multiple-linear-regression

November 5, 2023

[1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

# import warnings
import warnings
warnings.filterwarnings("ignore")

# We will use some methods from the sklearn module
from sklearn import linear_model
from sklearn.linear_model import LinearRegression
from sklearn import metrics
from sklearn.metrics import mean_squared_error, mean_absolute_error
from sklearn.model_selection import train_test_split, cross_val_score
```

[2]:
```
df = pd.read_csv("/kaggle/input/datasett/data (1).csv")
```

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

[3]:

	Car	Model	Volume	Weight	CO2
0	Toyoty	Aygo	1000	790	99
1	Mitsubishi	Space Star	1200	1160	95
2	Skoda	Citigo	1000	929	95
3	Fiat	500	900	865	90
4	Mini	Cooper	1500	1140	105

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

[4]: (36, 5)

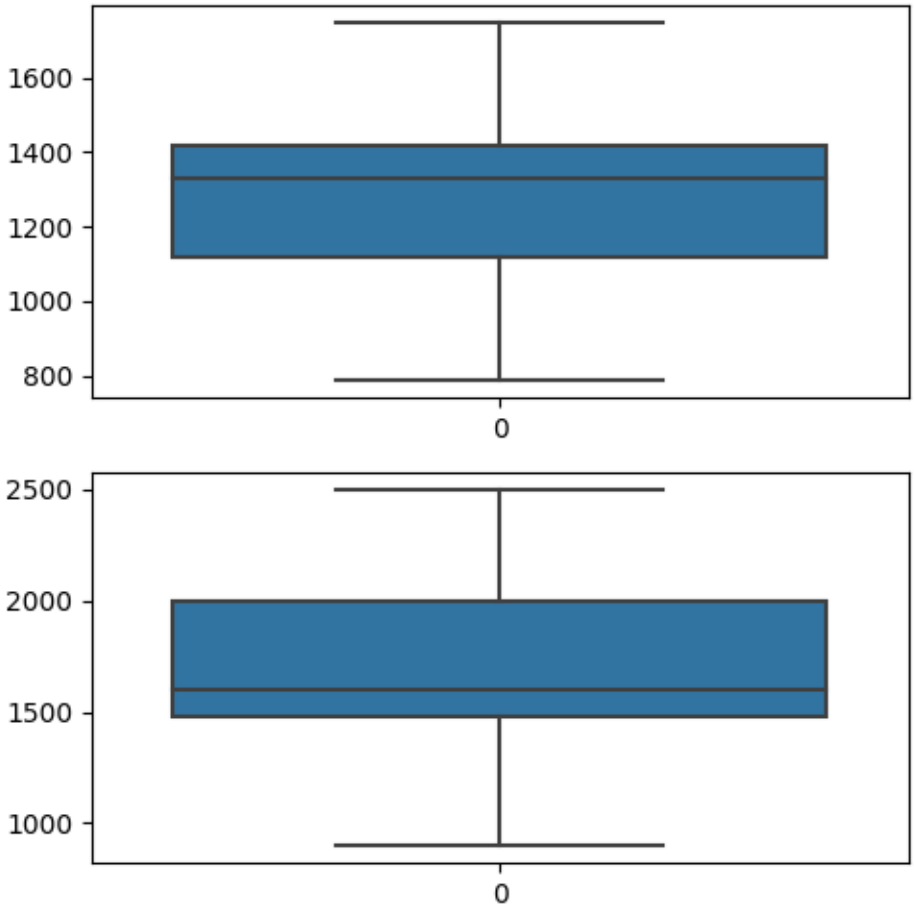
[6]:
```
print(df.describe())
```

