The famous iris dataset to start with. The reference link for the dataset is given below. https://archive.ics.uci.edu/dataset/53/iris.

```
#libraries
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

data = pd.read_csv('iris.data', sep = ',', names =
['sepal_length','sepal_width','petal_length','petal_width','class'])

data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 5 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   sepal_length  150 non-null    float64
 1   sepal_width   150 non-null    float64
 2   petal_length  150 non-null    float64
 3   petal_width   150 non-null    float64
 4   class         150 non-null    object
dtypes: float64(4), object(1)
memory usage: 6.0+ KB
```

```
data.describe()
```

```
       sepal_length  sepal_width  petal_length  petal_width
count    150.000000   150.000000    150.000000   150.000000
mean       5.843333     3.054000      3.758667     1.198667
std        0.828066     0.433594      1.764420     0.763161
min        4.300000     2.000000      1.000000     0.100000
25%        5.100000     2.800000      1.600000     0.300000
50%        5.800000     3.000000      4.350000     1.300000
75%        6.400000     3.300000      5.100000     1.800000
max        7.900000     4.400000      6.900000     2.500000
```

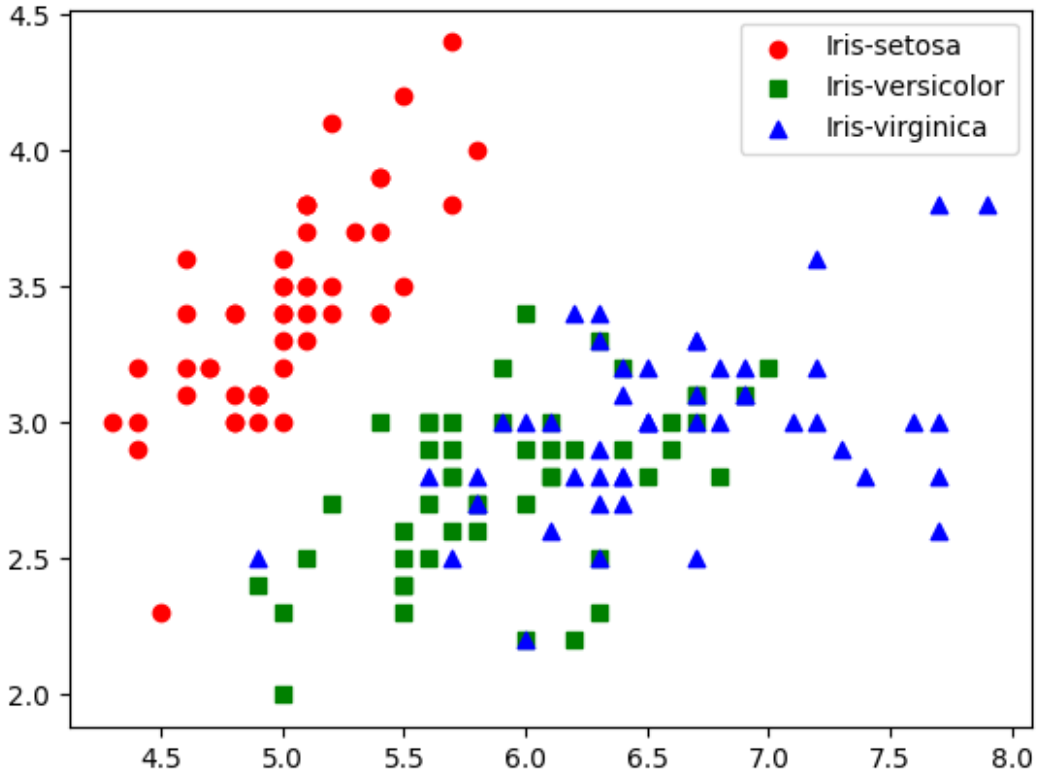
```
data['class'].value_counts()
```

```
Iris-setosa        50
Iris-versicolor    50
Iris-virginica     50
Name: class, dtype: int64
```

