Importar módulos que necesitaremos para este portátil

In [ ]:
```
import pandas as pd
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score
from sklearn.model_selection import train_test_split
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

Cargar el conjunto de datos de entrenamiento

In [ ]:
```
bike_data = pd.read_csv('daily-bike-share.csv')
bike_data['day'] = pd.DatetimeIndex(bike_data['dteday']).day
numeric_features = ['temp', 'atemp', 'hum', 'windspeed']
categorical_features = ['season','mnth','holiday','weekday','workingday','weathersit',
bike_data[numeric_features + ['rentals']].describe()
print(bike_data.head())
```

```
   instant    dteday  season  yr  mnth  holiday  weekday  workingday  \
0        1  1/1/2011       1   0     1        0        6           0
1        2  1/2/2011       1   0     1        0        0           0
2        3  1/3/2011       1   0     1        0        1           1
3        4  1/4/2011       1   0     1        0        2           1
4        5  1/5/2011       1   0     1        0        3           1

   weathersit      temp     atemp       hum  windspeed  rentals  day
0           2  0.344167  0.363625  0.805833   0.160446      331    1
1           2  0.363478  0.353739  0.696087   0.248539      131    2
2           1  0.196364  0.189405  0.437273   0.248309      120    3
3           1  0.200000  0.212122  0.590435   0.160296      108    4
4           1  0.226957  0.229270  0.436957   0.186900       82    5
```

Características y etiquetas separadas

Después de separar el conjunto de datos, ahora tenemos matrices entumecidas llamadas **X** que contienen las características y **y** que contienen las etiquetas.

In [ ]:
```
X, y = bike_data[['season','mnth', 'holiday','weekday','workingday','weathersit','temp
```

Dividir los datos 70%-30% en conjunto de entrenamiento y conjunto de prueba

In [ ]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.30, random_state

print ('Training Set: %d rows\nTest Set: %d rows' % (X_train.shape[0], X_test.shape[0]
```

```
Training Set: 511 rows
Test Set: 220 rows
```

Encaja un modelo de lazo en el set de entrenamiento

In [ ]:
```
from sklearn.linear_model import Lasso

model = Lasso().fit(X_train, y_train)
print (model, "\n")
```

```
Lasso()
```

Evaluar el modelo utilizando los datos de prueba

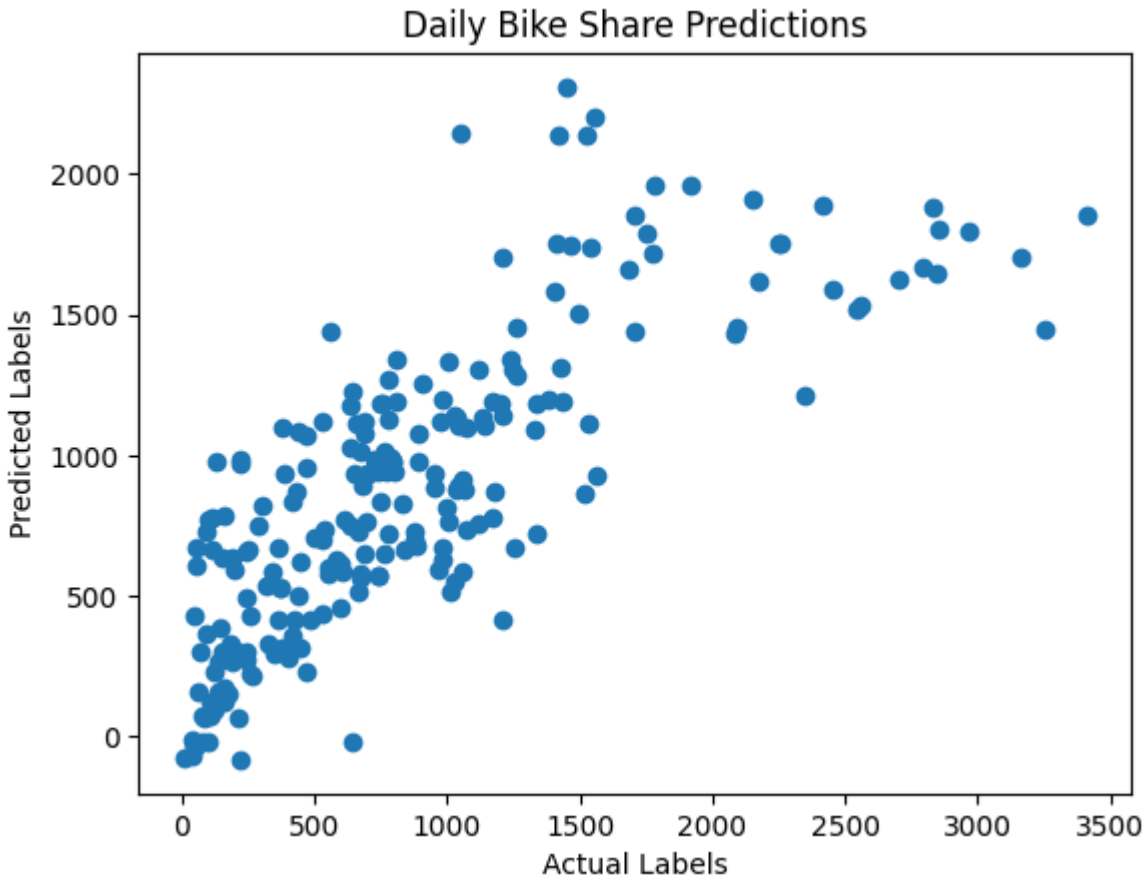
In [ ]:
```
predictions = model.predict(X_test)
mse = mean_squared_error(y_test, predictions)
print("MSE:", mse)
rmse = np.sqrt(mse)
print("RMSE:", rmse)
r2 = r2_score(y_test, predictions)
print("R2:", r2)
```

```
MSE: 201155.70593338404
RMSE: 448.5038527519959
R2: 0.6056468637824488
```

Gráfico predicho vs real

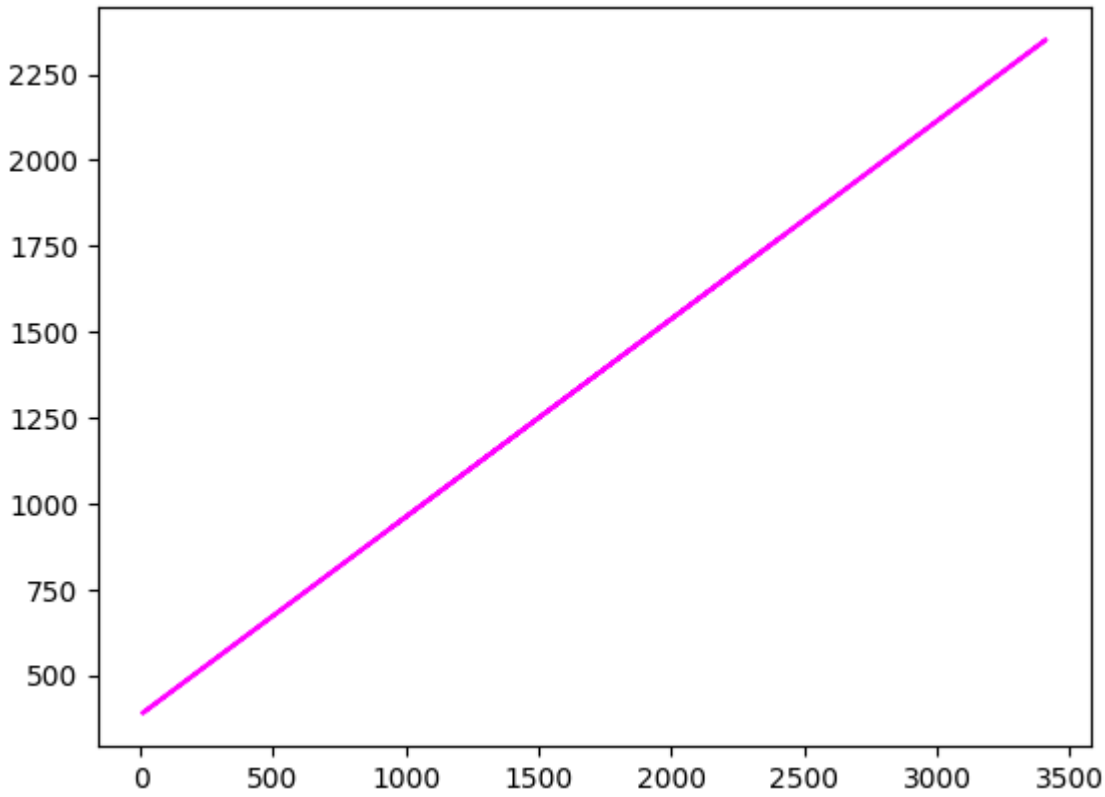
In [ ]:
```
plt.scatter(y_test, predictions)
plt.xlabel('Actual Labels')
plt.ylabel('Predicted Labels')
plt.title('Daily Bike Share Predictions')
```

Out[ ]:
```
Text(0.5, 1.0, 'Daily Bike Share Predictions')
```



superponer la línea de regresión

In [ ]:
```
z = np.polyfit(y_test, predictions, 1)
p = np.poly1d(z)
plt.plot(y_test,p(y_test), color='magenta')
plt.show()
```



Entrenar el modelo

In [ ]:
```
from sklearn.tree import DecisionTreeRegressor
from sklearn.tree import export_text

model = DecisionTreeRegressor().fit(X_train, y_train)
print (model, "\n")
```

```
DecisionTreeRegressor()
```