```
            Volume       Weight         CO2
count    36.000000    36.000000   36.000000
mean   1611.111111  1292.277778  102.027778
std     388.975047   242.123889    7.454571
min     900.000000   790.000000   90.000000
```

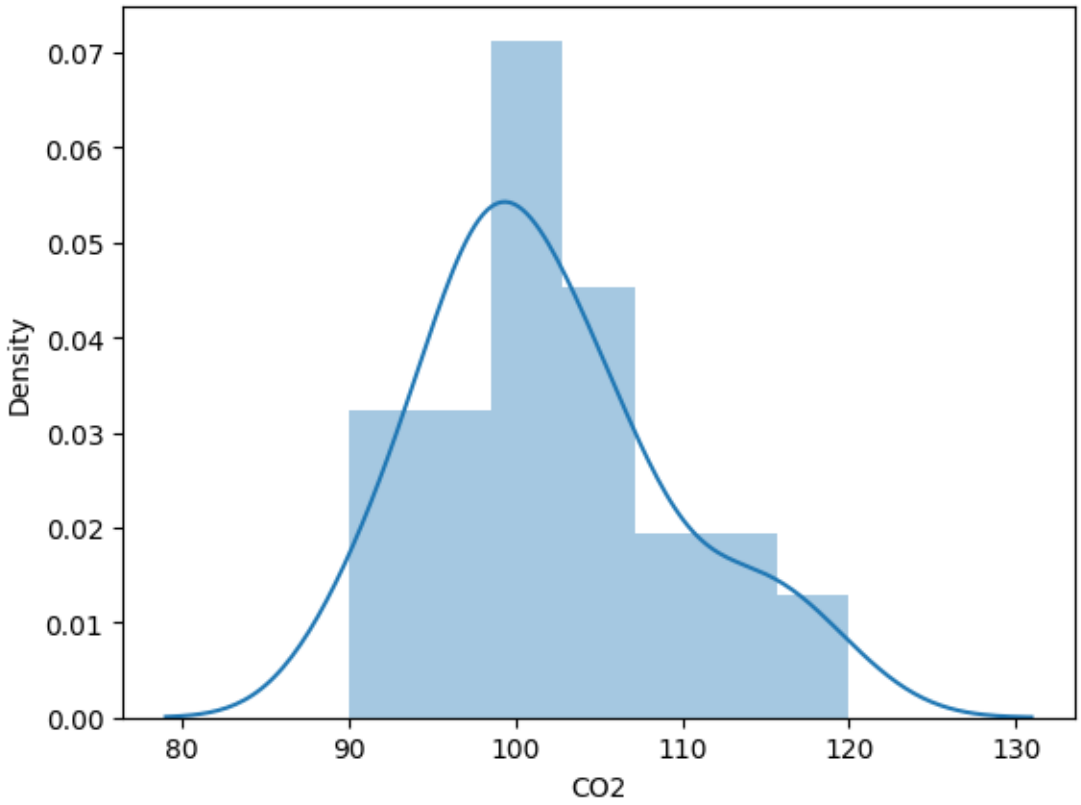
```
25%    1475.000000  1117.250000   97.750000
50%    1600.000000  1329.000000   99.000000
75%    2000.000000  1418.250000  105.000000
max    2500.000000  1746.000000  120.000000
```

[7]:
```
X = df[['Weight', 'Volume']]
y = df['CO2']
```

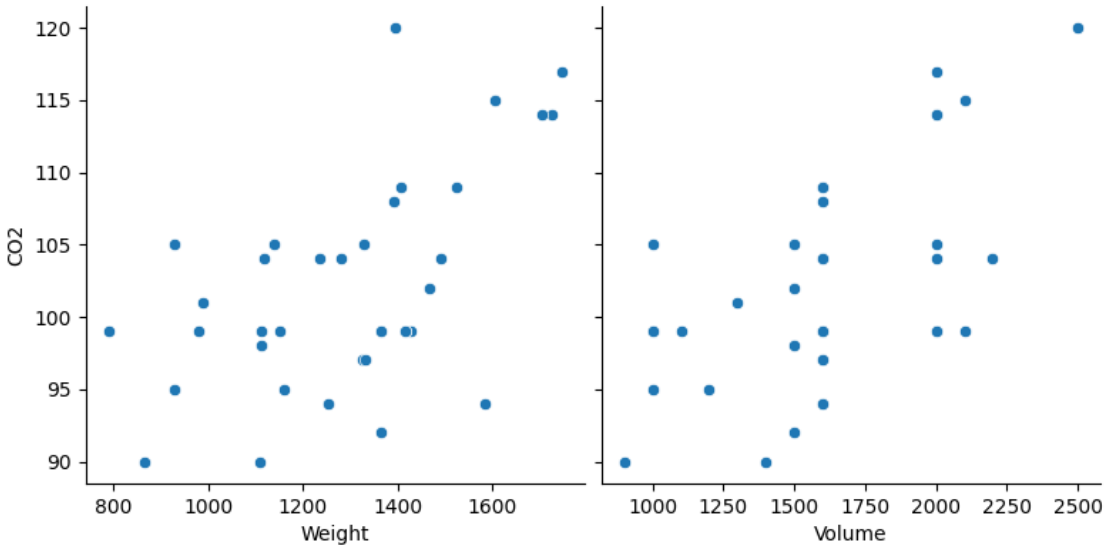
[8]:
```
fig, axs = plt.subplots(2, figsize = (5,5))
plt1 = sns.boxplot(df['Weight'], ax = axs[0])
plt2 = sns.boxplot(df['Volume'], ax = axs[1])
plt.tight_layout()
```



[9]:
```
sns.distplot(df['CO2']);
```



[10]:
```
sns.pairplot(df, x_vars=['Weight', 'Volume'], y_vars='CO2', height=4, aspect=1,␣
↪kind='scatter')
plt.show()
```



[12]:
```
X_train,X_test, y_train, y_test = train_test_split(X, y, test_size = 0.3,␣
↪random_state = 100)
```

[13]:
```
y_train.shape
```

[13]: (25,)

[14]:
```
y_test.shape
```

[14]: (11,)

[15]:
```
reg_model = linear_model.LinearRegression()
```

[16]:
```
reg_model = LinearRegression().fit(X_train, y_train)
```

[17]:
```
print('Intercept: ',reg_model.intercept_)
# pair the feature names with the coefficients
list(zip(X, reg_model.coef_))
```