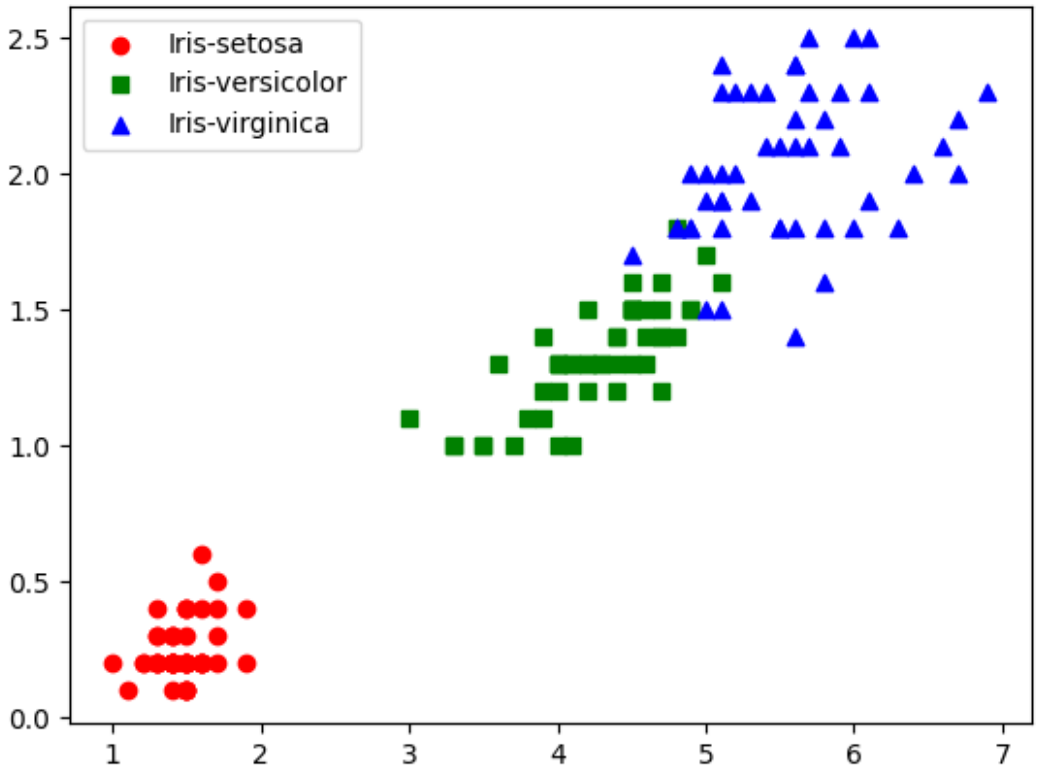
now let's visualize the plots for further analysis.

Scatter Plot

```
class_groups = data.groupby('class')
colors = ['red', 'green', 'blue']
markers = ['o', 's', '^']
for (class_name, group), color, marker in zip(class_groups, colors,
markers):
    plt.scatter(group['sepal_length'], group['sepal_width'],
label=class_name, color=color, marker=marker)
plt.legend()
plt.show()
```

