In [1]:
```
%config IPCompleter.greedy=True
```

Given a dataset that contains information about different types of flowers (e.g., Iris dataset), perform classification using the k-Nearest Neighbors (kNN) algorithm. Evaluate the performance of the model by calculating its accuracy and visualize the results using appropriate techniques.

In [38]:
```
import matplotlib.pyplot as plt
import pandas as pd
from sklearn.metrics import accuracy_score, confusion_matrix,
classification_report
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import train_test_split
from sklearn.datasets import load_iris
```

In [80]:
```
iris = load_iris()

df = pd.DataFrame(iris.data, columns=iris.feature_names)

df['target'] = iris.target

df
```

Out[80]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target
0	5.1	3.5	1.4	0.2	0
1	4.9	3.0	1.4	0.2	0
2	4.7	3.2	1.3	0.2	0
3	4.6	3.1	1.5	0.2	0
4	5.0	3.6	1.4	0.2	0
...	...	...	...	...	...
145	6.7	3.0	5.2	2.3	2
146	6.3	2.5	5.0	1.9	2
147	6.5	3.0	5.2	2.0	2
148	6.2	3.4	5.4	2.3	2
149	5.9	3.0	5.1	1.8	2

150 rows × 5 columns

In [64]:
```
X = df[["petal length (cm)", "petal width (cm)"]]
Y = df['target']
```

In [65]:
```
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.25,
random_state=42, shuffle=True)
```

In [84]:
```
knn = KNeighborsClassifier(n_neighbors=5)

knn.fit(X_train, Y_train)
```

Out[84]:
```
▾ KNeighborsClassifier i ?

KNeighborsClassifier()
```

In [85]:
```
Y_pred = knn.predict(X_test)
```

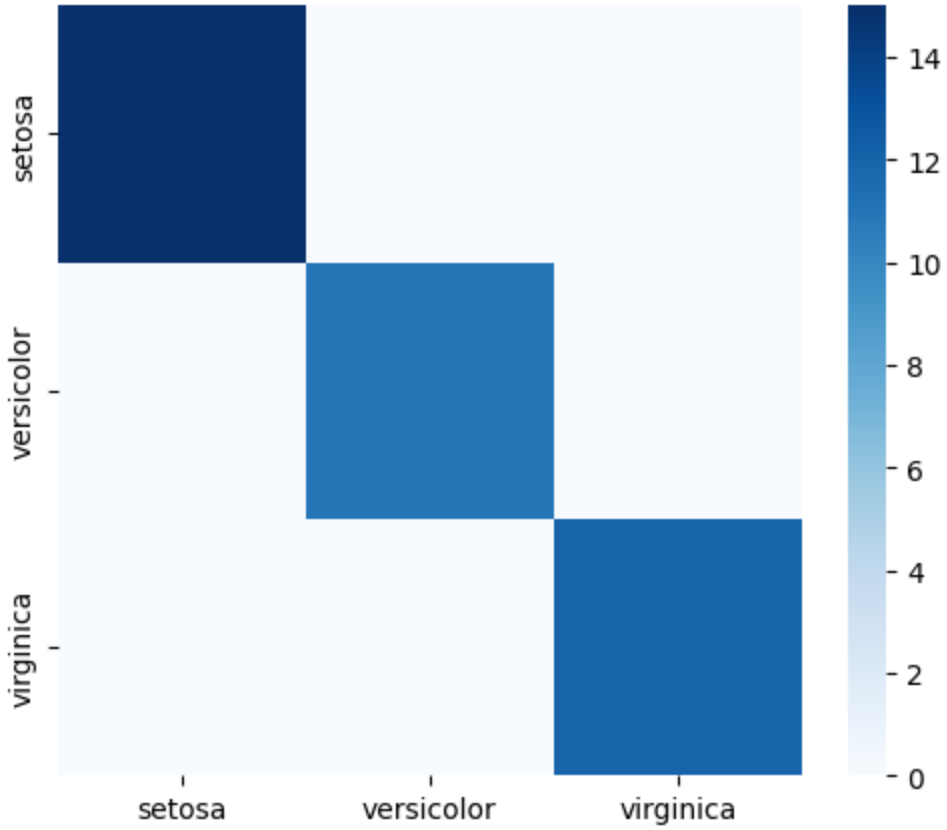
In [86]:
```
accuracy = accuracy_score(Y_test, Y_pred)
conf_matrix = confusion_matrix(Y_test, Y_pred)
class_report = classification_report(Y_test, Y_pred)
```

In [87]:
```
print(f"Accuracy: {accuracy}")
print(f"Classification Report:\n {class_report}")
```