Visualizar el árbol del modelo

In [ ]:
```
tree = export_text(model)
print(tree)
```

```
|--- feature_6 <= 0.45
|   |--- feature_4 <= 0.50
|   |   |--- feature_7 <= 0.32
|   |   |   |--- feature_8 <= 0.41
|   |   |   |   |--- feature_1 <= 2.50
|   |   |   |   |   |--- feature_9 <= 0.33
|   |   |   |   |   |   |--- feature_8 <= 0.36
|   |   |   |   |   |   |   |--- value: [558.00]
|   |   |   |   |   |   |--- feature_8 >  0.36
|   |   |   |   |   |   |   |--- value: [515.00]
|   |   |   |   |   |--- feature_9 >  0.33
|   |   |   |   |   |   |--- value: [317.00]
|   |   |   |   |--- feature_1 >  2.50
|   |   |   |   |   |--- feature_8 <= 0.40
|   |   |   |   |   |   |--- feature_7 <= 0.27
|   |   |   |   |   |   |   |--- value: [981.00]
|   |   |   |   |   |   |--- feature_7 >  0.27
|   |   |   |   |   |   |   |--- value: [968.00]
|   |   |   |   |   |--- feature_8 >  0.40
|   |   |   |   |   |   |--- feature_7 <= 0.28
|   |   |   |   |   |   |   |--- value: [532.00]
|   |   |   |   |   |   |--- feature_7 >  0.28
|   |   |   |   |   |   |   |--- value: [710.00]
|   |   |   |--- feature_8 >  0.41
|   |   |   |   |--- feature_7 <= 0.25
|   |   |   |   |   |--- feature_6 <= 0.18
|   |   |   |   |   |   |--- feature_8 <= 0.43
|   |   |   |   |   |   |   |--- value: [284.00]
|   |   |   |   |   |   |--- feature_8 >  0.43
|   |   |   |   |   |   |   |--- feature_7 <= 0.10
|   |   |   |   |   |   |   |   |--- value: [150.00]
|   |   |   |   |   |   |   |--- feature_7 >  0.10
|   |   |   |   |   |   |   |   |--- feature_2 <= 0.50
|   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.50
|   |   |   |   |   |   |   |   |   |   |--- value: [73.00]
|   |   |   |   |   |   |   |   |   |--- feature_8 >  0.50
|   |   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.68
|   |   |   |   |   |   |   |   |   |   |   |--- value: [68.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_8 >  0.68
|   |   |   |   |   |   |   |   |   |   |   |--- value: [67.00]
|   |   |   |   |   |   |   |   |   |--- feature_2 >  0.50
|   |   |   |   |   |   |   |   |   |   |--- value: [117.00]
|   |   |   |   |   |--- feature_6 >  0.18
|   |   |   |   |   |   |--- feature_9 <= 0.17
|   |   |   |   |   |   |   |--- feature_6 <= 0.21
|   |   |   |   |   |   |   |   |--- value: [123.00]
|   |   |   |   |   |   |   |--- feature_6 >  0.21
|   |   |   |   |   |   |   |   |--- value: [140.00]
|   |   |   |   |   |   |--- feature_9 >  0.17
|   |   |   |   |   |   |   |--- feature_6 <= 0.19
|   |   |   |   |   |   |   |   |--- value: [333.00]
|   |   |   |   |   |   |   |--- feature_6 >  0.19
|   |   |   |   |   |   |   |   |--- feature_8 <= 0.53
|   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.21
|   |   |   |   |   |   |   |   |   |   |--- value: [251.00]
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.21
|   |   |   |   |   |   |   |   |   |   |--- feature_2 <= 0.50
|   |   |   |   |   |   |   |   |   |   |   |--- value: [205.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_2 >  0.50
|   |   |   |   |   |   |   |   |   |   |   |--- value: [217.00]
```

```
|   |   |   |   |   |   |   |   |--- feature_8 >  0.53
|   |   |   |   |   |   |   |   |   |--- feature_1 <= 7.00
|   |   |   |   |   |   |   |   |   |   |--- value: [288.00]
|   |   |   |   |   |   |   |   |   |--- feature_1 >  7.00
|   |   |   |   |   |   |   |   |   |   |--- value: [275.00]
|   |   |   |   |--- feature_7 >  0.25
|   |   |   |   |   |--- feature_9 <= 0.11
|   |   |   |   |   |   |--- value: [706.00]
|   |   |   |   |   |--- feature_9 >  0.11
|   |   |   |   |   |   |--- feature_8 <= 0.54
|   |   |   |   |   |   |   |--- feature_5 <= 1.50
|   |   |   |   |   |   |   |   |--- feature_7 <= 0.26
|   |   |   |   |   |   |   |   |   |--- value: [309.00]
|   |   |   |   |   |   |   |   |--- feature_7 >  0.26
|   |   |   |   |   |   |   |   |   |--- feature_0 <= 2.50
|   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.16
|   |   |   |   |   |   |   |   |   |   |   |--- value: [408.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.16
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |--- feature_0 >  2.50
|   |   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.48
|   |   |   |   |   |   |   |   |   |   |   |--- value: [440.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_8 >  0.48
|   |   |   |   |   |   |   |   |   |   |   |--- value: [502.00]
|   |   |   |   |   |   |   |--- feature_5 >  1.50
|   |   |   |   |   |   |   |   |--- value: [618.00]
|   |   |   |   |   |   |--- feature_8 >  0.54
|   |   |   |   |   |   |   |--- feature_6 <= 0.29
|   |   |   |   |   |   |   |   |--- feature_8 <= 0.63
|   |   |   |   |   |   |   |   |   |--- value: [354.00]
|   |   |   |   |   |   |   |   |--- feature_8 >  0.63
|   |   |   |   |   |   |   |   |   |--- value: [318.00]
|   |   |   |   |   |   |   |--- feature_6 >  0.29
|   |   |   |   |   |   |   |   |--- feature_1 <= 7.00
|   |   |   |   |   |   |   |   |   |--- value: [195.00]
|   |   |   |   |   |   |   |   |--- feature_1 >  7.00
|   |   |   |   |   |   |   |   |   |--- value: [155.00]
|   |   |   |--- feature_7 >  0.32
|   |   |   |   |--- feature_9 <= 0.25
|   |   |   |   |   |--- feature_6 <= 0.37
|   |   |   |   |   |   |--- feature_7 <= 0.36
|   |   |   |   |   |   |   |--- feature_6 <= 0.36
|   |   |   |   |   |   |   |   |--- feature_1 <= 10.50
|   |   |   |   |   |   |   |   |   |--- feature_7 <= 0.33
|   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.21
|   |   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.20
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.20
|   |   |   |   |   |   |   |   |   |   |   |--- value: [1047.00]
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.21
|   |   |   |   |   |   |   |   |   |   |--- value: [724.00]
|   |   |   |   |   |   |   |   |--- feature_7 >  0.33
|   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.83
|   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.16
|   |   |   |   |   |   |   |   |   |   |   |--- value: [694.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.16
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |--- feature_8 >  0.83
|   |   |   |   |   |   |   |   |   |   |--- value: [879.00]
|   |   |   |   |   |   |   |--- feature_1 >  10.50
```

```
|   |   |   |   |   |   |   |   |--- feature_8 <= 0.57
|   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.51
|   |   |   |   |   |   |   |   |   |   |--- value: [943.00]
|   |   |   |   |   |   |   |   |   |--- feature_8 >  0.51
|   |   |   |   |   |   |   |   |   |   |--- feature_7 <= 0.33
|   |   |   |   |   |   |   |   |   |   |   |--- value: [1156.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_7 >  0.33
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |--- feature_8 >  0.57
|   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.10
|   |   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.66
|   |   |   |   |   |   |   |   |   |   |   |--- value: [955.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_8 >  0.66
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |--- feature_9 >  0.10
|   |   |   |   |   |   |   |   |   |--- feature_1 <= 11.50
|   |   |   |   |   |   |   |   |   |   |--- value: [922.00]
|   |   |   |   |   |   |   |   |   |--- feature_1 >  11.50
|   |   |   |   |   |   |   |   |   |   |--- value: [767.00]
|   |   |   |   |   |   |   |--- feature_6 >  0.36
|   |   |   |   |   |   |   |   |--- value: [1658.00]
|   |   |   |   |   |   |--- feature_7 >  0.36
|   |   |   |   |   |   |   |--- feature_1 <= 6.00
|   |   |   |   |   |   |   |   |--- value: [331.00]
|   |   |   |   |   |   |   |--- feature_1 >  6.00
|   |   |   |   |   |   |   |   |--- feature_1 <= 11.50
|   |   |   |   |   |   |   |   |   |--- value: [560.00]
|   |   |   |   |   |   |   |   |--- feature_1 >  11.50
|   |   |   |   |   |   |   |   |   |--- value: [538.00]
|   |   |   |   |--- feature_6 >  0.37
|   |   |   |   |   |--- feature_9 <= 0.24
|   |   |   |   |   |   |--- feature_9 <= 0.15
|   |   |   |   |   |   |   |--- feature_8 <= 0.67
|   |   |   |   |   |   |   |   |--- feature_1 <= 10.50
|   |   |   |   |   |   |   |   |   |--- value: [2252.00]
|   |   |   |   |   |   |   |   |--- feature_1 >  10.50
|   |   |   |   |   |   |   |   |   |--- value: [2290.00]
|   |   |   |   |   |   |   |--- feature_8 >  0.67
|   |   |   |   |   |   |   |   |--- feature_1 <= 10.50
|   |   |   |   |   |   |   |   |   |--- value: [1619.00]
|   |   |   |   |   |   |   |   |--- feature_1 >  10.50
|   |   |   |   |   |   |   |   |   |--- feature_1 <= 11.50
|   |   |   |   |   |   |   |   |   |   |--- value: [1249.00]
|   |   |   |   |   |   |   |   |   |--- feature_1 >  11.50
|   |   |   |   |   |   |   |   |   |   |--- value: [1153.00]
|   |   |   |   |   |   |--- feature_9 >  0.15
|   |   |   |   |   |   |   |--- feature_8 <= 0.51
|   |   |   |   |   |   |   |   |--- value: [1651.00]
|   |   |   |   |   |   |   |--- feature_8 >  0.51
|   |   |   |   |   |   |   |   |--- feature_9 <= 0.20
|   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.42
|   |   |   |   |   |   |   |   |   |   |--- feature_1 <= 2.00
|   |   |   |   |   |   |   |   |   |   |   |--- value: [1070.00]
|   |   |   |   |   |   |   |   |   |--- feature_1 >  2.00
|   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |--- feature_6 >  0.42
|   |   |   |   |   |   |   |   |   |--- value: [1188.00]
|   |   |   |   |   |   |   |--- feature_9 >  0.20
|   |   |   |   |   |   |   |   |--- feature_6 <= 0.43
|   |   |   |   |   |   |   |   |   |--- value: [665.00]
```

```
|   |   |   |   |   |   |   |   |   |--- feature_6 >  0.43
|   |   |   |   |   |   |   |   |   |   |--- value: [642.00]
|   |   |   |   |   |--- feature_9 >  0.24
|   |   |   |   |   |   |--- value: [2301.00]
|   |   |   |--- feature_9 >  0.25
|   |   |   |   |--- feature_9 <= 0.32
|   |   |   |   |   |--- feature_1 <= 2.50
|   |   |   |   |   |   |--- value: [397.00]
|   |   |   |   |   |--- feature_1 >  2.50
|   |   |   |   |   |   |--- feature_8 <= 0.64
|   |   |   |   |   |   |   |--- value: [982.00]
|   |   |   |   |   |   |--- feature_8 >  0.64
|   |   |   |   |   |   |   |--- feature_7 <= 0.40
|   |   |   |   |   |   |   |   |--- value: [640.00]
|   |   |   |   |   |   |   |--- feature_7 >  0.40
|   |   |   |   |   |   |   |   |--- value: [480.00]
|   |   |   |   |--- feature_9 >  0.32
|   |   |   |   |   |--- feature_7 <= 0.41
|   |   |   |   |   |   |--- value: [120.00]
|   |   |   |   |   |--- feature_7 >  0.41
|   |   |   |   |   |   |--- value: [121.00]
|   |--- feature_4 >  0.50
|   |   |--- feature_6 <= 0.34
|   |   |   |--- feature_1 <= 2.50
|   |   |   |   |--- feature_7 <= 0.29
|   |   |   |   |   |--- feature_7 <= 0.19
|   |   |   |   |   |   |--- feature_7 <= 0.14
|   |   |   |   |   |   |   |--- feature_8 <= 0.43
|   |   |   |   |   |   |   |   |--- value: [95.00]
|   |   |   |   |   |   |   |--- feature_8 >  0.43
|   |   |   |   |   |   |   |   |--- feature_3 <= 1.50
|   |   |   |   |   |   |   |   |   |--- value: [86.00]
|   |   |   |   |   |   |   |   |--- feature_3 >  1.50
|   |   |   |   |   |   |   |   |   |--- value: [89.00]
|   |   |   |   |   |   |--- feature_7 >  0.14
|   |   |   |   |   |   |   |--- feature_8 <= 0.46
|   |   |   |   |   |   |   |   |--- feature_9 <= 0.32
|   |   |   |   |   |   |   |   |   |--- value: [61.00]
|   |   |   |   |   |   |   |   |--- feature_9 >  0.32
|   |   |   |   |   |   |   |   |   |--- value: [75.00]
|   |   |   |   |   |   |   |--- feature_8 >  0.46
|   |   |   |   |   |   |   |   |--- feature_9 <= 0.30
|   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.21
|   |   |   |   |   |   |   |   |   |   |--- feature_3 <= 2.00
|   |   |   |   |   |   |   |   |   |   |   |--- value: [42.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_3 >  2.00
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.21
|   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.16
|   |   |   |   |   |   |   |   |   |   |   |--- value: [41.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_6 >  0.16
|   |   |   |   |   |   |   |   |   |   |   |--- value: [38.00]
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.30
|   |   |   |   |   |   |   |   |   |   |--- value: [25.00]
|   |   |   |   |   |--- feature_7 >  0.19
|   |   |   |   |   |   |--- feature_3 <= 4.50
|   |   |   |   |   |   |   |--- feature_9 <= 0.26
|   |   |   |   |   |   |   |   |--- feature_3 <= 2.50
|   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.60
|   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.19
```

```
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.19
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |--- feature_8 >  0.60
|   |   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.66
|   |   |   |   |   |   |   |   |   |   |   |--- value: [186.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_8 >  0.66
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |--- feature_3 >  2.50
|   |   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.51
|   |   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.22
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |   |   |--- feature_6 >  0.22
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [82.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_8 >  0.51
|   |   |   |   |   |   |   |   |   |   |   |--- feature_7 <= 0.23
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [15.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_7 >  0.23
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 4
|   |   |   |   |   |   |   |   |--- feature_9 >  0.26
|   |   |   |   |   |   |   |   |   |--- feature_5 <= 2.50
|   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.31
