

```
In [3]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import train_test_split
from sklearn.metrics import confusion_matrix, classification_report
```

```
In [4]: df = pd.read_csv("C:/Users/sindh/Desktop/Iris.csv")
df.head()
```

```
Out[4]:
```

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

```
In [5]: df.shape
```

```
Out[5]: (150, 6)
```

```
In [6]: df.isnull().sum()
```

```
Out[6]: Id          0
SepalLengthCm      0
SepalWidthCm       0
PetalLengthCm      0
PetalWidthCm       0
Species           0
dtype: int64
```

```
In [7]: df.describe()
```

```
Out[7]:
```

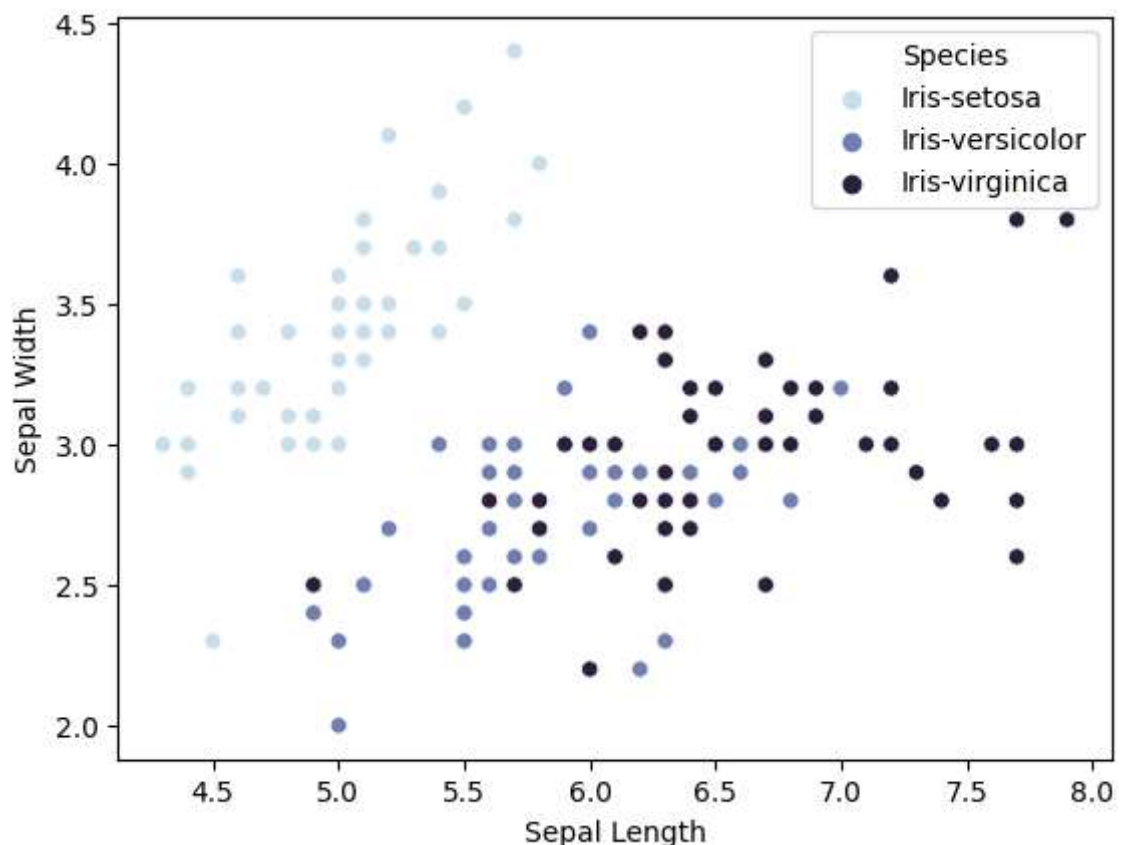
	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm
<b>count</b>	150.000000	150.000000	150.000000	150.000000	150.000000
<b>mean</b>	75.500000	5.843333	3.054000	3.758667	1.198667
<b>std</b>	43.445368	0.828066	0.433594	1.764420	0.763161
<b>min</b>	1.000000	4.300000	2.000000	1.000000	0.100000
<b>25%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

```
In [8]: species = np.unique(df.loc[:, 'Species'])
species
```

```
Out[8]: array(['Iris-setosa', 'Iris-versicolor', 'Iris-virginica'], dtype=object)
```

