To obtain the classification of various classes using k-Nearest Neighbor approach

In [25]:
```
# 1.    Load the basic libraries and packages

import pandas as pd
import seaborn as sns
import numpy as np
import math
import matplotlib.pyplot as plt
from sklearn.datasets import load_iris
from sklearn.metrics import confusion_matrix
from sklearn.model_selection import train_test_split
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import accuracy_score
```

In [11]:
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# 2.    Load the dataset

url = "https://archive.ics.uci.edu/ml/machine-learning-databases/iris/iris.data"
names = ["Sepal_Length", "Sepal_Width", "Petal_Length", "Petal_Width", "Class"]
dataset = pd.read_csv(url, names=names)
```

In [12]:
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# 3.    Analyse the dataset

dataset.describe()
```

Out[12]:

	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

In [13]:
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# 4.    Pre-process the data

traningclass = dataset.values[:, -1]
unique_list = list(set(traningclass))

for i in range(len(traningclass)):
    for j in range(len(unique_list)):
        if traningclass[i] == unique_list[j]:
            traningclass[i] = j

traningclass = traningclass[:-1]
```

In [14]:
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# 5.    Visualize the Data
```
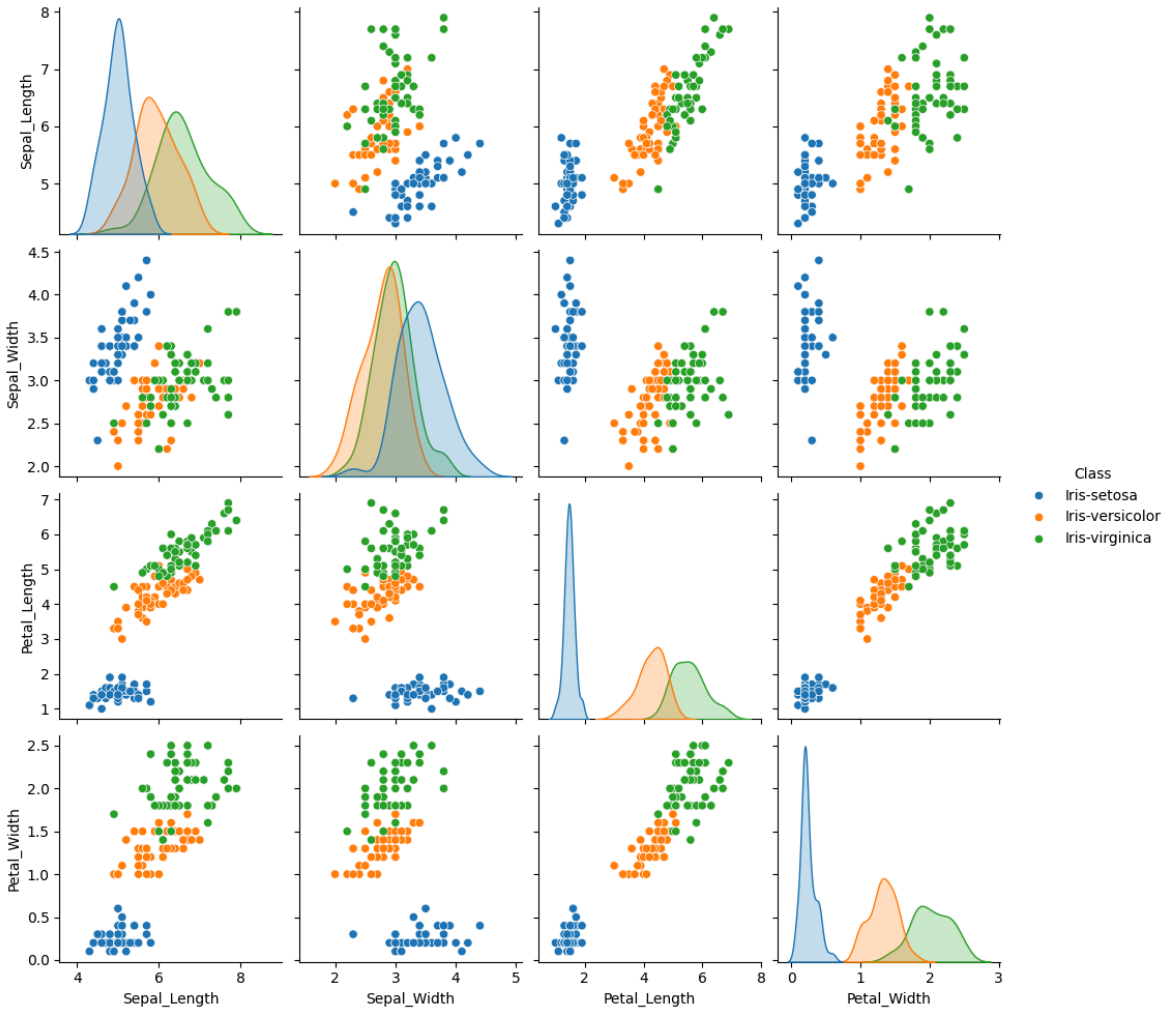

```
sns.pairplot(dataset, hue="Class")
plt.show()
```



In [15]:
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# 6.    Separate the feature and prediction value columns

training = dataset.values[:, :-1]
testing = dataset.values[149, :-1]
training = dataset.values[:149, :-1]
```

In [17]:
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# 7.    Select the number K of the neighbors

k = 25
```

