```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
import seaborn as sns
```

```
# Importing the dataset
df = pd.read_csv("https://raw.githubusercontent.com/PROxZIMA/Academic-Codes/master/Semester%206/DSBDAL/A6/iris.csv");
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 6 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   Id             150 non-null    int64  
 1   SepalLengthCm  150 non-null    float64
 2   SepalWidthCm   150 non-null    float64
 3   PetalLengthCm  150 non-null    float64
 4   PetalWidthCm   150 non-null    float64
 5   Species        150 non-null    object 
dtypes: float64(4), int64(1), object(1)
memory usage: 7.2+ KB
```

```
df.describe()
```

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm
count	150.000000	150.000000	150.000000	150.000000	150.000000
mean	75.500000	5.843333	3.054000	3.758667	1.198667
std	43.445368	0.828066	0.433594	1.764420	0.763161
min	1.000000	4.300000	2.000000	1.000000	0.100000
25%	38.250000	5.100000	2.800000	1.600000	0.300000
50%	75.500000	5.800000	3.000000	4.350000	1.300000
75%	112.750000	6.400000	3.300000	5.100000	1.800000
max	150.000000	7.900000	4.400000	6.900000	2.500000

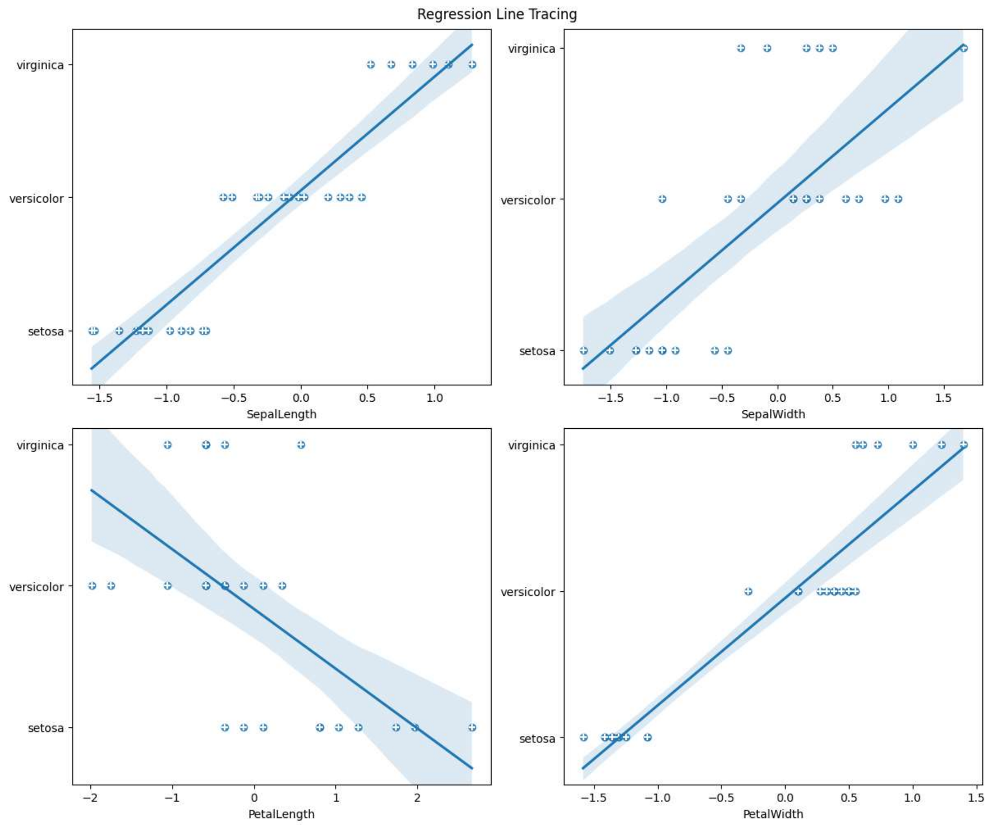
```
X = df.iloc[:, :4].values
Y = df['Species'].values
```

```
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler

X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size = 0.2, random_state = 0)
sc_X = StandardScaler()
X_train = sc_X.fit_transform(X_train)
X_test = sc_X.transform(X_test)

print(f'Train Dataset Size - X: {X_train.shape}, Y: {Y_train.shape}')
print(f'Test  Dataset Size - X: {X_test.shape}, Y: {Y_test.shape}')
```

```
Train Dataset Size - X: (120, 4), Y: (120,)
Test  Dataset Size - X: (30, 4), Y: (30,)
```

```
from sklearn.naive_bayes import GaussianNB

classifier = GaussianNB()
classifier.fit(X_train, Y_train)
predictions = classifier.predict(X_test)

mapper = {'setosa': 0, 'versicolor': 1, 'virginica': 2}
predictions_ = [mapper[i] for i in predictions]

fig, axs = plt.subplots(2, 2, figsize = (12, 10), constrained_layout = True);
_ = fig.suptitle('Regression Line Tracing')

for i in range(4):
    x, y = i // 2, i % 2
    _ = sns.regplot(x = X_test[:, i], y = predictions_, ax=axs[x, y])
    _ = axs[x, y].scatter(X_test[:, i][::-1], Y_test[::-1], marker = '+', color="white")
    _ = axs[x, y].set_xlabel(df.columns[i + 1][:-2])
```

```
▾ GaussianNB
GaussianNB()
```



```
from sklearn.metrics import confusion_matrix
from sklearn.metrics import classification_report

cm = confusion_matrix(Y_test, predictions)
```

```
print(f'''Confusion matrix :\n
               | Positive Prediction\t| Negative Prediction
---------------+------------------------+---------------------
Positive Class | True Positive (TP) {cm[0, 0]}\t| False Negative (FN) {cm[0, 1]}
---------------+------------------------+---------------------
Negative Class | False Positive (FP) {cm[1, 0]}\t| True Negative (TN) {cm[1, 1]}\n\n''')

cm = classification_report(Y_test, predictions)
print('Classification report : \n', cm)
```

```
Confusion matrix :

               | Positive Prediction    | Negative Prediction
---------------+------------------------+---------------------
Positive Class | True Positive (TP) 11  | False Negative (FN) 0
---------------+------------------------+---------------------
Negative Class | False Positive (FP) 0  | True Negative (TN) 13


Classification report :
               precision    recall  f1-score   support
```

```
      setosa       1.00      1.00      1.00        11
  versicolor       1.00      1.00      1.00        13
   virginica       1.00      1.00      1.00         6

    accuracy                           1.00        30
   macro avg       1.00      1.00      1.00        30
weighted avg       1.00      1.00      1.00        30
```

```
df.shape
```

```
(150, 6)
```

```
df.isnull().sum()
```

```
Id               0
SepalLengthCm    0
SepalWidthCm     0
PetalLengthCm    0
PetalWidthCm     0
Species          0
dtype: int64
```

```
df.tail()
```

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
145	146	6.7	3.0	5.2	2.3	virginica
146	147	6.3	2.5	5.0	1.9	virginica
147	148	6.5	3.0	5.2	2.0	virginica
148	149	6.2	3.4	5.4	2.3	virginica
149	150	5.9	3.0	5.1	1.8	virginica

```
df.head()
```

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
0	1	5.1	3.5	1.4	0.2	setosa
1	2	4.9	3.0	1.4	0.2	setosa
2	3	4.7	3.2	1.3	0.2	setosa
3	4	4.6	3.1	1.5	0.2	setosa
4	5	5.0	3.6	1.4	0.2	setosa

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