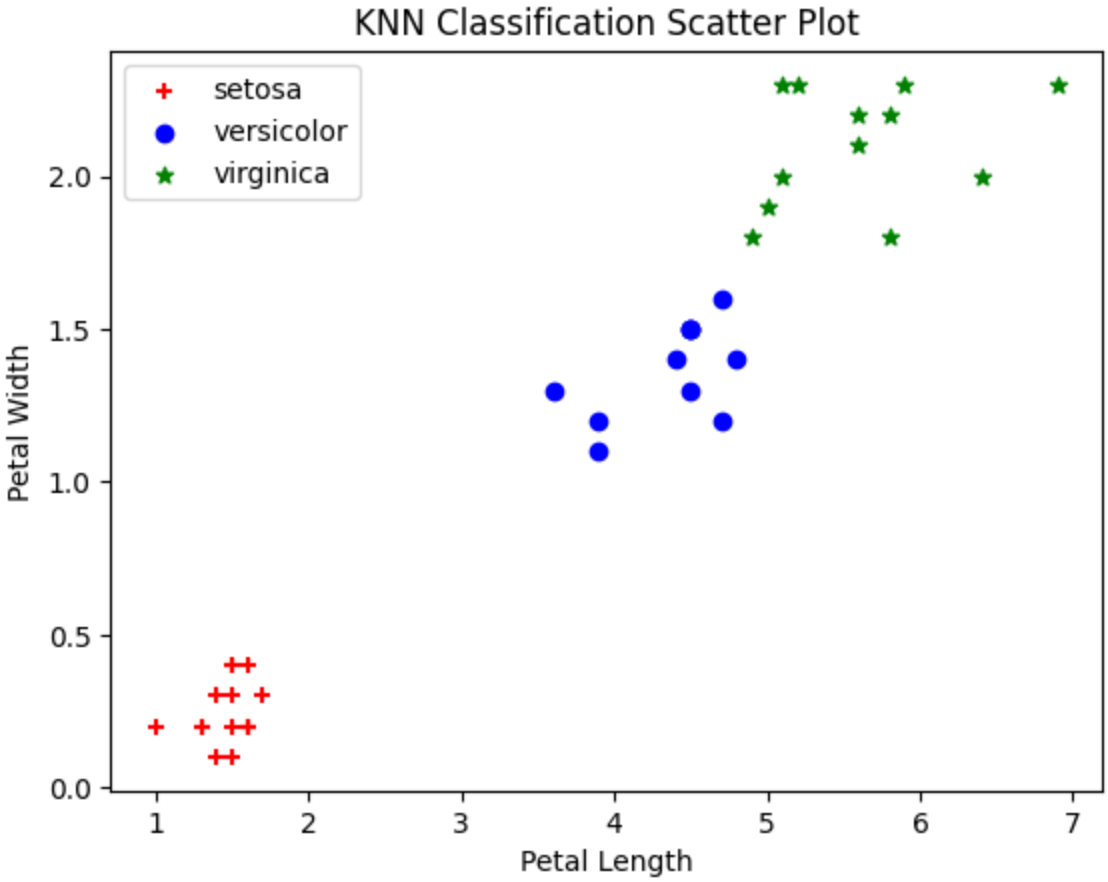
```
Accuracy: 1.0
Classification Report:
               precision    recall  f1-score   support

           0       1.00      1.00      1.00        15
           1       1.00      1.00      1.00        11
           2       1.00      1.00      1.00        12

    accuracy                           1.00        38
   macro avg       1.00      1.00      1.00        38
weighted avg       1.00      1.00      1.00        38
```

In [88]:
```
import seaborn as sns

plt.figure(figsize=(6, 5))
sns.heatmap(conf_matrix, fmt='d', cmap='Blues',
xticklabels=iris.target_names, yticklabels=iris.target_names)
```

Out[88]: <Axes: >



In [89]:
```
colors = ["r", "b", "g"]
markers = ["+", "o", "*"]

for i, label in enumerate(iris.target_names):
    class_points = (Y_pred == i)
    plt.scatter(X_test.iloc[class_points, 0], X_test.iloc[class_points, 1],
marker=markers[i], color=colors[i], label=label)

plt.title("KNN Classification Scatter Plot")
plt.xlabel("Petal Length")
plt.ylabel("Petal Width")
plt.legend()
plt.show()
```


KNN Classification Scatter Plot
setosa
versicolor
virginica
Petal Width
Petal Length
0.0
0.5
1.0
1.5
2.0
1
2
3
4
5
6
7