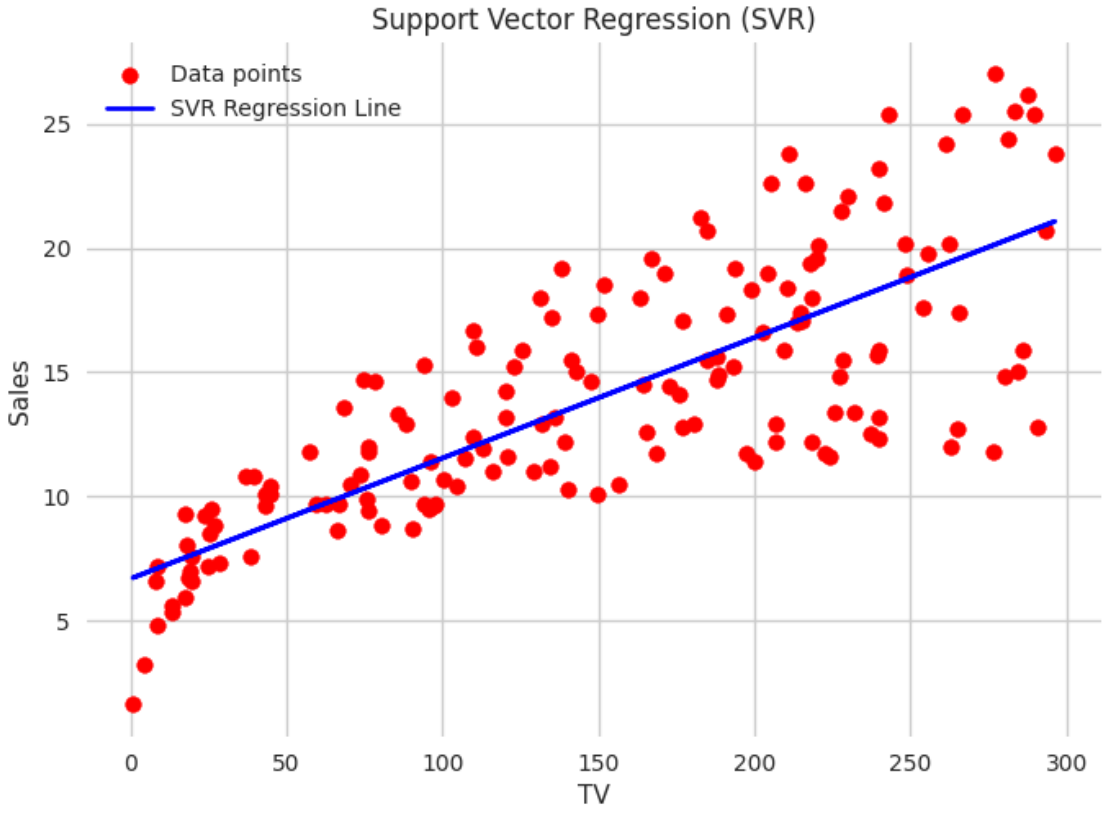
[ ]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,
  ↪random_state=42)

# Train a linear regression model
model = SVR(kernel="linear", C=1, gamma="auto")
model.fit(X_train, y_train)
```

[ ]:
```
SVR(C=1, gamma='auto', kernel='linear')
```

[ ]:
```
y_pred = model.predict(X_test)

mse = mean_squared_error(y_test, y_pred)
print(f'Mean Squared Error: {mse}')
```

```
Mean Squared Error: 3.248967470487195
```

[ ]:
```
plt.scatter(X_train, y_train, color='red', label='Data points')

plt.plot(X, model.predict(X), color='blue', linewidth=2, label='SVR Regression
  ↪Line')

plt.xlabel('TV')
plt.ylabel('Sales')
plt.title('Support Vector Regression (SVR)')
plt.legend()
plt.show()
```



0.2 Support Vector Machine

[ ]:
```
from sklearn.model_selection import train_test_split
from sklearn.svm import SVC
from sklearn.metrics import accuracy_score, classification_report, confusion_matrix
import pandas as pd
```

[ ]:
```
df = pd.read_csv('placement.csv')
```

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

[ ]:
```
              cgpa  placement_exam_marks       placed
count  1000.000000           1000.000000  1000.000000
mean      6.961240             32.225000     0.489000
std       0.615898             19.130822     0.500129
min       4.890000              0.000000     0.000000
25%       6.550000             17.000000     0.000000
50%       6.960000             28.000000     0.000000
75%       7.370000             44.000000     1.000000
max       9.120000            100.000000     1.000000
```

[ ]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 3 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   cgpa                  1000 non-null   float64
 1   placement_exam_marks  1000 non-null   float64
 2   placed                1000 non-null   int64  
dtypes: float64(2), int64(1)
memory usage: 23.6 KB
```

[ ]:
```
X = df[['cgpa', 'placement_exam_marks']]
y = df['placed']

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,
  ↪random_state=42)

svm_model = SVC(kernel='linear', C=10, gamma="auto")

svm_model.fit(X_train, y_train)

y_pred = svm_model.predict(X_test)

cm = confusion_matrix(y_test, y_pred)

print(f"Confusion Matrix:\n{cm}")
```

```
Confusion Matrix:
[[45 62]
 [35 58]]
```