|   |   |   |   |   |   |   |   |   |   |   |--- value: [72.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.31
|   |   |   |   |   |   |   |   |   |   |   |--- value: [64.00]
|   |   |   |   |   |   |   |   |   |--- feature_5 >  2.50
|   |   |   |   |   |   |   |   |   |   |--- value: [34.00]
|   |   |   |   |   |   |   |--- feature_3 >  4.50
|   |   |   |   |   |   |   |   |--- feature_8 <= 0.47
|   |   |   |   |   |   |   |   |   |--- value: [115.00]
|   |   |   |   |   |   |   |   |--- feature_8 >  0.47
|   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.27
|   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.14
|   |   |   |   |   |   |   |   |   |   |   |--- value: [149.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.14
|   |   |   |   |   |   |   |   |   |   |   |--- value: [148.00]
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.27
|   |   |   |   |   |   |   |   |   |   |--- value: [174.00]
|   |   |   |   |--- feature_7 >  0.29
|   |   |   |   |   |--- feature_3 <= 4.50
|   |   |   |   |   |   |--- feature_5 <= 1.50
|   |   |   |   |   |   |   |--- feature_6 <= 0.31
|   |   |   |   |   |   |   |   |--- feature_6 <= 0.29
|   |   |   |   |   |   |   |   |   |--- value: [206.00]
|   |   |   |   |   |   |   |   |--- feature_6 >  0.29
|   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.20
|   |   |   |   |   |   |   |   |   |   |--- value: [173.00]
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.20
|   |   |   |   |   |   |   |   |   |   |--- value: [163.00]
|   |   |   |   |   |   |   |   |--- feature_6 >  0.31
|   |   |   |   |   |   |   |   |   |--- value: [218.00]
|   |   |   |   |   |   |   |--- feature_5 >  1.50
|   |   |   |   |   |   |   |   |--- feature_7 <= 0.33
|   |   |   |   |   |   |   |   |   |--- value: [74.00]
|   |   |   |   |   |   |   |   |--- feature_7 >  0.33
|   |   |   |   |   |   |   |   |   |--- value: [135.00]
|   |   |   |   |   |--- feature_3 >  4.50
|   |   |   |   |   |   |--- feature_5 <= 1.50
|   |   |   |   |   |   |   |--- feature_6 <= 0.32
|   |   |   |   |   |   |   |   |--- value: [310.00]
```

```
|   |   |   |   |   |   |   |--- feature_6 >  0.32
|   |   |   |   |   |   |   |   |--- value: [307.00]
|   |   |   |   |   |   |   |--- feature_5 >  1.50
|   |   |   |   |   |   |   |   |--- value: [227.00]
|   |   |   |--- feature_1 >  2.50
|   |   |   |   |--- feature_9 <= 0.20
|   |   |   |   |   |--- feature_9 <= 0.12
|   |   |   |   |   |   |--- feature_9 <= 0.06
|   |   |   |   |   |   |   |--- feature_7 <= 0.33
|   |   |   |   |   |   |   |   |--- value: [362.00]
|   |   |   |   |   |   |   |--- feature_7 >  0.33
|   |   |   |   |   |   |   |   |--- value: [337.00]
|   |   |   |   |   |   |--- feature_9 >  0.06
|   |   |   |   |   |   |   |--- feature_3 <= 3.50
|   |   |   |   |   |   |   |   |--- feature_5 <= 1.50
|   |   |   |   |   |   |   |   |   |--- value: [143.00]
|   |   |   |   |   |   |   |   |--- feature_5 >  1.50
|   |   |   |   |   |   |   |   |   |--- feature_3 <= 2.00
|   |   |   |   |   |   |   |   |   |   |--- value: [174.00]
|   |   |   |   |   |   |   |   |   |--- feature_3 >  2.00
|   |   |   |   |   |   |   |   |   |   |--- value: [178.00]
|   |   |   |   |   |   |   |--- feature_3 >  3.50
|   |   |   |   |   |   |   |   |--- feature_3 <= 4.50
|   |   |   |   |   |   |   |   |   |--- feature_7 <= 0.28
|   |   |   |   |   |   |   |   |   |   |--- value: [254.00]
|   |   |   |   |   |   |   |   |   |--- feature_7 >  0.28
|   |   |   |   |   |   |   |   |   |   |--- value: [243.00]
|   |   |   |   |   |   |   |   |--- feature_3 >  4.50
|   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.30
|   |   |   |   |   |   |   |   |   |   |--- value: [261.00]
|   |   |   |   |   |   |   |   |   |--- feature_6 >  0.30
|   |   |   |   |   |   |   |   |   |   |--- value: [268.00]
|   |   |   |   |   |--- feature_9 >  0.12
|   |   |   |   |   |   |--- feature_8 <= 0.64
|   |   |   |   |   |   |   |--- feature_8 <= 0.45
|   |   |   |   |   |   |   |   |--- feature_9 <= 0.14
|   |   |   |   |   |   |   |   |   |--- value: [316.00]
|   |   |   |   |   |   |   |   |--- feature_9 >  0.14
|   |   |   |   |   |   |   |   |   |--- value: [245.00]
|   |   |   |   |   |   |   |--- feature_8 >  0.45
|   |   |   |   |   |   |   |   |--- feature_9 <= 0.14
|   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.64
|   |   |   |   |   |   |   |   |   |   |--- value: [491.00]
|   |   |   |   |   |   |   |   |   |--- feature_8 >  0.64
|   |   |   |   |   |   |   |   |   |   |--- value: [429.00]
|   |   |   |   |   |   |   |   |--- feature_9 >  0.14
|   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.30
|   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.17
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 3
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.17
|   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |--- feature_6 >  0.30
|   |   |   |   |   |   |   |   |   |   |--- feature_0 <= 2.50
|   |   |   |   |   |   |   |   |   |   |   |--- value: [359.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_0 >  2.50
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 3
|   |   |   |   |   |   |--- feature_8 >  0.64
|   |   |   |   |   |   |   |--- feature_7 <= 0.31
|   |   |   |   |   |   |   |   |--- value: [168.00]
|   |   |   |   |   |   |   |--- feature_7 >  0.31
```

```
|   |   |   |   |   |   |   |   |--- feature_9 <= 0.13
|   |   |   |   |   |   |   |   |   |--- value: [349.00]
|   |   |   |   |   |   |   |   |--- feature_9 >  0.13
|   |   |   |   |   |   |   |   |   |--- feature_1 <= 7.50
|   |   |   |   |   |   |   |   |   |   |--- value: [289.00]
|   |   |   |   |   |   |   |   |   |--- feature_1 >  7.50
|   |   |   |   |   |   |   |   |   |   |--- value: [314.00]
|   |   |   |   |--- feature_9 >  0.20
|   |   |   |   |   |--- feature_8 <= 0.78
|   |   |   |   |   |   |--- feature_9 <= 0.23
|   |   |   |   |   |   |   |--- feature_9 <= 0.21
|   |   |   |   |   |   |   |   |--- feature_0 <= 3.00
|   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.21
|   |   |   |   |   |   |   |   |   |   |--- value: [221.00]
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.21
|   |   |   |   |   |   |   |   |   |   |--- value: [222.00]
|   |   |   |   |   |   |   |   |--- feature_0 >  3.00
|   |   |   |   |   |   |   |   |   |--- value: [198.00]
|   |   |   |   |   |   |   |--- feature_9 >  0.21
|   |   |   |   |   |   |   |   |--- feature_5 <= 1.50
|   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.23
|   |   |   |   |   |   |   |   |   |   |--- value: [123.00]
|   |   |   |   |   |   |   |   |   |--- feature_6 >  0.23
|   |   |   |   |   |   |   |   |   |   |--- value: [137.00]
|   |   |   |   |   |   |   |   |--- feature_5 >  1.50
|   |   |   |   |   |   |   |   |   |--- feature_1 <= 3.50
|   |   |   |   |   |   |   |   |   |   |--- value: [191.00]
|   |   |   |   |   |   |   |   |   |--- feature_1 >  3.50
|   |   |   |   |   |   |   |   |   |   |--- value: [177.00]
|   |   |   |   |   |   |   |--- feature_9 >  0.23
|   |   |   |   |   |   |   |   |--- feature_3 <= 4.50
|   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.56
|   |   |   |   |   |   |   |   |   |   |--- feature_0 <= 1.50
|   |   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.26
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [203.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.26
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 3
|   |   |   |   |   |   |   |   |   |   |--- feature_0 >  1.50
|   |   |   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.43
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [317.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_8 >  0.43
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [326.00]
|   |   |   |   |   |   |   |   |   |--- feature_8 >  0.56
|   |   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.62
|   |   |   |   |   |   |   |   |   |   |   |--- feature_1 <= 11.50
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [139.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_1 >  11.50
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [150.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_8 >  0.62
|   |   |   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.71
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [247.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_8 >  0.71
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [195.00]
|   |   |   |   |   |   |   |   |--- feature_3 >  4.50
|   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.23
|   |   |   |   |   |   |   |   |   |   |--- value: [456.00]
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.23
|   |   |   |   |   |   |   |   |   |   |--- feature_0 <= 1.50
|   |   |   |   |   |   |   |   |   |   |   |--- value: [247.00]
|   |   |   |   |   |   |   |   |   |--- feature_0 >  1.50
```

```
|   |   |   |   |   |   |   |   |   |   |--- feature_5 <= 1.50
|   |   |   |   |   |   |   |   |   |   |   |--- value: [300.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_5 >  1.50
|   |   |   |   |   |   |   |   |   |   |   |--- value: [307.00]
|   |   |   |   |   |--- feature_8 >  0.78
|   |   |   |   |   |   |--- feature_6 <= 0.26
|   |   |   |   |   |   |   |--- value: [9.00]
|   |   |   |   |   |   |--- feature_6 >  0.26
|   |   |   |   |   |   |   |--- feature_7 <= 0.28
|   |   |   |   |   |   |   |   |--- feature_5 <= 2.50
|   |   |   |   |   |   |   |   |   |--- value: [166.00]
|   |   |   |   |   |   |   |   |--- feature_5 >  2.50
|   |   |   |   |   |   |   |   |   |--- value: [179.00]
|   |   |   |   |   |   |   |--- feature_7 >  0.28
|   |   |   |   |   |   |   |   |--- feature_8 <= 0.81
|   |   |   |   |   |   |   |   |   |--- value: [123.00]
|   |   |   |   |   |   |   |   |--- feature_8 >  0.81
|   |   |   |   |   |   |   |   |   |--- value: [87.00]
|   |   |   |--- feature_6 >  0.34
|   |   |   |   |--- feature_3 <= 4.50
|   |   |   |   |   |--- feature_8 <= 0.48
|   |   |   |   |   |   |--- feature_6 <= 0.42
|   |   |   |   |   |   |   |--- feature_8 <= 0.44
|   |   |   |   |   |   |   |   |--- feature_9 <= 0.38
|   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.23
|   |   |   |   |   |   |   |   |   |   |--- value: [229.00]
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.23
|   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.30
|   |   |   |   |   |   |   |   |   |   |   |--- value: [324.00]
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.30
|   |   |   |   |   |   |   |   |   |   |--- value: [340.00]
|   |   |   |   |   |   |   |   |--- feature_9 >  0.38
|   |   |   |   |   |   |   |   |   |--- value: [208.00]
|   |   |   |   |   |   |   |--- feature_8 >  0.44
|   |   |   |   |   |   |   |   |--- feature_3 <= 3.50
|   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.47
|   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.38
|   |   |   |   |   |   |   |   |   |   |   |--- value: [482.00]
|   |   |   |   |   |   |   |   |   |--- feature_6 >  0.38
|   |   |   |   |   |   |   |   |   |   |--- value: [518.00]
|   |   |   |   |   |   |   |   |--- feature_8 >  0.47
|   |   |   |   |   |   |   |   |   |--- value: [413.00]
|   |   |   |   |   |   |   |   |--- feature_3 >  3.50
|   |   |   |   |   |   |   |   |   |--- value: [663.00]
|   |   |   |   |   |   |--- feature_6 >  0.42
|   |   |   |   |   |   |   |--- feature_7 <= 0.43
|   |   |   |   |   |   |   |   |--- value: [1192.00]
|   |   |   |   |   |   |   |--- feature_7 >  0.43
|   |   |   |   |   |   |   |   |--- feature_7 <= 0.44
|   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.45
|   |   |   |   |   |   |   |   |   |   |--- value: [819.00]
|   |   |   |   |   |   |   |   |   |--- feature_8 >  0.45
|   |   |   |   |   |   |   |   |   |   |--- value: [834.00]
|   |   |   |   |   |   |   |   |--- feature_7 >  0.44
|   |   |   |   |   |   |   |   |   |--- value: [795.00]
|   |   |   |   |   |--- feature_8 >  0.48
|   |   |   |   |   |   |--- feature_5 <= 1.50
|   |   |   |   |   |   |   |--- feature_8 <= 0.55
|   |   |   |   |   |   |   |   |--- feature_1 <= 2.50
|   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.36
```

```
|   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.35
|   |   |   |   |   |   |   |   |   |   |--- value: [141.00]
|   |   |   |   |   |   |   |   |   |--- feature_6 >  0.35
|   |   |   |   |   |   |   |   |   |   |--- value: [199.00]
|   |   |   |   |   |   |   |   |--- feature_6 >  0.36
|   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.25
|   |   |   |   |   |   |   |   |   |   |--- value: [259.00]
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.25
|   |   |   |   |   |   |   |   |   |   |--- value: [253.00]
|   |   |   |   |   |   |   |   |--- feature_1 >  2.50
|   |   |   |   |   |   |   |   |   |--- feature_7 <= 0.41
|   |   |   |   |   |   |   |   |   |   |--- value: [432.00]
|   |   |   |   |   |   |   |   |   |--- feature_7 >  0.41
|   |   |   |   |   |   |   |   |   |   |--- value: [331.00]
|   |   |   |   |   |   |   |--- feature_8 >  0.55
|   |   |   |   |   |   |   |   |--- feature_8 <= 0.65
|   |   |   |   |   |   |   |   |   |--- feature_1 <= 3.50
|   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.42
|   |   |   |   |   |   |   |   |   |   |   |--- value: [394.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_6 >  0.42
|   |   |   |   |   |   |   |   |   |   |   |--- value: [460.00]
|   |   |   |   |   |   |   |   |   |--- feature_1 >  3.50
|   |   |   |   |   |   |   |   |   |   |--- feature_1 <= 7.50
|   |   |   |   |   |   |   |   |   |   |   |--- value: [571.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_1 >  7.50