In [19]:
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# 8.    Calculate the Euclidean distance of K number of neighbors

def Euclidean_Distance(row_i, row_j):
    distance = 0.0
    for i in range(len(row_i)):
        distance += (row_i[i] - row_j[i])**2
    return np.sqrt(distance)

distance = []
for i in range(len(training)):
    dist = Euclidean_Distance(training[i], testing)
    distance.append([dist, traningclass[i]])
```

In [20]:
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# 9.    Take the K nearest neighbors as per the calculated Euclidean distance.
```

```
# Sort the distances and select the first k
distance.sort()
k_nearest_neighbors = distance[:k]
```

In [21]:
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# 10.   Among these k neighbors, count the number of the data points in each cat

# Count occurrences of each class in the K nearest neighbors
result = {}
for dist, label in k_nearest_neighbors:
    result[label] = result.get(label, 0) + 1
```

In [22]:
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# 11.   Assign the new data points to that category for which the number of the

max_key = max(result, key=result.get)
class_name = unique_list[max_key]
print("Predicted Class:", class_name)
```

```
Predicted Class: Iris-virginica
```

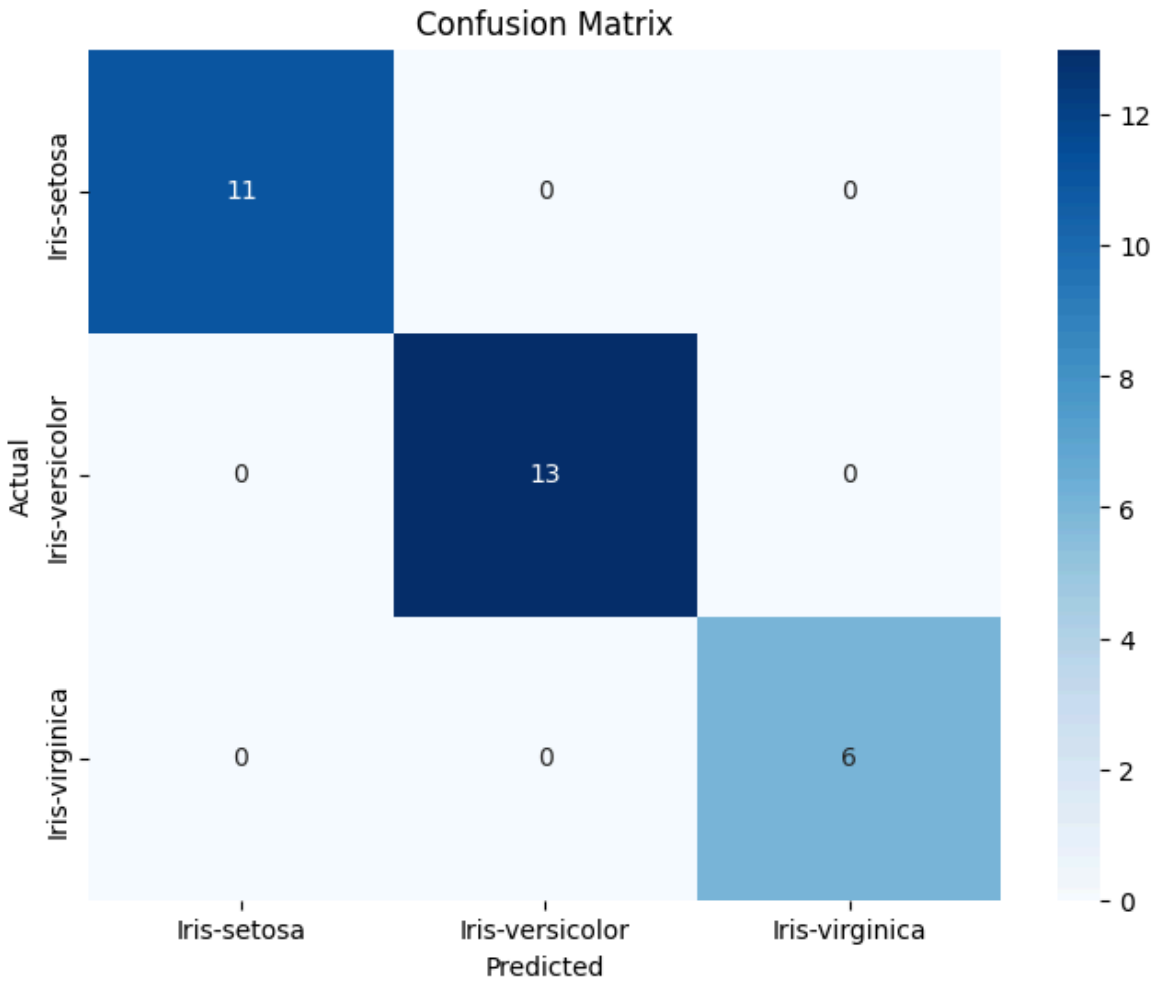
In [24]:
```
# 1. Confusion Matrix

X = dataset.iloc[:, :-1].values
y = dataset.iloc[:, -1].values
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_

classifier = KNeighborsClassifier(n_neighbors=25)
classifier.fit(X_train, y_train)
y_pred = classifier.predict(X_test)

cm = confusion_matrix(y_test, y_pred)

plt.figure(figsize=(8, 6))
sns.heatmap(cm, annot=True, fmt="d", cmap="Blues", xticklabels=np.unique(y), yti
plt.xlabel("Predicted")
plt.ylabel("Actual")
plt.title("Confusion Matrix")
plt.show()
```



In [26]:
```
# 2. Print The Accuracy

accuracy = accuracy_score(y_test, y_pred)
print("Accuracy:", accuracy)
```

```
Accuracy: 1.0
```