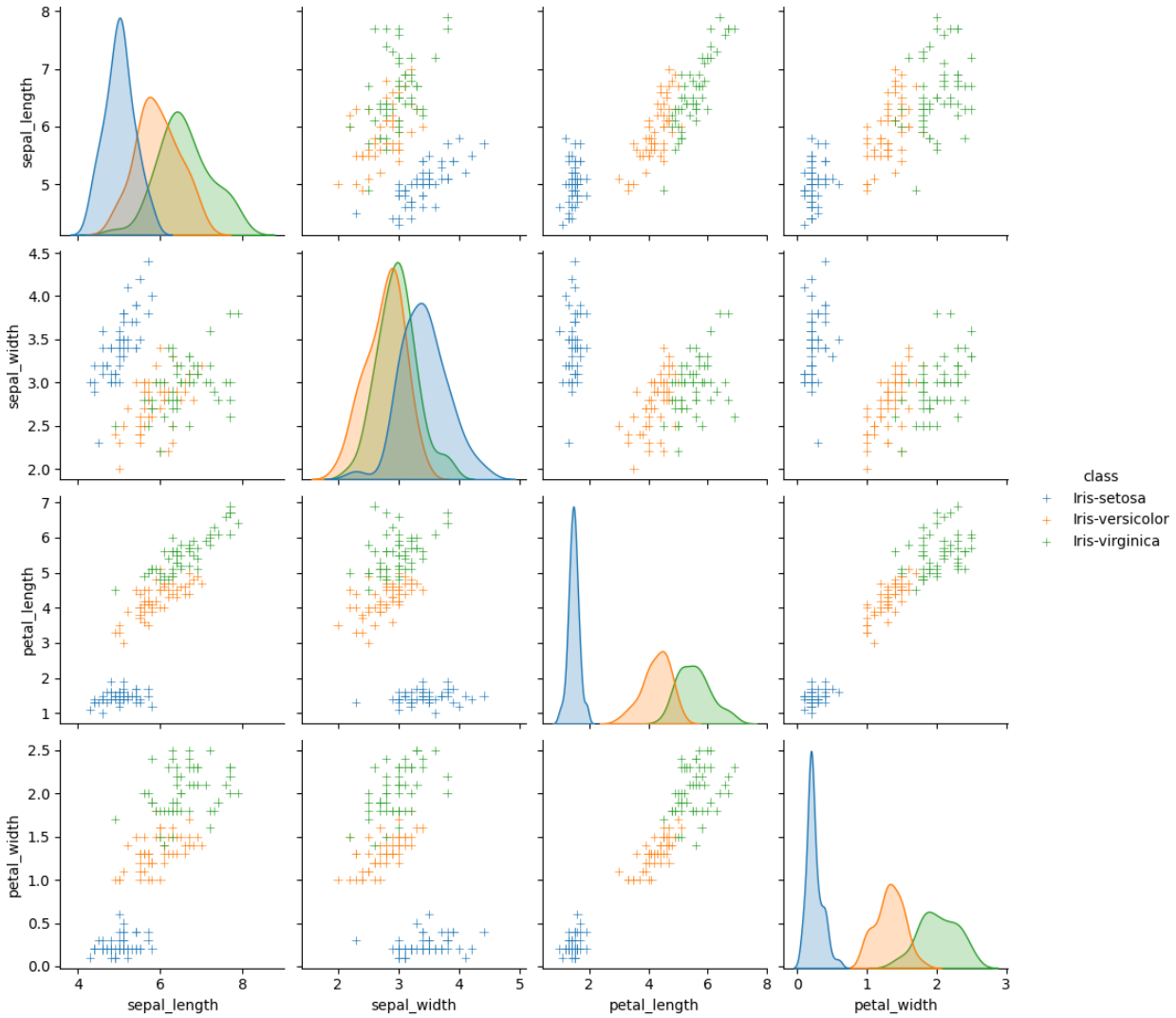



```
class_groups = data.groupby('class')
colors = ['red', 'green', 'blue']
markers = ['o', 's', '^']
for (class_name, group), color, marker in zip(class_groups, colors,
markers):
    plt.scatter(group['petal_length'], group['petal_width'],
label=class_name, color=color, marker=marker)
plt.legend()
plt.show()
```



Pair Plot

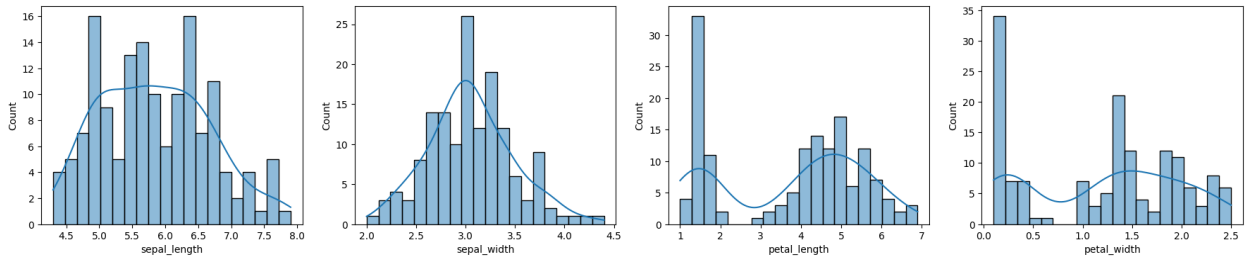
```
g = sns.pairplot(data, hue = 'class', markers = '+')
plt.show()
```



- so it's clear from the pair plot that the relationship between pairs of features of a iris-setosa (in blue) is distinctly different from those of the other species.
- There is some overlap in the pairwise relationships of the other two species, iris-versicolor (orange) and iris-virginica (green).