|   |   |   |   |   |   |   |   |   |   |   |--- value: [615.00]
|   |   |   |   |   |   |   |   |--- feature_8 >  0.65
|   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.10
|   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.07
|   |   |   |   |   |   |   |   |   |   |   |--- value: [305.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.07
|   |   |   |   |   |   |   |   |   |   |   |--- feature_7 <= 0.40
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [370.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_7 >  0.40
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [376.00]
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.10
|   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.37
|   |   |   |   |   |   |   |   |   |   |   |--- value: [439.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_6 >  0.37
|   |   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.41
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [410.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_6 >  0.41
|   |   |   |   |   |   |   |   |   |   |   |--- value: [433.00]
|   |   |   |   |   |--- feature_5 >  1.50
|   |   |   |   |   |   |--- feature_7 <= 0.39
|   |   |   |   |   |   |   |--- feature_9 <= 0.17
|   |   |   |   |   |   |   |   |--- feature_3 <= 1.50
|   |   |   |   |   |   |   |   |   |--- value: [330.00]
|   |   |   |   |   |   |   |   |--- feature_3 >  1.50
|   |   |   |   |   |   |   |   |   |--- feature_3 <= 3.00
|   |   |   |   |   |   |   |   |   |   |--- value: [534.00]
|   |   |   |   |   |   |   |   |   |--- feature_3 >  3.00
|   |   |   |   |   |   |   |   |   |   |--- value: [466.00]
|   |   |   |   |   |   |   |--- feature_9 >  0.17
|   |   |   |   |   |   |   |   |--- feature_9 <= 0.35
|   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.82
|   |   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.79
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 3
|   |   |   |   |   |   |   |   |   |--- feature_8 >  0.79
|   |   |   |   |   |   |   |   |   |   |--- value: [269.00]
```

```
|   |   |   |   |   |   |   |   |   |--- feature_8 >  0.82
|   |   |   |   |   |   |   |   |   |   |--- value: [203.00]
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.35
|   |   |   |   |   |   |   |   |   |--- value: [127.00]
|   |   |   |   |   |   |   |--- feature_7 >  0.39
|   |   |   |   |   |   |   |   |--- feature_9 <= 0.26
|   |   |   |   |   |   |   |   |   |--- feature_1 <= 3.00
|   |   |   |   |   |   |   |   |   |   |--- value: [190.00]
|   |   |   |   |   |   |   |   |   |--- feature_1 >  3.00
|   |   |   |   |   |   |   |   |   |   |--- feature_7 <= 0.40
|   |   |   |   |   |   |   |   |   |   |   |--- value: [233.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_7 >  0.40
|   |   |   |   |   |   |   |   |   |   |   |--- feature_7 <= 0.42
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 3
|   |   |   |   |   |   |   |   |   |   |   |--- feature_7 >  0.42
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |--- feature_9 >  0.26
|   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.75
|   |   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.69
|   |   |   |   |   |   |   |   |   |   |   |--- feature_1 <= 8.00
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [167.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_1 >  8.00
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [181.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_8 >  0.69
|   |   |   |   |   |   |   |   |   |   |   |--- value: [255.00]
|   |   |   |   |   |   |   |   |   |--- feature_8 >  0.75
|   |   |   |   |   |   |   |   |   |   |--- feature_5 <= 2.50
|   |   |   |   |   |   |   |   |   |   |   |--- feature_3 <= 2.00
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [81.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_3 >  2.00
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [112.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_5 >  2.50
|   |   |   |   |   |   |   |   |   |   |   |--- feature_1 <= 11.00
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [2.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_1 >  11.00
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [50.00]
|   |   |   |   |--- feature_3 >  4.50
|   |   |   |   |   |--- feature_8 <= 0.39
|   |   |   |   |   |   |--- value: [1807.00]
|   |   |   |   |   |--- feature_8 >  0.39
|   |   |   |   |   |   |--- feature_5 <= 1.50
|   |   |   |   |   |   |   |--- feature_9 <= 0.16
|   |   |   |   |   |   |   |   |--- feature_7 <= 0.38
|   |   |   |   |   |   |   |   |   |--- value: [1603.00]
|   |   |   |   |   |   |   |   |--- feature_7 >  0.38
|   |   |   |   |   |   |   |   |   |--- value: [1095.00]
|   |   |   |   |   |   |   |--- feature_9 >  0.16
|   |   |   |   |   |   |   |   |--- feature_7 <= 0.35
|   |   |   |   |   |   |   |   |   |--- value: [484.00]
|   |   |   |   |   |   |   |   |--- feature_7 >  0.35
|   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.53
|   |   |   |   |   |   |   |   |   |   |--- value: [618.00]
|   |   |   |   |   |   |   |   |   |--- feature_8 >  0.53
|   |   |   |   |   |   |   |   |   |   |--- value: [709.00]
|   |   |   |   |   |   |--- feature_5 >  1.50
|   |   |   |   |   |   |   |--- feature_7 <= 0.37
|   |   |   |   |   |   |   |   |--- feature_7 <= 0.36
|   |   |   |   |   |   |   |   |   |--- value: [178.00]
|   |   |   |   |   |   |   |   |--- feature_7 >  0.36
|   |   |   |   |   |   |   |   |   |--- value: [246.00]
```

```
|   |   |   |   |   |   |--- feature_7 >  0.37
|   |   |   |   |   |   |   |--- feature_7 <= 0.39
|   |   |   |   |   |   |   |   |--- value: [796.00]
|   |   |   |   |   |   |   |--- feature_7 >  0.39
|   |   |   |   |   |   |   |   |--- feature_8 <= 0.73
|   |   |   |   |   |   |   |   |   |--- feature_1 <= 7.00
|   |   |   |   |   |   |   |   |   |   |--- value: [447.00]
|   |   |   |   |   |   |   |   |   |--- feature_1 >  7.00
|   |   |   |   |   |   |   |   |   |   |--- value: [470.00]
|   |   |   |   |   |   |   |   |--- feature_8 >  0.73
|   |   |   |   |   |   |   |   |   |--- value: [548.00]
|--- feature_6 >  0.45
|   |--- feature_4 <= 0.50
|   |   |--- feature_8 <= 0.83
|   |   |   |--- feature_1 <= 10.50
|   |   |   |   |--- feature_9 <= 0.28
|   |   |   |   |   |--- feature_6 <= 0.81
|   |   |   |   |   |   |--- feature_8 <= 0.67
|   |   |   |   |   |   |   |--- feature_9 <= 0.09
|   |   |   |   |   |   |   |   |--- value: [3065.00]
|   |   |   |   |   |   |   |--- feature_9 >  0.09
|   |   |   |   |   |   |   |   |--- feature_8 <= 0.66
|   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.15
|   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.14
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 8
|   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.14
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 3
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.15
|   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.16
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 4
|   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.16
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 10
|   |   |   |   |   |   |   |   |--- feature_8 >  0.66
|   |   |   |   |   |   |   |   |   |--- value: [3031.00]
|   |   |   |   |   |   |--- feature_8 >  0.67
|   |   |   |   |   |   |   |--- feature_7 <= 0.67
|   |   |   |   |   |   |   |   |--- feature_7 <= 0.50
|   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.79
|   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.47
|   |   |   |   |   |   |   |   |   |   |   |--- value: [1138.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_6 >  0.47
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |--- feature_8 >  0.79
|   |   |   |   |   |   |   |   |   |   |--- value: [2207.00]
|   |   |   |   |   |   |   |   |--- feature_7 >  0.50
|   |   |   |   |   |   |   |   |   |--- feature_7 <= 0.51
|   |   |   |   |   |   |   |   |   |   |--- value: [3155.00]
|   |   |   |   |   |   |   |   |   |--- feature_7 >  0.51
|   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.69
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 7
|   |   |   |   |   |   |   |   |   |--- feature_6 >  0.69
|   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 6
|   |   |   |   |   |   |   |--- feature_7 >  0.67
|   |   |   |   |   |   |   |   |--- feature_6 <= 0.74
|   |   |   |   |   |   |   |   |   |--- feature_3 <= 0.50
|   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.73
|   |   |   |   |   |   |   |   |   |   |   |--- value: [1249.00]
|   |   |   |   |   |   |   |   |   |--- feature_6 >  0.73
|   |   |   |   |   |   |   |   |   |   |--- value: [1298.00]
|   |   |   |   |   |   |   |   |--- feature_3 >  0.50
```

```
|   |   |   |   |   |   |   |   |   |   |--- feature_1 <= 6.50
|   |   |   |   |   |   |   |   |   |   |   |--- value: [1549.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_1 >  6.50
|   |   |   |   |   |   |   |   |   |   |   |--- value: [1521.00]
|   |   |   |   |   |   |   |   |   |--- feature_6 >  0.74
|   |   |   |   |   |   |   |   |   |   |--- value: [1920.00]
|   |   |   |   |   |--- feature_6 >  0.81
|   |   |   |   |   |   |--- feature_6 <= 0.84
|   |   |   |   |   |   |   |--- value: [1203.00]
|   |   |   |   |   |   |--- feature_6 >  0.84
|   |   |   |   |   |   |   |--- value: [987.00]
|   |   |   |   |--- feature_9 >  0.28
|   |   |   |   |   |--- feature_6 <= 0.47
|   |   |   |   |   |   |--- value: [1558.00]
|   |   |   |   |   |--- feature_6 >  0.47
|   |   |   |   |   |   |--- feature_6 <= 0.57
|   |   |   |   |   |   |   |--- value: [998.00]
|   |   |   |   |   |   |--- feature_6 >  0.57
|   |   |   |   |   |   |   |--- value: [1198.00]
|   |   |   |--- feature_1 >  10.50
|   |   |   |   |--- feature_8 <= 0.71
|   |   |   |   |   |--- value: [787.00]
|   |   |   |   |--- feature_8 >  0.71
|   |   |   |   |   |--- value: [1097.00]
|   |   |--- feature_8 >  0.83
|   |   |   |--- feature_9 <= 0.30
|   |   |   |   |--- feature_3 <= 3.00
|   |   |   |   |   |--- feature_6 <= 0.61
|   |   |   |   |   |   |--- value: [1582.00]
|   |   |   |   |   |--- feature_6 >  0.61
|   |   |   |   |   |   |--- value: [1483.00]
|   |   |   |   |--- feature_3 >  3.00
|   |   |   |   |   |--- feature_6 <= 0.48
|   |   |   |   |   |   |--- value: [1462.00]
|   |   |   |   |   |--- feature_6 >  0.48
|   |   |   |   |   |   |--- feature_1 <= 4.00
|   |   |   |   |   |   |   |--- value: [1033.00]
|   |   |   |   |   |   |--- feature_1 >  4.00
|   |   |   |   |   |   |   |--- value: [902.00]
|   |   |   |--- feature_9 >  0.30
|   |   |   |   |--- value: [226.00]
|   |--- feature_4 >  0.50
|   |   |--- feature_8 <= 0.83
|   |   |   |--- feature_3 <= 4.50
|   |   |   |   |--- feature_7 <= 0.53
|   |   |   |   |   |--- feature_9 <= 0.10
|   |   |   |   |   |   |--- feature_8 <= 0.48
|   |   |   |   |   |   |   |--- value: [1348.00]
|   |   |   |   |   |   |--- feature_8 >  0.48
|   |   |   |   |   |   |   |--- feature_8 <= 0.74
|   |   |   |   |   |   |   |   |--- feature_7 <= 0.50
|   |   |   |   |   |   |   |   |   |--- feature_3 <= 2.50
|   |   |   |   |   |   |   |   |   |   |--- value: [830.00]
|   |   |   |   |   |   |   |   |   |--- feature_3 >  2.50
|   |   |   |   |   |   |   |   |   |   |--- value: [846.00]
|   |   |   |   |   |   |   |   |--- feature_7 >  0.50
|   |   |   |   |   |   |   |   |   |--- value: [763.00]
|   |   |   |   |   |   |   |--- feature_8 >  0.74
|   |   |   |   |   |   |   |   |--- value: [1122.00]
|   |   |   |   |   |--- feature_9 >  0.10
```

```
|   |   |   |   |   |   |--- feature_9 <= 0.23
|   |   |   |   |   |   |   |--- feature_3 <= 2.50
|   |   |   |   |   |   |   |   |--- feature_8 <= 0.64
|   |   |   |   |   |   |   |   |   |--- feature_7 <= 0.46
|   |   |   |   |   |   |   |   |   |   |--- feature_1 <= 6.50
|   |   |   |   |   |   |   |   |   |   |   |--- value: [838.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_1 >  6.50
|   |   |   |   |   |   |   |   |   |   |   |--- value: [922.00]
|   |   |   |   |   |   |   |   |   |--- feature_7 >  0.46
|   |   |   |   |   |   |   |   |   |   |--- feature_0 <= 3.00
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 3
|   |   |   |   |   |   |   |   |   |   |--- feature_0 >  3.00
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |--- feature_8 >  0.64
|   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.14
|   |   |   |   |   |   |   |   |   |   |--- feature_7 <= 0.49
|   |   |   |   |   |   |   |   |   |   |   |--- value: [699.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_7 >  0.49
|   |   |   |   |   |   |   |   |   |   |   |--- value: [637.00]
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.14
|   |   |   |   |   |   |   |   |   |   |--- feature_0 <= 3.00
|   |   |   |   |   |   |   |   |   |   |   |--- value: [409.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_0 >  3.00
|   |   |   |   |   |   |   |   |   |   |   |--- value: [486.00]
|   |   |   |   |   |   |   |   |--- feature_3 >  2.50
|   |   |   |   |   |   |   |   |   |--- feature_7 <= 0.50
|   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.13
|   |   |   |   |   |   |   |   |   |   |   |--- value: [655.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.13
|   |   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.46
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [516.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_6 >  0.46
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 4
|   |   |   |   |   |   |   |   |   |--- feature_7 >  0.50
|   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.54
|   |   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.53