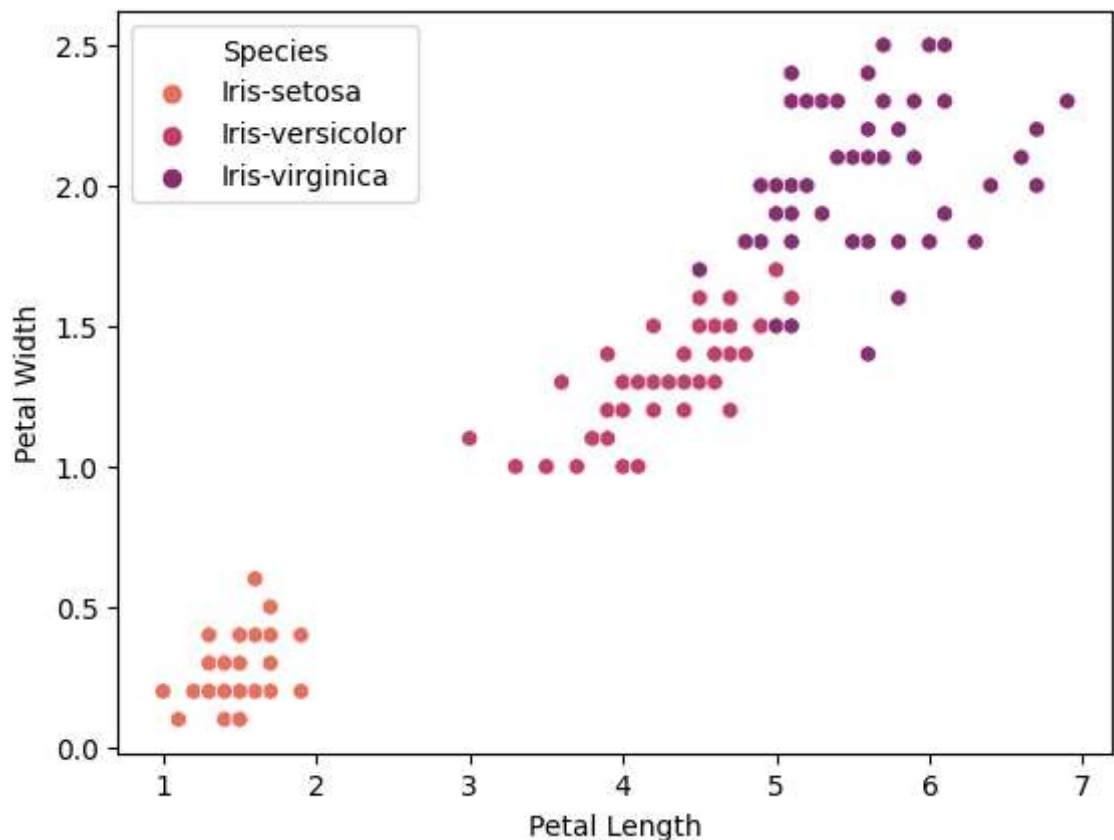
```
In [20]: sns.scatterplot(df,x=df.loc[:, 'SepalLengthCm'],y=df.loc[:, 'SepalWidthCm'],  
                        hue=df.loc[:, 'Species'],palette="ch:s=.25,rot=-.25")  
plt.xlabel("Sepal Length")  
plt.ylabel("Sepal Width")  
plt.show()
```

C:\Users\sindh\anaconda3\lib\site-packages\seaborn\\_oldcore.py:1498: FutureWarning: is\_categorical\_dtype is deprecated and will be removed in a future version. Use isinstance(dtype, CategoricalDtype) instead  
if pd.api.types.is\_categorical\_dtype(vector):  
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if pd.api.types.is\_categorical\_dtype(vector):



```
In [10]: sns.scatterplot(df,x=df.loc[:, 'PetalLengthCm'],y=df.loc[:, 'PetalWidthCm'],  
                        hue=df.loc[:, 'Species'],palette="flare")  
plt.xlabel("Petal Length")  
plt.ylabel("Petal Width")  
plt.show()
```

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```
In [11]: fig, axes = plt.subplots(1, 2)
fig.set_figwidth(20)

sns.boxplot( x=df.iloc[:,1], y=df.loc[:, 'Species'],
             palette="flare", data=df, ax=axes[0])
fig.axes[0].set_xlabel("Sepal Length")

sns.boxplot( x=df.iloc[:,2], y=df.loc[:, 'Species'],
             palette="flare", data=df, ax=axes[1])
fig.axes[1].set_xlabel("Sepal Width")

plt.show()
```

C:\Users\sindh\anaconda3\lib\site-packages\seaborn\\_oldcore.py:1498: FutureWarning: is\_categorical\_dtype is deprecated and will be removed in a future version. Use isinstance(dtype, CategoricalDtype) instead  
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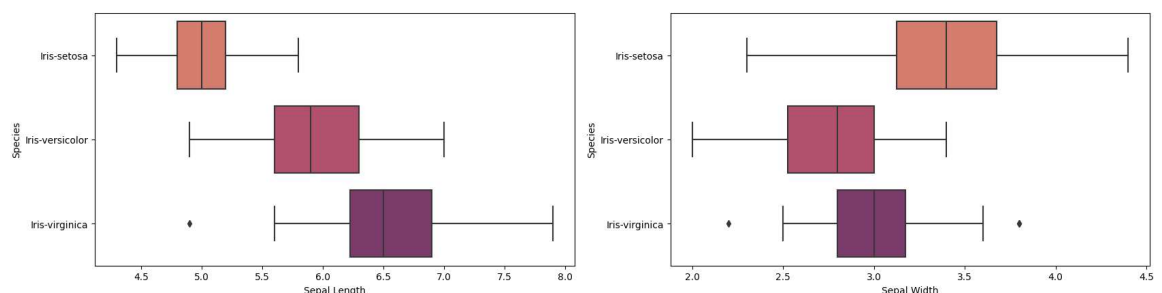
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```
In [12]: fig, axes = plt.subplots(1, 2)
fig.set_figwidth(20)
sns.boxplot( x=df.iloc[:,3], y=df.loc[:, 'Species'],
            palette="flare", data=df, ax=axes[0])
fig.axes[0].set_xlabel("Petal Length")

sns.boxplot( x=df.iloc[:,4], y=df.loc[:, 'Species'],
            palette="flare", data=df, ax=axes[1])
fig.axes[1].set_xlabel("Petal Width")

plt.show()
```

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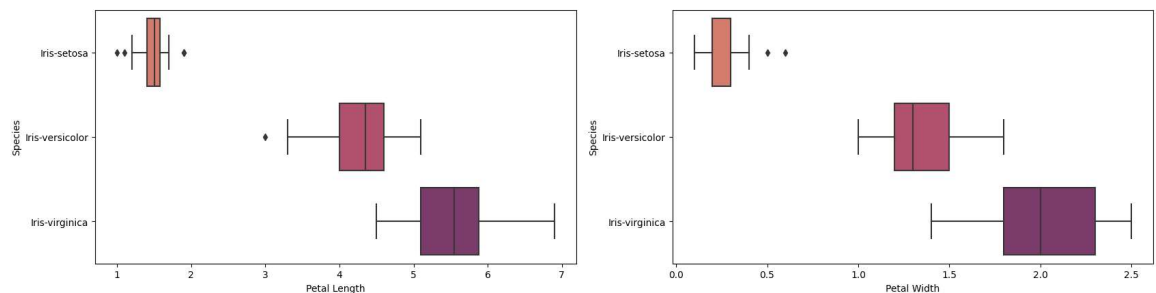
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```
In [13]: from sklearn.neighbors import KNeighborsClassifier
X = df.iloc[:,1:5]
y = df.iloc[:,5]

X_train, X_test, y_train, y_test = train_test_split(X , y ,test_size=0.3, ra
print(X_train.shape,X_test.shape)

(105, 4) (45, 4)
```

```
In [17]: from sklearn.model_selection import train_test_split
from sklearn.neighbors import KNeighborsClassifier

# Assuming you have already defined X and y

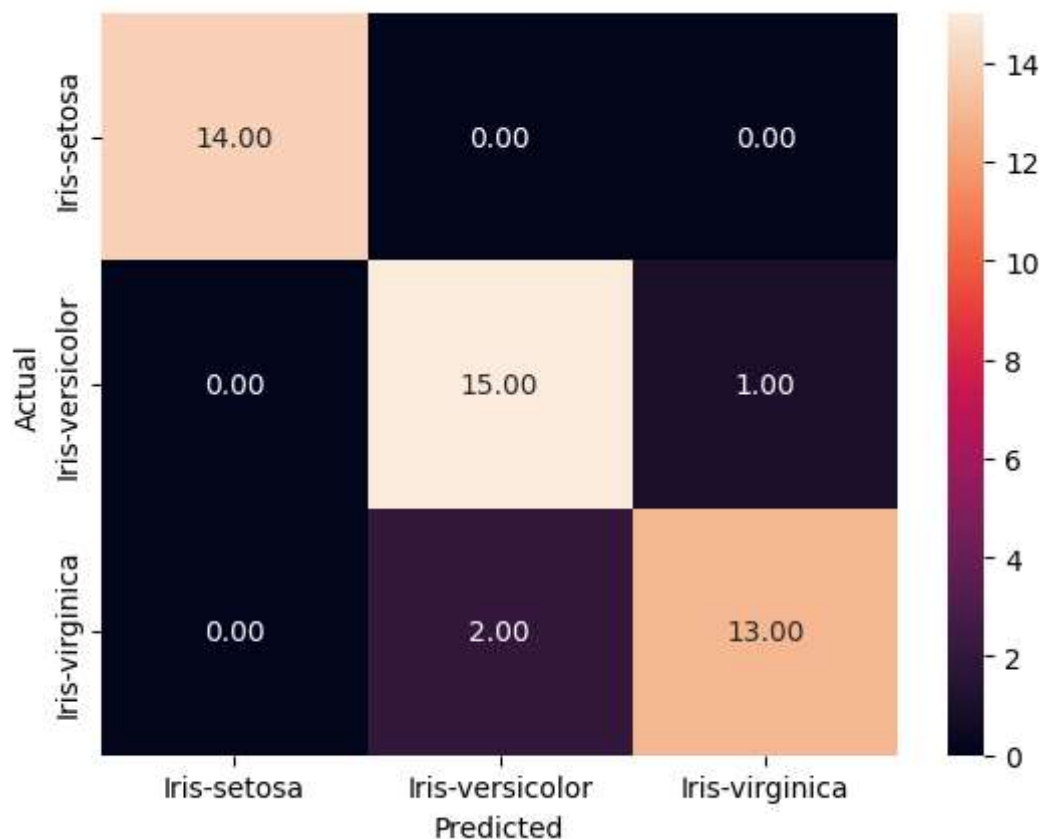
# Step 2: Create and train the KNN classifier
knn = KNeighborsClassifier(algorithm='auto', n_neighbors=3, weights='uniform')

knn.fit(X_train, y_train)

# Step 3: Calculate and print accuracy
acc = knn.score(X_test, y_test)
print("Accuracy:", acc)
```

Accuracy: 0.9333333333333333

```
In [18]: y_pred = knn.predict(X_test)
cm = confusion_matrix(y_test, y_pred)
df_cm = pd.DataFrame(cm, species, species)
sns.heatmap(df_cm, annot=True, fmt='.2f')
plt.xlabel("Predicted")
plt.ylabel("Actual")
plt.show()
```



```
In [19]: print(classification_report(y_pred,y_test))
```

	precision	recall	f1-score	support
Iris-setosa	1.00	1.00	1.00	14
Iris-versicolor	0.94	0.88	0.91	17
Iris-virginica	0.87	0.93	0.90	14
accuracy			0.93	45
macro avg	0.93	0.94	0.94	45
weighted avg	0.93	0.93	0.93	45

```
In [ ]:
```