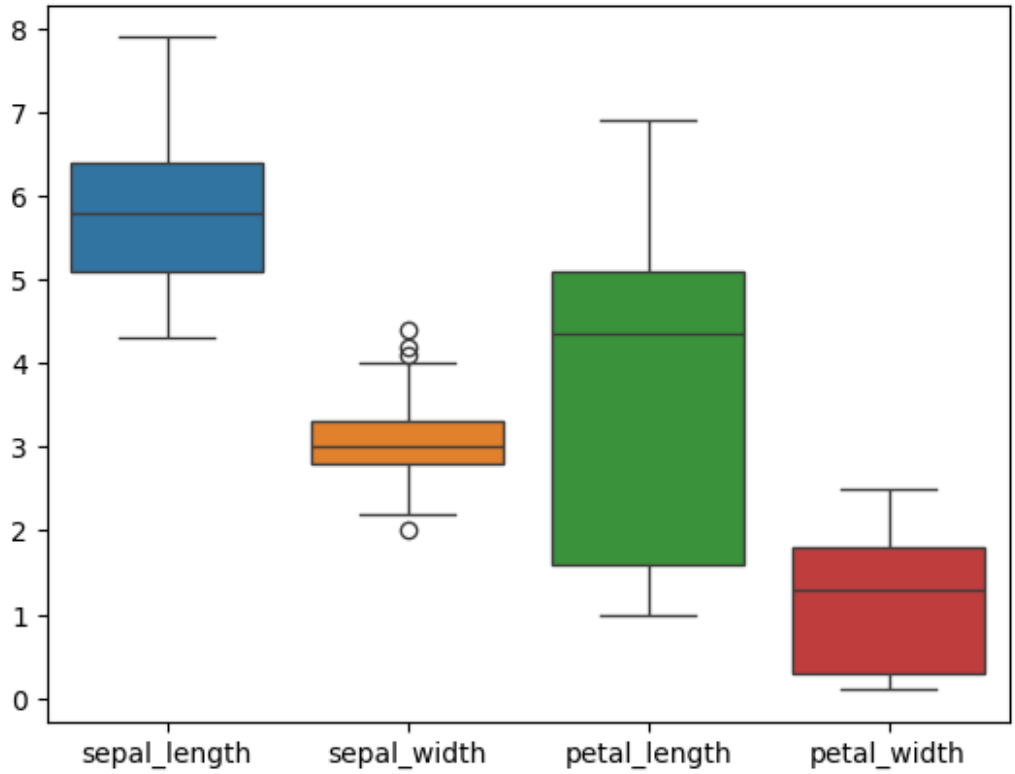
Histogram

```
fig, ax = plt.subplots(ncols = 4, figsize = (22, 4))
sns.histplot(x=data['sepal_length'], bins=20, kde=True, ax=ax[0])
sns.histplot(x=data['sepal_width'], bins=20, kde=True, ax=ax[1])
sns.histplot(x=data['petal_length'], bins=20, kde=True, ax=ax[2])
sns.histplot(x=data['petal_width'], bins=20, kde=True, ax=ax[3])
plt.show()
```



Box Plot

```
sns.boxplot(data)
plt.show()
```




```
from sklearn.preprocessing import LabelEncoder
le = LabelEncoder()

X = data.drop(columns = ['class'])
y = data['class']

y = le.fit_transform(y)
```

Modeling

1. Logistic Regression

```
from sklearn.linear_model import LogisticRegression
model = LogisticRegression(max_iter=1000)
classify(model)
```

```
Accuracy: 1.0
CV Score: 0.9733333333333334
```

2. Decision Tree

```
from sklearn.tree import DecisionTreeClassifier
model = DecisionTreeClassifier()
classify(model)
```

```
Accuracy: 1.0
CV Score: 0.9666666666666668
```

3. Random Forest

```
from sklearn.ensemble import RandomForestClassifier
model = RandomForestClassifier()
classify(model)
```

```
Accuracy: 1.0
CV Score: 0.96
```

4. Extra Tree

```
from sklearn.ensemble import ExtraTreesClassifier
model = ExtraTreesClassifier()
classify(model)
```

```
Accuracy: 1.0
CV Score: 0.9533333333333334
```