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [735.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_6 >  0.53
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [695.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_6 >  0.54
|   |   |   |   |   |   |   |   |   |   |   |--- feature_0 <= 3.00
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [550.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_0 >  3.00
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [559.00]
|   |   |   |   |   |   |   |--- feature_9 >  0.23
|   |   |   |   |   |   |   |   |--- feature_7 <= 0.47
|   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.47
|   |   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.43
|   |   |   |   |   |   |   |   |   |   |   |--- value: [745.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_8 >  0.43
|   |   |   |   |   |   |   |   |   |   |   |--- value: [614.00]
|   |   |   |   |   |   |   |   |   |--- feature_6 >  0.47
|   |   |   |   |   |   |   |   |   |   |--- value: [471.00]
|   |   |   |   |   |   |   |   |--- feature_7 >  0.47
|   |   |   |   |   |   |   |   |   |--- feature_5 <= 1.50
|   |   |   |   |   |   |   |   |   |   |--- feature_3 <= 2.50
|   |   |   |   |   |   |   |   |   |   |   |--- value: [905.00]
|   |   |   |   |   |   |   |   |   |--- feature_3 >  2.50
|   |   |   |   |   |   |   |   |   |   |--- value: [834.00]
|   |   |   |   |   |   |   |   |   |--- feature_5 >  1.50
```

```
|   |   |   |   |   |   |   |   |   |--- value: [1008.00]
|   |   |   |   |--- feature_7 >  0.53
|   |   |   |   |   |--- feature_9 <= 0.13
|   |   |   |   |   |   |--- feature_7 <= 0.72
|   |   |   |   |   |   |   |--- feature_6 <= 0.68
|   |   |   |   |   |   |   |   |--- feature_8 <= 0.82
|   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.09
|   |   |   |   |   |   |   |   |   |   |--- feature_7 <= 0.59
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |   |--- feature_7 >  0.59
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.09
|   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.64
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 6
|   |   |   |   |   |   |   |   |   |   |--- feature_6 >  0.64
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 3
|   |   |   |   |   |   |   |   |   |--- feature_8 >  0.82
|   |   |   |   |   |   |   |   |   |   |--- value: [1334.00]
|   |   |   |   |   |   |   |   |--- feature_6 >  0.68
|   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.12
|   |   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.59
|   |   |   |   |   |   |   |   |   |   |   |--- value: [1177.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_8 >  0.59
|   |   |   |   |   |   |   |   |   |   |   |--- feature_5 <= 1.50
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [1363.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_5 >  1.50
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.12
|   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.13
|   |   |   |   |   |   |   |   |   |   |   |--- feature_3 <= 1.50
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [989.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_3 >  1.50
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.13
|   |   |   |   |   |   |   |   |   |   |   |--- value: [1233.00]
|   |   |   |   |   |   |   |--- feature_7 >  0.72
|   |   |   |   |   |   |   |   |--- feature_8 <= 0.61
|   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.12
|   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.11
|   |   |   |   |   |   |   |   |   |   |   |--- value: [872.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.11
|   |   |   |   |   |   |   |   |   |   |   |--- value: [921.00]
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.12
|   |   |   |   |   |   |   |   |   |   |--- value: [778.00]
|   |   |   |   |   |   |   |   |--- feature_8 >  0.61
|   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.70
|   |   |   |   |   |   |   |   |   |   |--- value: [673.00]
|   |   |   |   |   |   |   |   |   |--- feature_8 >  0.70
|   |   |   |   |   |   |   |   |   |   |--- value: [568.00]
|   |   |   |   |   |--- feature_9 >  0.13
|   |   |   |   |   |   |--- feature_8 <= 0.53
|   |   |   |   |   |   |   |--- feature_7 <= 0.73
|   |   |   |   |   |   |   |   |--- feature_9 <= 0.15
|   |   |   |   |   |   |   |   |   |--- value: [1281.00]
|   |   |   |   |   |   |   |   |--- feature_9 >  0.15
|   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.51
|   |   |   |   |   |   |   |   |   |   |--- feature_1 <= 6.50
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 6
|   |   |   |   |   |   |   |   |   |   |--- feature_1 >  6.50
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 4
```

```
|   |   |   |   |   |   |   |   |   |--- feature_8 >  0.51
|   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.65
|   |   |   |   |   |   |   |   |   |   |   |--- value: [1242.00]
|   |   |   |   |   |   |   |   |   |   |--- feature_6 >  0.65
|   |   |   |   |   |   |   |   |   |   |   |--- value: [1032.00]
|   |   |   |   |   |   |   |   |--- feature_7 >  0.73
|   |   |   |   |   |   |   |   |   |--- value: [1405.00]
|   |   |   |   |   |   |   |--- feature_8 >  0.53
|   |   |   |   |   |   |   |   |--- feature_5 <= 1.50
|   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.17
|   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.17
|   |   |   |   |   |   |   |   |   |   |   |--- feature_3 <= 3.50
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 7
|   |   |   |   |   |   |   |   |   |   |   |--- feature_3 >  3.50
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.17
|   |   |   |   |   |   |   |   |   |   |   |--- feature_3 <= 2.50
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [1128.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_3 >  2.50
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [1198.00]
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.17
|   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.78
|   |   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.72
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 7
|   |   |   |   |   |   |   |   |   |   |   |--- feature_6 >  0.72
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 5
|   |   |   |   |   |   |   |   |   |   |--- feature_6 >  0.78
|   |   |   |   |   |   |   |   |   |   |   |--- feature_7 <= 0.74
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [662.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_7 >  0.74
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [606.00]
|   |   |   |   |   |   |   |   |--- feature_5 >  1.50
|   |   |   |   |   |   |   |   |   |--- feature_3 <= 1.50
|   |   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.76
|   |   |   |   |   |   |   |   |   |   |   |--- feature_7 <= 0.55
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |   |   |--- feature_7 >  0.55
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 4
|   |   |   |   |   |   |   |   |   |   |--- feature_8 >  0.76
|   |   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.20
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [653.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.20
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [630.00]
|   |   |   |   |   |   |   |   |   |--- feature_3 >  1.50
|   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.19
|   |   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.15
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 5
|   |   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.15
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 3
|   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.19
|   |   |   |   |   |   |   |   |   |   |   |--- feature_1 <= 8.00
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 5
|   |   |   |   |   |   |   |   |   |   |   |--- feature_1 >  8.00
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [428.00]
|   |   |   |   |--- feature_3 >  4.50
|   |   |   |   |   |--- feature_1 <= 4.00
|   |   |   |   |   |   |--- value: [2469.00]
|   |   |   |   |   |--- feature_1 >  4.00
|   |   |   |   |   |   |--- feature_8 <= 0.72
|   |   |   |   |   |   |   |--- feature_9 <= 0.12
```

```
|   |   |   |   |   |   |   |--- feature_9 <= 0.08
|   |   |   |   |   |   |   |   |--- value: [1325.00]
|   |   |   |   |   |   |   |--- feature_9 >  0.08
|   |   |   |   |   |   |   |   |--- feature_8 <= 0.65
|   |   |   |   |   |   |   |   |   |--- feature_7 <= 0.62
|   |   |   |   |   |   |   |   |   |   |--- value: [1516.00]
|   |   |   |   |   |   |   |   |   |--- feature_7 >  0.62
|   |   |   |   |   |   |   |   |   |   |--- value: [1511.00]
|   |   |   |   |   |   |   |   |--- feature_8 >  0.65
|   |   |   |   |   |   |   |   |   |--- value: [1379.00]
|   |   |   |   |   |   |   |--- feature_9 >  0.12
|   |   |   |   |   |   |   |   |--- feature_7 <= 0.77
|   |   |   |   |   |   |   |   |   |--- feature_1 <= 6.50
|   |   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.52
|   |   |   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.36
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [898.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_8 >  0.36
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |   |--- feature_8 >  0.52
|   |   |   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.58
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |   |   |--- feature_8 >  0.58
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 3
|   |   |   |   |   |   |   |   |   |--- feature_1 >  6.50
|   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.72
|   |   |   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.69
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |   |   |--- feature_6 >  0.69
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 3
|   |   |   |   |   |   |   |   |   |   |--- feature_6 >  0.72
|   |   |   |   |   |   |   |   |   |   |   |--- feature_8 <= 0.51
|   |   |   |   |   |   |   |   |   |   |   |   |--- value: [1366.00]
|   |   |   |   |   |   |   |   |   |   |   |--- feature_8 >  0.51
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |--- feature_7 >  0.77
|   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.17
|   |   |   |   |   |   |   |   |   |   |--- value: [829.00]
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.17
|   |   |   |   |   |   |   |   |   |   |--- value: [670.00]
|   |   |   |   |   |   |--- feature_8 >  0.72
|   |   |   |   |   |   |   |--- feature_9 <= 0.20
|   |   |   |   |   |   |   |   |--- feature_1 <= 5.50
|   |   |   |   |   |   |   |   |   |--- feature_6 <= 0.61
|   |   |   |   |   |   |   |   |   |   |--- value: [909.00]
|   |   |   |   |   |   |   |   |   |--- feature_6 >  0.61
|   |   |   |   |   |   |   |   |   |   |--- value: [1417.00]
|   |   |   |   |   |   |   |   |--- feature_1 >  5.50
|   |   |   |   |   |   |   |   |   |--- feature_7 <= 0.53
|   |   |   |   |   |   |   |   |   |   |--- value: [1182.00]
|   |   |   |   |   |   |   |   |   |--- feature_7 >  0.53
|   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.16
|   |   |   |   |   |   |   |   |   |   |   |--- feature_9 <= 0.14
|   |   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |   |--- feature_9 >  0.14
|   |   |   |   |   |   |   |   |   |   |   |--- truncated branch of depth 2
|   |   |   |   |   |   |   |   |   |--- feature_9 >  0.16
|   |   |   |   |   |   |   |   |   |   |--- value: [1045.00]
|   |   |   |   |   |   |   |--- feature_9 >  0.20
|   |   |   |   |   |   |   |   |--- feature_7 <= 0.57
|   |   |   |   |   |   |   |   |   |--- value: [529.00]
```

```
|   |   |   |   |   |   |   |--- feature_7 >  0.57
|   |   |   |   |   |   |   |   |--- value: [533.00]
|   |   |--- feature_8 >  0.83
|   |   |   |--- feature_5 <= 2.50
|   |   |   |   |--- feature_9 <= 0.10
|   |   |   |   |   |--- value: [258.00]
|   |   |   |   |--- feature_9 >  0.10
|   |   |   |   |   |--- feature_1 <= 5.50
|   |   |   |   |   |   |--- feature_9 <= 0.19
|   |   |   |   |   |   |   |--- value: [692.00]
|   |   |   |   |   |   |--- feature_9 >  0.19
|   |   |   |   |   |   |   |--- feature_3 <= 2.50
|   |   |   |   |   |   |   |   |--- value: [678.00]
|   |   |   |   |   |   |   |--- feature_3 >  2.50
|   |   |   |   |   |   |   |   |--- feature_9 <= 0.26
|   |   |   |   |   |   |   |   |   |--- value: [536.00]
|   |   |   |   |   |   |   |   |--- feature_9 >  0.26
|   |   |   |   |   |   |   |   |   |--- value: [547.00]
|   |   |   |   |   |--- feature_1 >  5.50
|   |   |   |   |   |   |--- feature_3 <= 3.50
|   |   |   |   |   |   |   |--- feature_7 <= 0.55
|   |   |   |   |   |   |   |   |--- value: [438.00]
|   |   |   |   |   |   |   |--- feature_7 >  0.55
|   |   |   |   |   |   |   |   |--- feature_6 <= 0.64
|   |   |   |   |   |   |   |   |   |--- value: [480.00]
|   |   |   |   |   |   |   |   |--- feature_6 >  0.64
|   |   |   |   |   |   |   |   |   |--- value: [477.00]
|   |   |   |   |   |   |--- feature_3 >  3.50
|   |   |   |   |   |   |   |--- value: [555.00]
|   |   |   |--- feature_5 >  2.50
|   |   |   |   |--- feature_1 <= 11.00
|   |   |   |   |   |--- feature_9 <= 0.17
|   |   |   |   |   |   |--- value: [315.00]
|   |   |   |   |   |--- feature_9 >  0.17
|   |   |   |   |   |   |--- feature_7 <= 0.51
|   |   |   |   |   |   |   |--- value: [254.00]
|   |   |   |   |   |   |--- feature_7 >  0.51
|   |   |   |   |   |   |   |--- feature_8 <= 0.90
|   |   |   |   |   |   |   |   |--- value: [204.00]
|   |   |   |   |   |   |   |--- feature_8 >  0.90
|   |   |   |   |   |   |   |   |--- value: [217.00]
|   |   |   |   |--- feature_1 >  11.00
|   |   |   |   |   |--- value: [126.00]
```