```
Intercept:  74.33882836589245
```

[17]: [('Weight', 0.0171800645996374), ('Volume', 0.0025046399866402976)]

[18]:
```
y_pred= reg_model.predict(X_test)
x_pred= reg_model.predict(X_train)
```

[19]:
```
print("Prediction for test set: {}".format(y_pred))
```

```
Prediction for test set: [ 90.41571939 102.16323413  99.56363213 104.56661845
101.54657652
  95.94770019 108.64011848 102.22654214  92.80374837  97.27327129
  97.57074463]
```

[20]:
```
#Actual value and the predicted value
reg_model_diff = pd.DataFrame({'Actual value': y_test, 'Predicted value':␣
↪y_pred})
reg_model_diff
```

[20]:

	Actual value	Predicted value
0	99	90.415719
19	105	102.163234
32	104	99.563632
35	120	104.566618
7	92	101.546577
12	99	95.947700
29	114	108.640118

```
33          108       102.226542
5           105        92.803748
1            95        97.273271
18          104        97.570745
```

[21]:
```
mae = metrics.mean_absolute_error(y_test, y_pred)
mse = metrics.mean_squared_error(y_test, y_pred)
r2 = np.sqrt(metrics.mean_squared_error(y_test, y_pred))

print('Mean Absolute Error:', mae)
print('Mean Square Error:', mse)
print('Root Mean Square Error:', r2)
```

```
Mean Absolute Error: 6.901980901636316
Mean Square Error: 63.39765310998794
Root Mean Square Error: 7.96226432053018
```