In [1]:
```
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 [2]:
```
df = pd.read_csv("C:/Users/HP/Downloads/Iris.csv")
df.head()
```

Out[2]:

| | 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 [3]:
```
df.shape
```

Out[3]:
```
(150, 6)
```

In [4]:
```
df.isnull().sum()
```

Out[4]:
```
Id               0
SepalLengthCm    0
SepalWidthCm     0
PetalLengthCm    0
PetalWidthCm     0
Species          0
dtype: int64
```

In [5]:
```
df.describe()
```

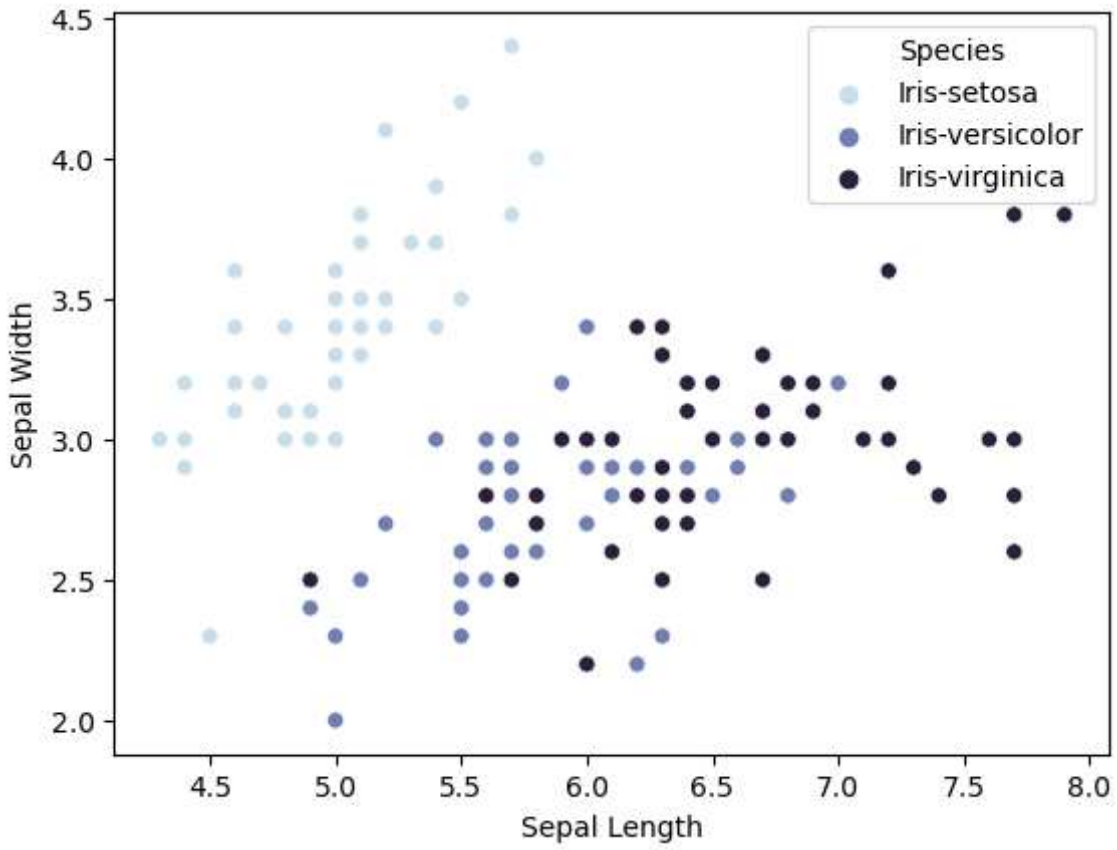
Out[5]:

| | 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 |

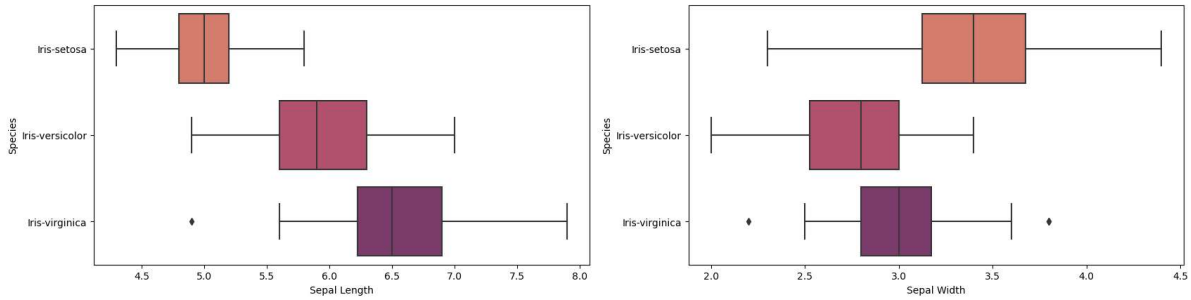
In [6]:
```
species = np.unique(df.loc[:,'Species'])
species
```

Out[6]:
```
array(['Iris-setosa', 'Iris-versicolor', 'Iris-virginica'], dtype=object)
```

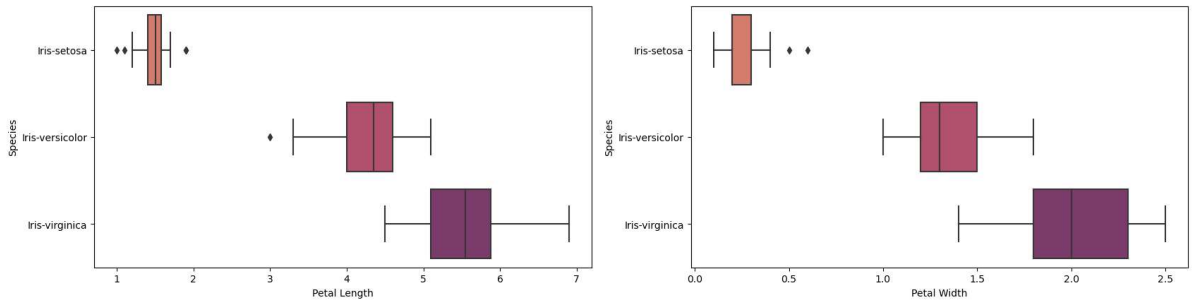
In [7]:
```