Evaluar el modelo utilizando los datos de prueba

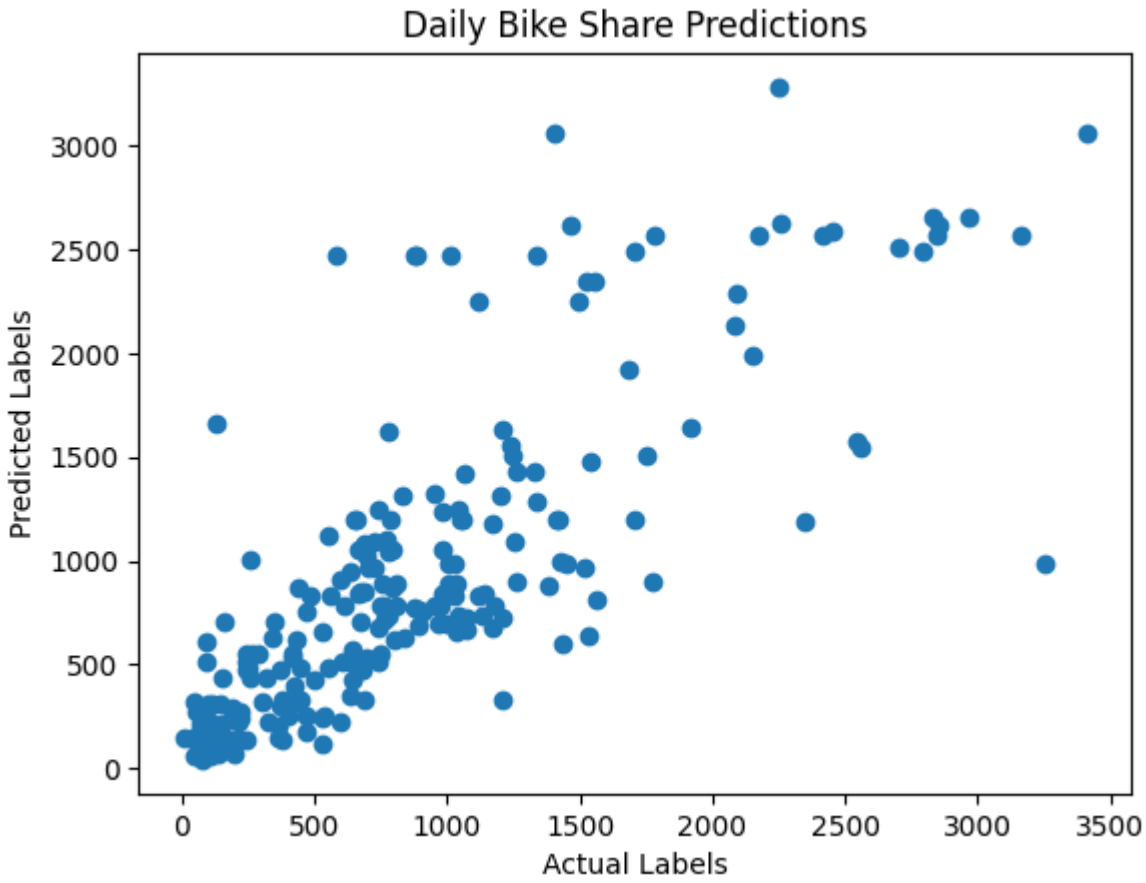
In [ ]:
```
predictions = model.predict(X_test)
mse = mean_squared_error(y_test, predictions)
print("MSE:", mse)
rmse = np.sqrt(mse)
print("RMSE:", rmse)
r2 = r2_score(y_test, predictions)
print("R2:", r2)
```

```
MSE: 225757.46818181817
RMSE: 475.139419730481
R2: 0.5574166529906086
```

Gráfico predicho vs real

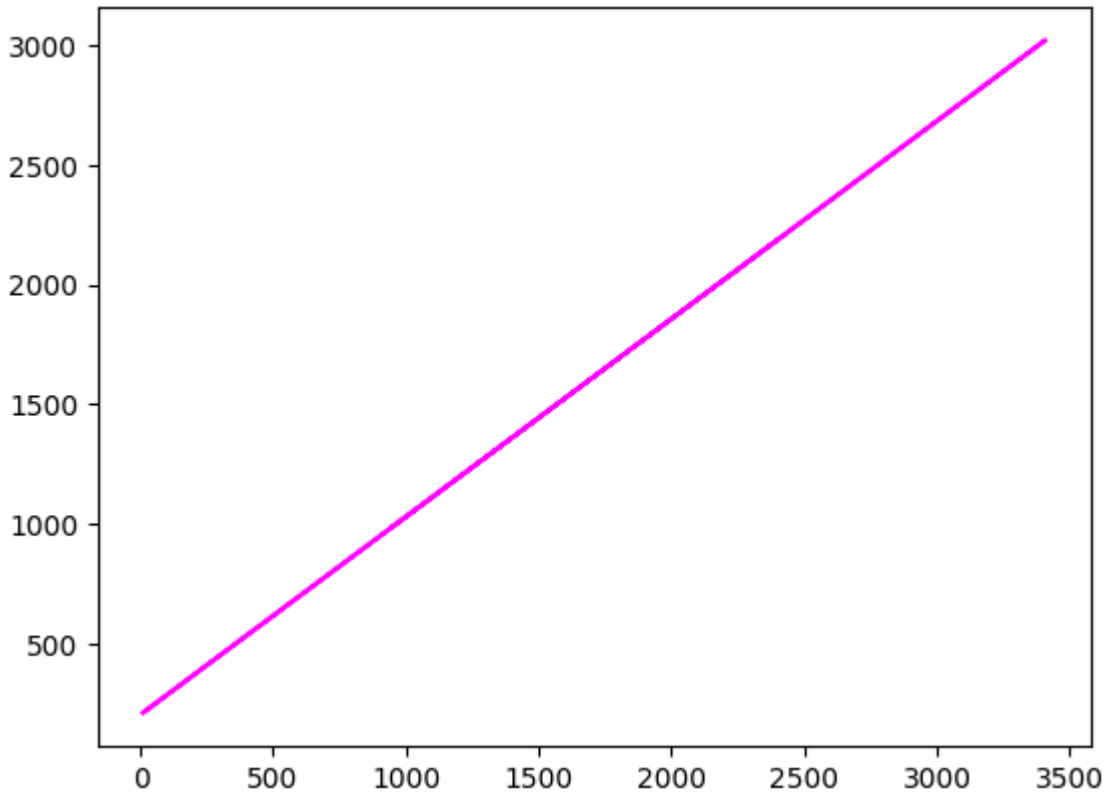
In [ ]:
```
plt.scatter(y_test, predictions)
plt.xlabel('Actual Labels')
plt.ylabel('Predicted Labels')
plt.title('Daily Bike Share Predictions')
```

Out[ ]:
```
Text(0.5, 1.0, 'Daily Bike Share Predictions')
```



superponer la línea de regresión

In [ ]:
```
z = np.polyfit(y_test, predictions, 1)
p = np.poly1d(z)
plt.plot(y_test,p(y_test), color='magenta')
plt.show()
```



Entrenar el modelo

In [ ]:
```
from sklearn.ensemble import RandomForestRegressor

model = RandomForestRegressor().fit(X_train, y_train)
print (model, "\n")
```

```
RandomForestRegressor()
```

Evaluar el modelo utilizando los datos de prueba

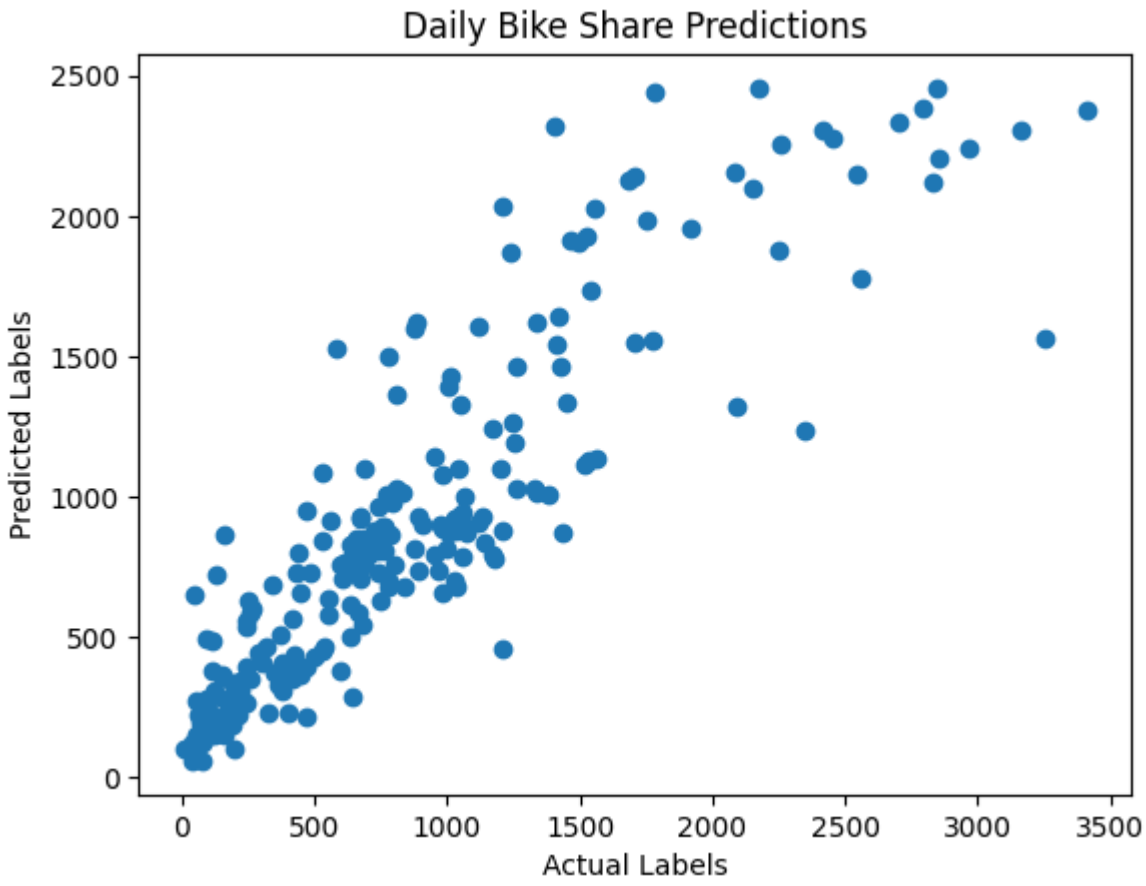
In [ ]:
```
predictions = model.predict(X_test)
mse = mean_squared_error(y_test, predictions)
print("MSE:", mse)
rmse = np.sqrt(mse)
print("RMSE:", rmse)
r2 = r2_score(y_test, predictions)
print("R2:", r2)
```

```
MSE: 114270.9676290909
RMSE: 338.0398905885086
R2: 0.7759789400253472
```

Gráfico predicho vs real

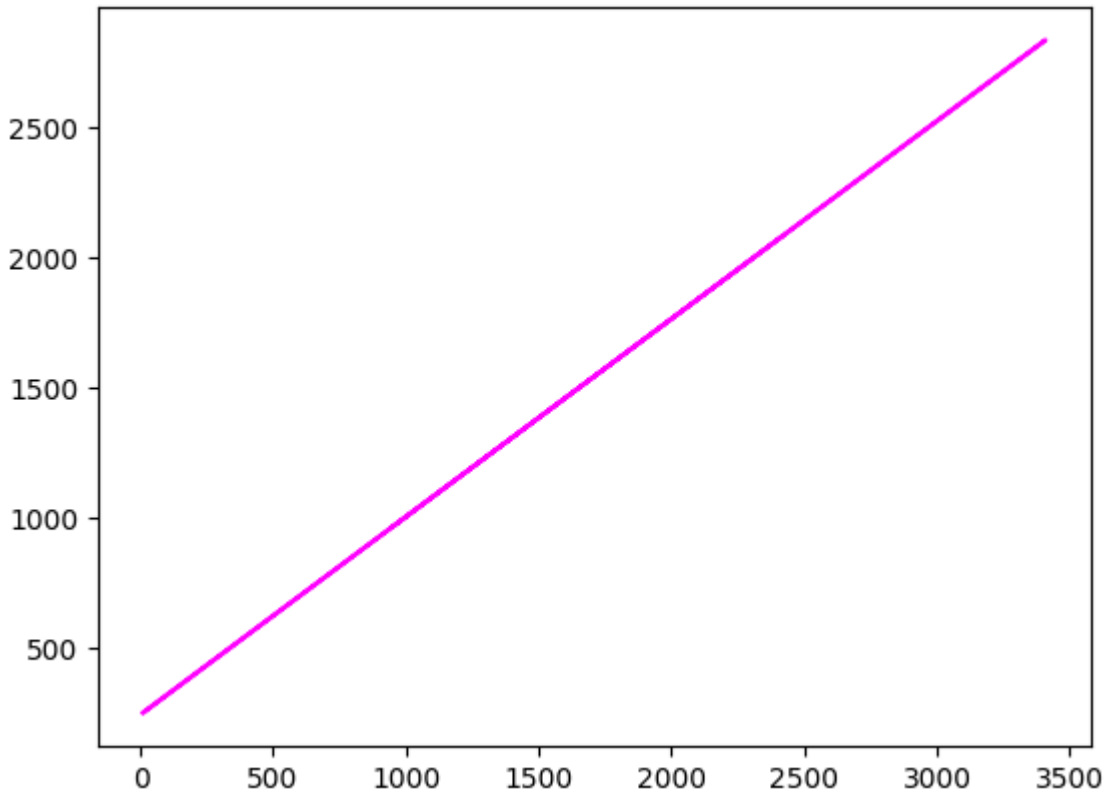
In [ ]:
```
plt.scatter(y_test, predictions)
plt.xlabel('Actual Labels')
plt.ylabel('Predicted Labels')
plt.title('Daily Bike Share Predictions')
```

Out[ ]: Text(0.5, 1.0, 'Daily Bike Share Predictions')



superponer la línea de regresión

In [ ]:
```
z = np.polyfit(y_test, predictions, 1)
p = np.poly1d(z)
plt.plot(y_test,p(y_test), color='magenta')
plt.show()
```



Entrenar el modelo

In [ ]:
```
from sklearn.ensemble import GradientBoostingRegressor
```

Encajar un modelo de lazo en el set de entrenamiento

In [ ]:
```
model = GradientBoostingRegressor().fit(X_train, y_train)
print (model, "\n")
```

```
GradientBoostingRegressor()
```

Evaluar el modelo utilizando los datos de prueba

In [ ]:
```
predictions = model.predict(X_test)
mse = mean_squared_error(y_test, predictions)
print("MSE:", mse)
rmse = np.sqrt(mse)
print("RMSE:", rmse)
r2 = r2_score(y_test, predictions)
print("R2:", r2)
```

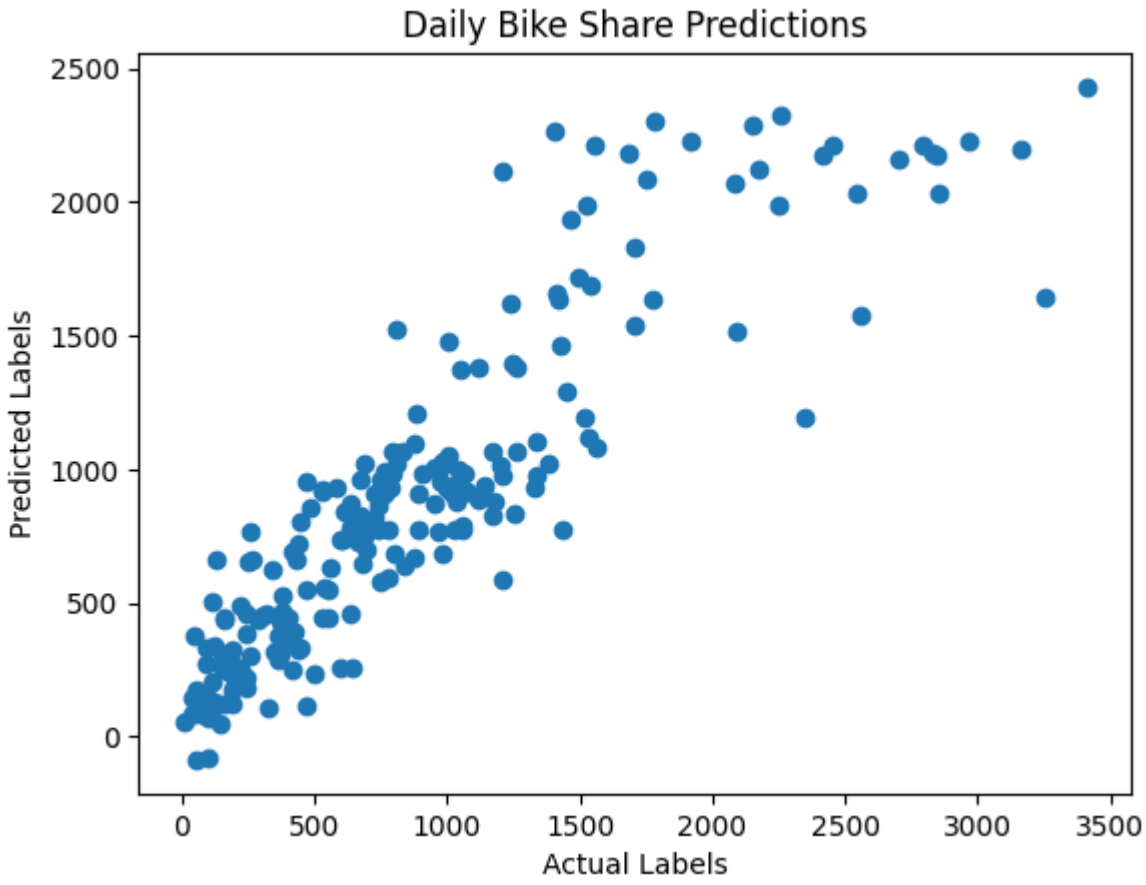
```
MSE: 103982.62941888033
RMSE: 322.4633768645369
R2: 0.7961485813528819
```

Gráfico predicho vs real

In [ ]:
```
plt.scatter(y_test, predictions)
```

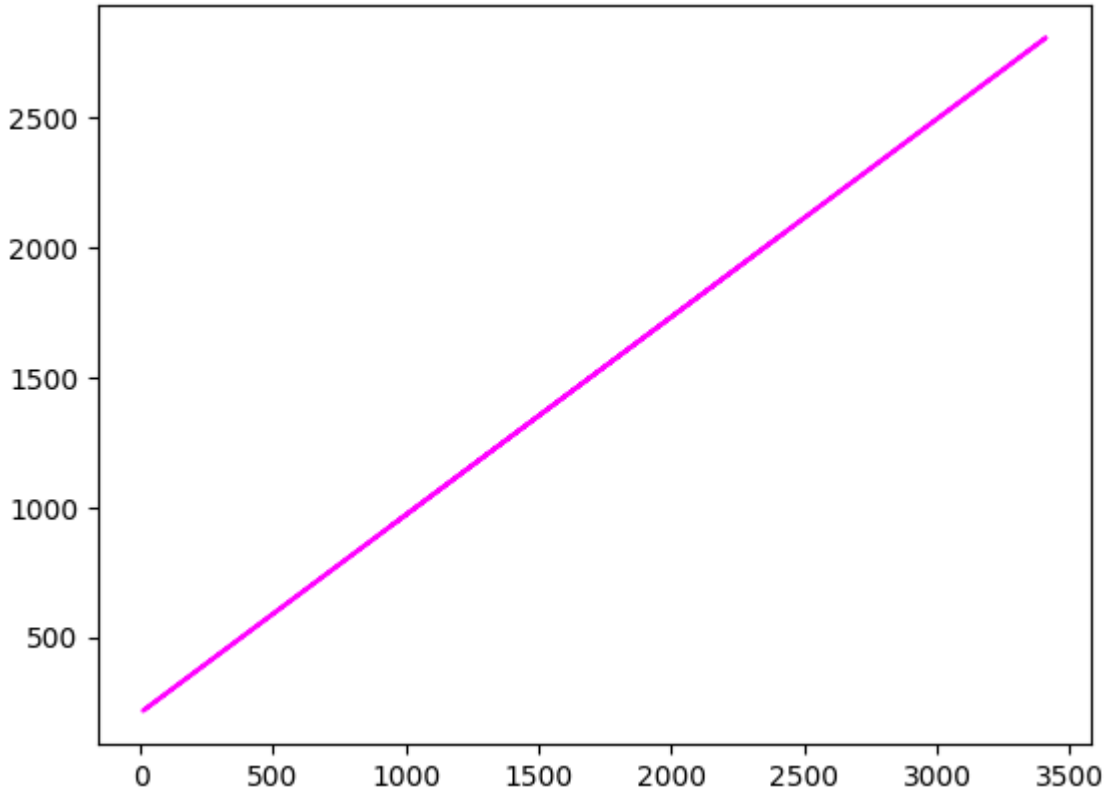
```
plt.xlabel('Actual Labels')
plt.ylabel('Predicted Labels')
plt.title('Daily Bike Share Predictions')
```

Out[ ]:
```
Text(0.5, 1.0, 'Daily Bike Share Predictions')
```



superponer la línea de regresión

In [ ]:
```
z = np.polyfit(y_test, predictions, 1)
p = np.poly1d(z)
plt.plot(y_test,p(y_test), color='magenta')
plt.show()
```



Optimización y guardado de modelos

Importar módulos que necesitaremos para este portátil

In [ ]:
```
import pandas as pd
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score
from sklearn.model_selection import train_test_split
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

Cargar el conjunto de datos de entrenamiento

In [ ]:
```
bike_data = pd.read_csv('daily-bike-share.csv')
bike_data['day'] = pd.DatetimeIndex(bike_data['dteday']).day
numeric_features = ['temp', 'atemp', 'hum', 'windspeed']
categorical_features = ['season','mnth','holiday','weekday','workingday','weathersit',
bike_data[numeric_features + ['rentals']].describe()
print(bike_data.head())
```

```
   instant    dteday  season  yr  mnth  holiday  weekday  workingday  \
0        1  1/1/2011       1   0     1        0        6           0
1        2  1/2/2011       1   0     1        0        0           0
2        3  1/3/2011       1   0     1        0        1           1
3        4  1/4/2011       1   0     1        0        2           1
4        5  1/5/2011       1   0     1        0        3           1

   weathersit      temp     atemp       hum  windspeed  rentals  day
0           2  0.344167  0.363625  0.805833   0.160446      331    1
1           2  0.363478  0.353739  0.696087   0.248539      131    2
2           1  0.196364  0.189405  0.437273   0.248309      120    3
3           1  0.200000  0.212122  0.590435   0.160296      108    4
4           1  0.226957  0.229270  0.436957   0.186900       82    5
```

Características y etiquetas separadas

Después de separar el conjunto de datos, ahora tenemos matrices numpy llamadas **X** que contienen las características y **y** que contienen las etiquetas.

In [ ]:
```
X, y = bike_data[['season','mnth', 'holiday','weekday','workingday','weathersit','temp
```

Dividir los datos 70%-30% en conjunto de entrenamiento y conjunto de prueba

In [ ]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.30, random_state

print ('Training Set: %d rows\nTest Set: %d rows' % (X_train.shape[0], X_test.shape[0]
```

```
Training Set: 511 rows
Test Set: 220 rows
```

Entrenar el modelo

In [ ]:
```
from sklearn.ensemble import GradientBoostingRegressor, RandomForestRegressor
```

Encajar un modelo de lazo en el set de entrenamiento

In [ ]:
```
model = GradientBoostingRegressor().fit(X_train, y_train)
print (model, "\n")
```

```
GradientBoostingRegressor()
```

Evaluar el modelo utilizando los datos de prueba

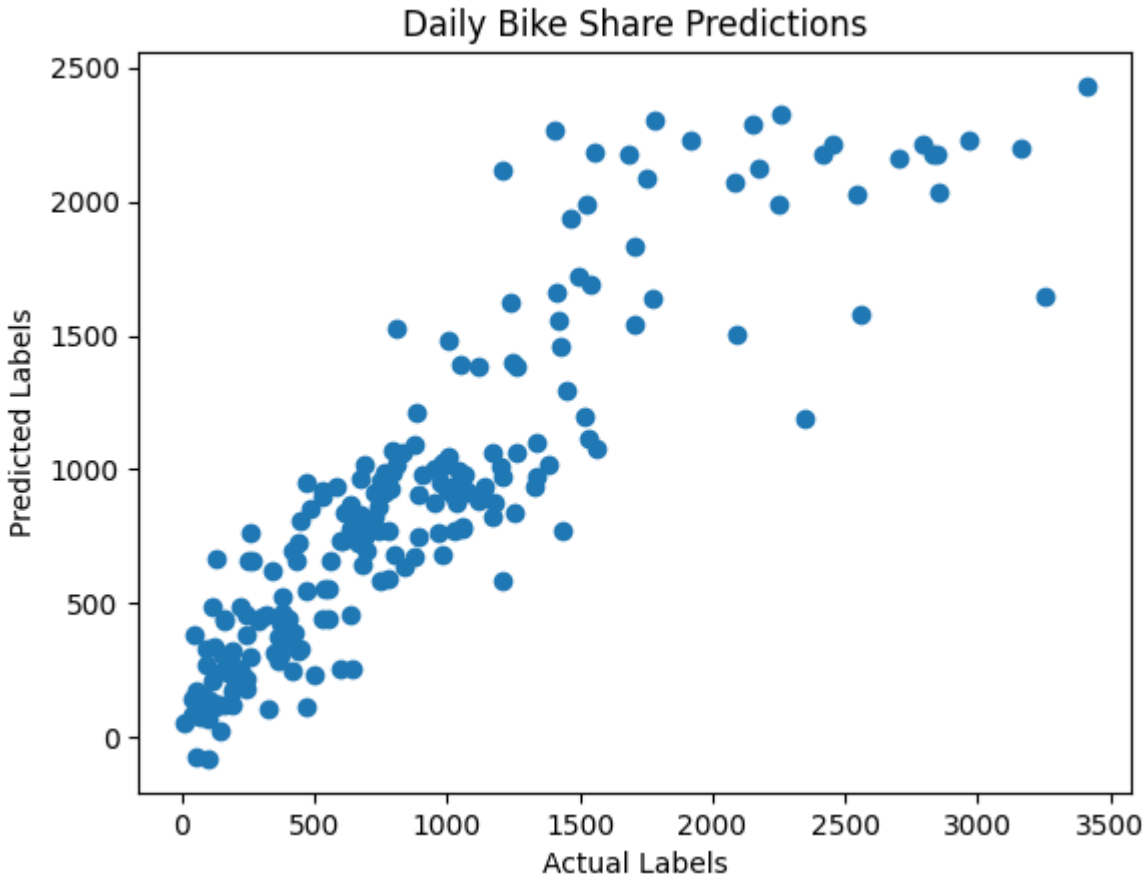
In [ ]:
```
predictions = model.predict(X_test)
mse = mean_squared_error(y_test, predictions)
print("MSE:", mse)
rmse = np.sqrt(mse)
print("RMSE:", rmse)
r2 = r2_score(y_test, predictions)
print("R2:", r2)
```

```
MSE: 103749.79480282562
RMSE: 322.1021496401811
R2: 0.7966050390041085
```

Gráfico predicho vs real

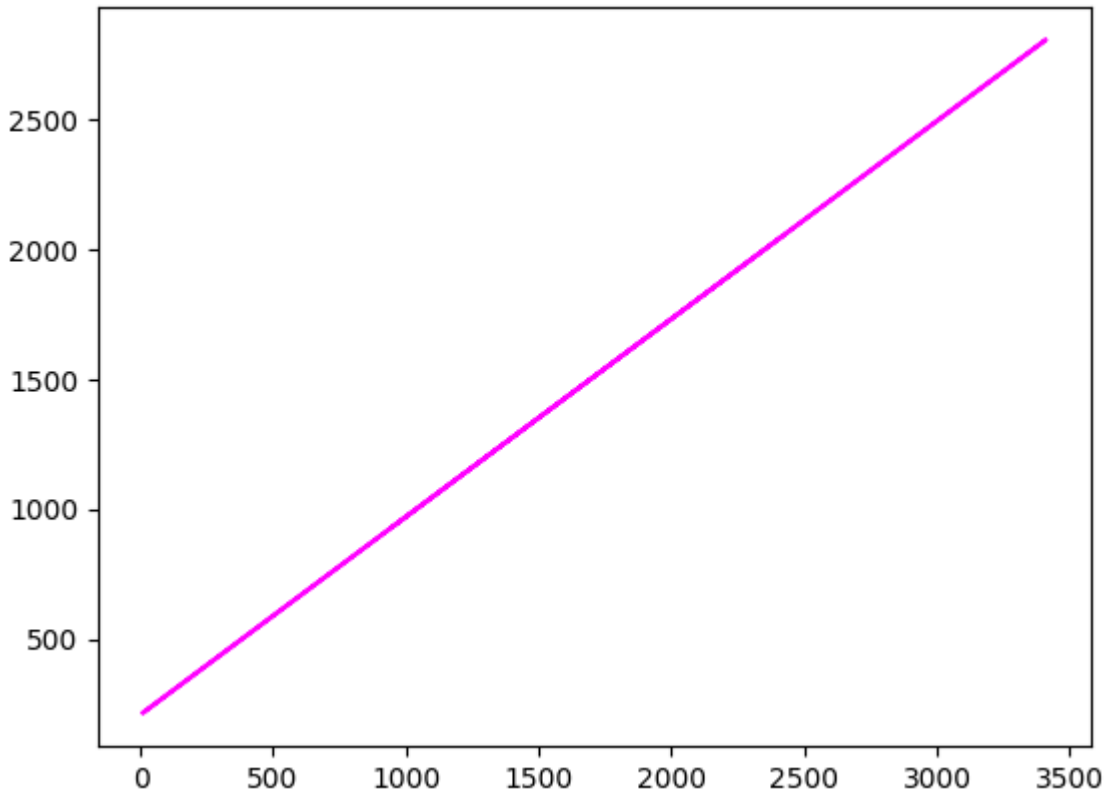
In [ ]:
```
plt.scatter(y_test, predictions)
plt.xlabel('Actual Labels')
plt.ylabel('Predicted Labels')
plt.title('Daily Bike Share Predictions')
```

Out[ ]:
```
Text(0.5, 1.0, 'Daily Bike Share Predictions')
```



superponer la línea de regresión

In [ ]:
```
z = np.polyfit(y_test, predictions, 1)
p = np.poly1d(z)
plt.plot(y_test,p(y_test), color='magenta')
plt.show()
```



Usar un algoritmo de aumento de gradiente

In [ ]:
```
from sklearn.model_selection import GridSearchCV
from sklearn.metrics import make_scorer, r2_score
alg = GradientBoostingRegressor()
```

Pruebe estos valores de hiperparámetros

In [ ]:
```
params = {
 'learning_rate': [0.1, 0.5, 1.0],
 'n_estimators' : [50, 100, 150]
 }
```

Encuentra la mejor combinación de hiperparámetros para optimizar la métrica R2

In [ ]:
```
score = make_scorer(r2_score)
gridsearch = GridSearchCV(alg, params, scoring=score, cv=3, return_train_score=True)
gridsearch.fit(X_train, y_train)
print("Best parameter combination:", gridsearch.best_params_, "\n")
```

```
Best parameter combination: {'learning_rate': 0.1, 'n_estimators': 100}
```

Consigue el mejor modelo

In [ ]:
```
model=gridsearch.best_estimator_
print(model, "\n")
```

```
GradientBoostingRegressor()
```

Evaluar el modelo utilizando los datos de prueba

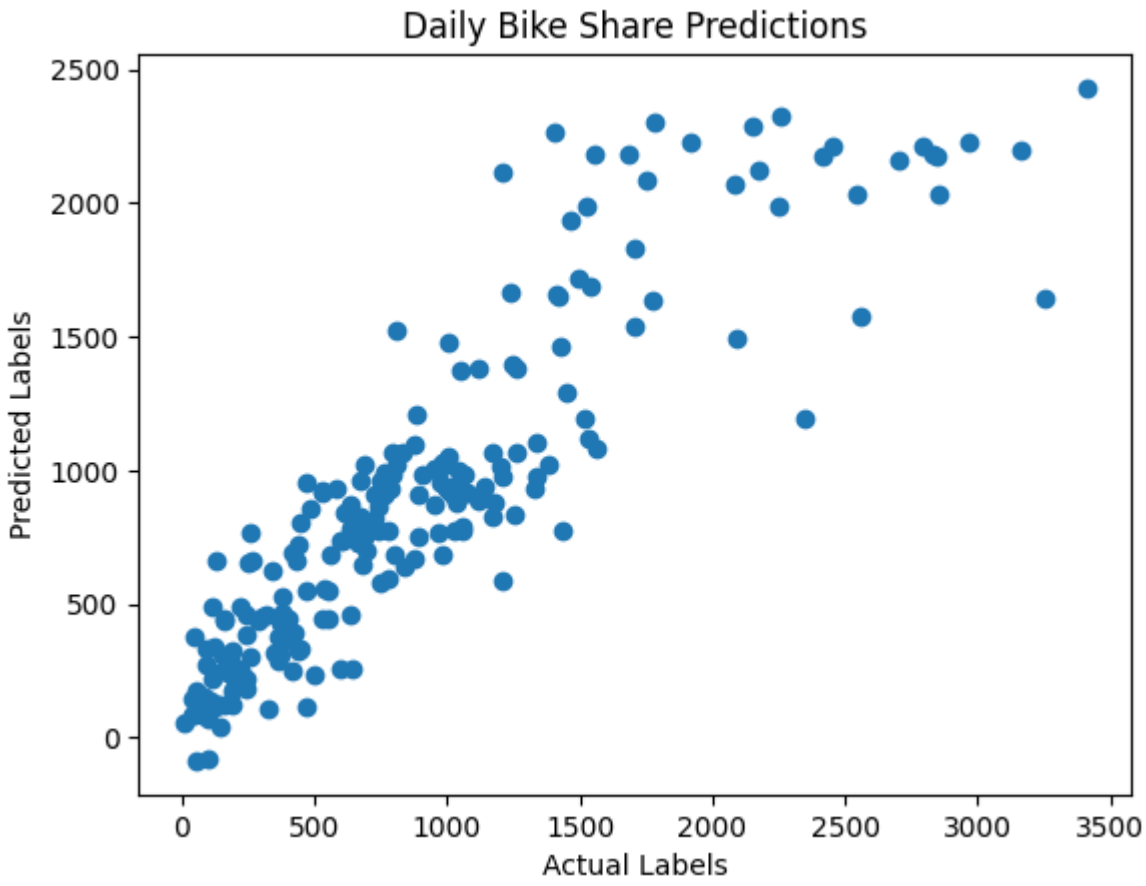
In [ ]:
```
predictions = model.predict(X_test)
mse = mean_squared_error(y_test, predictions)
print("MSE:", mse)
rmse = np.sqrt(mse)
print("RMSE:", rmse)
r2 = r2_score(y_test, predictions)
print("R2:", r2)
```

```
MSE: 104215.62469388853
RMSE: 322.82444872389783
R2: 0.7956918087398606
```

Gráfico predicho vs real

In [ ]:
```
plt.scatter(y_test, predictions)
plt.xlabel('Actual Labels')
plt.ylabel('Predicted Labels')
plt.title('Daily Bike Share Predictions')
```

Out[ ]:
```
Text(0.5, 1.0, 'Daily Bike Share Predictions')
```



superponer la línea de regresión

In [ ]:
```
z = np.polyfit(y_test, predictions, 1)
p = np.poly1d(z)
plt.plot(y_test,p(y_test), color='magenta')
plt.show()
```