sns.scatterplot(df,x=df.loc[:,'SepalLengthCm'],y=df.loc[:,'SepalWidthCm'],
                hue=df.loc[:,'Species'],palette="ch:s=.25,rot=-.25")
plt.xlabel("Sepal Length")
plt.ylabel("Sepal Width")
plt.show()
```



In [8]:
```
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()
```




In [9]:
```
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()
```



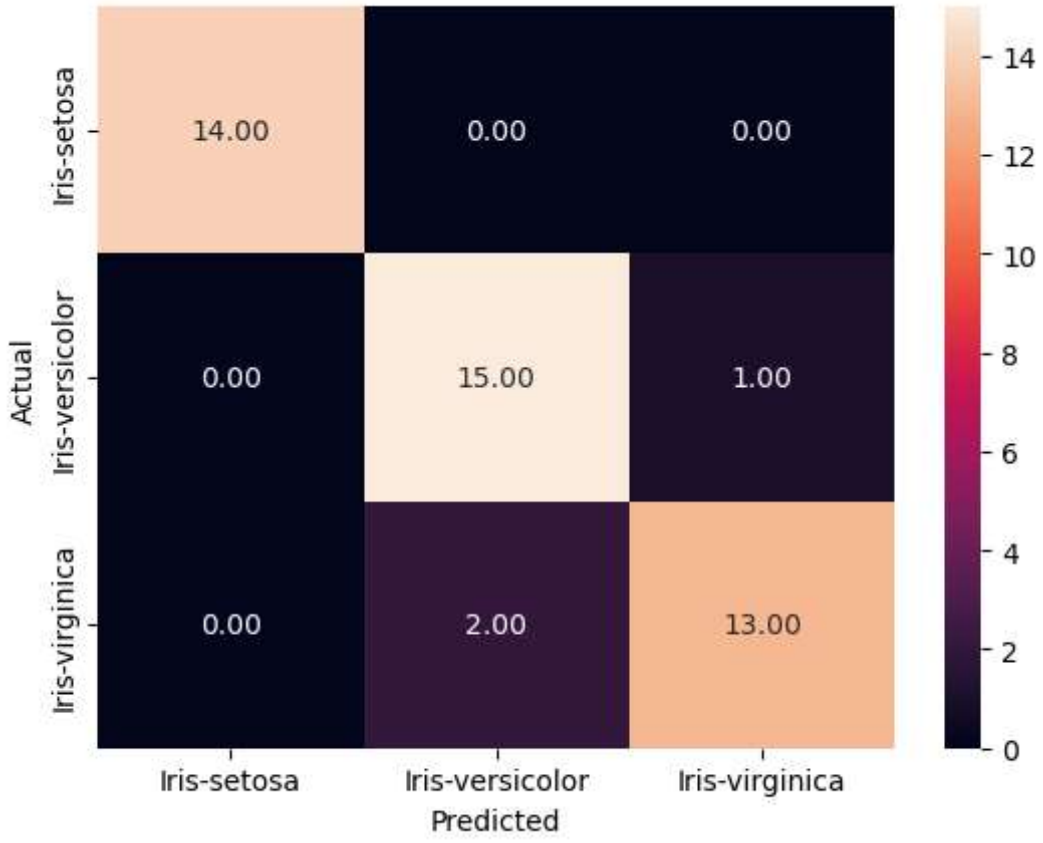

In [10]:
```
X = df.iloc[:,1:5]
y = df.iloc[:,5]

#Split the data to train and test
X_train, X_test, y_train, y_test = train_test_split(X , y ,test_size=0.3, rand
print(X_train.shape,X_test.shape)
```

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

In [11]:
```
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 [12]:
```
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 [13]:
```
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 [ ]: