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/Sayed Janu/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()
```

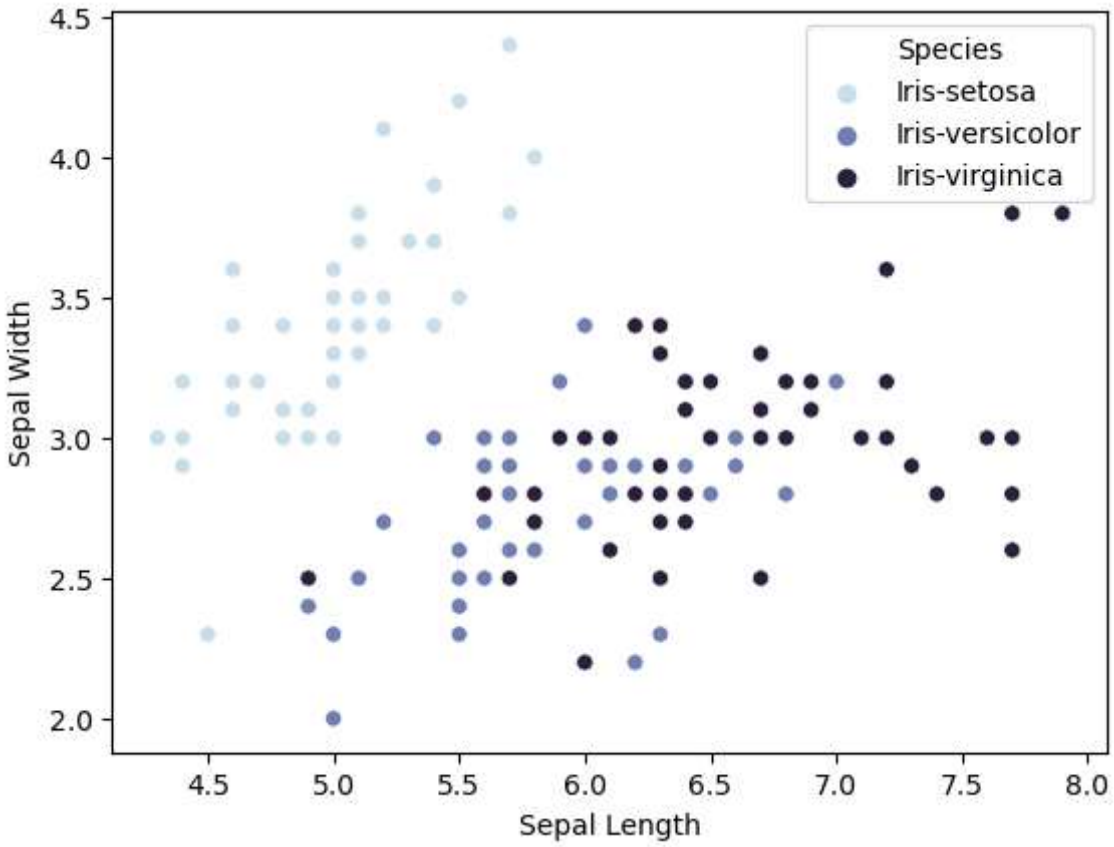
Out[5]:

	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

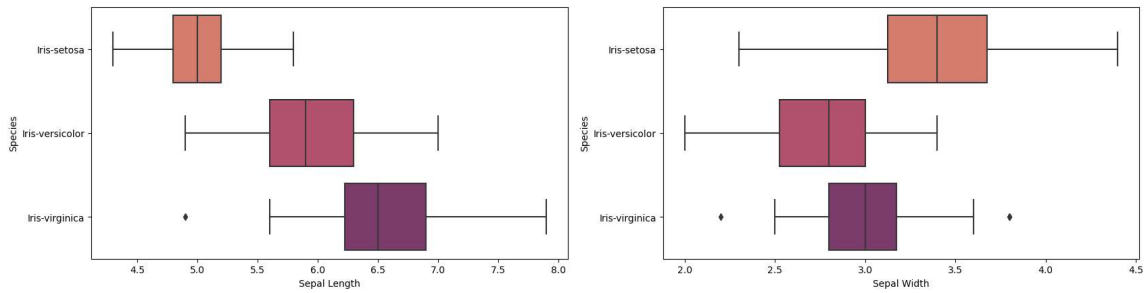
In [6]:
```
species = np.unique(df.loc[:,'Species'])
species
```

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

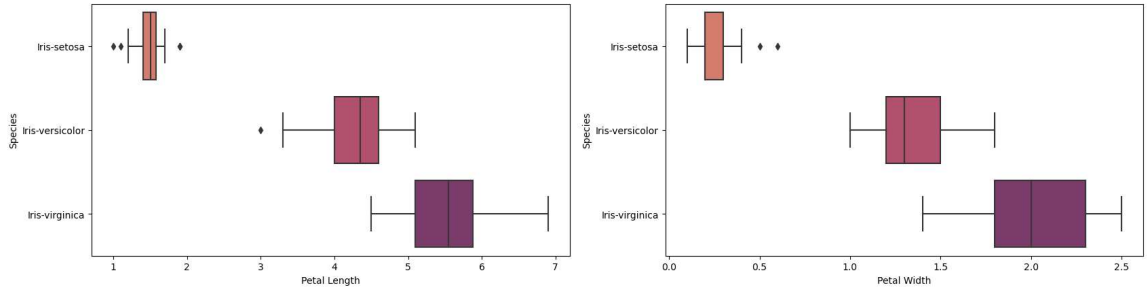
In [7]:
```
sns.scatterplot(df,x=df.loc[:,'SepalLengthCm'],y=df.loc[:,'SepalWidthCm'],
                hue=df.loc[:,'Species'],palette="ch:s=.25,rot=-.25")
plt.xlabel("Sepal Length")
plt.ylabel("Sepal Width")
plt.show()
```



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()
```



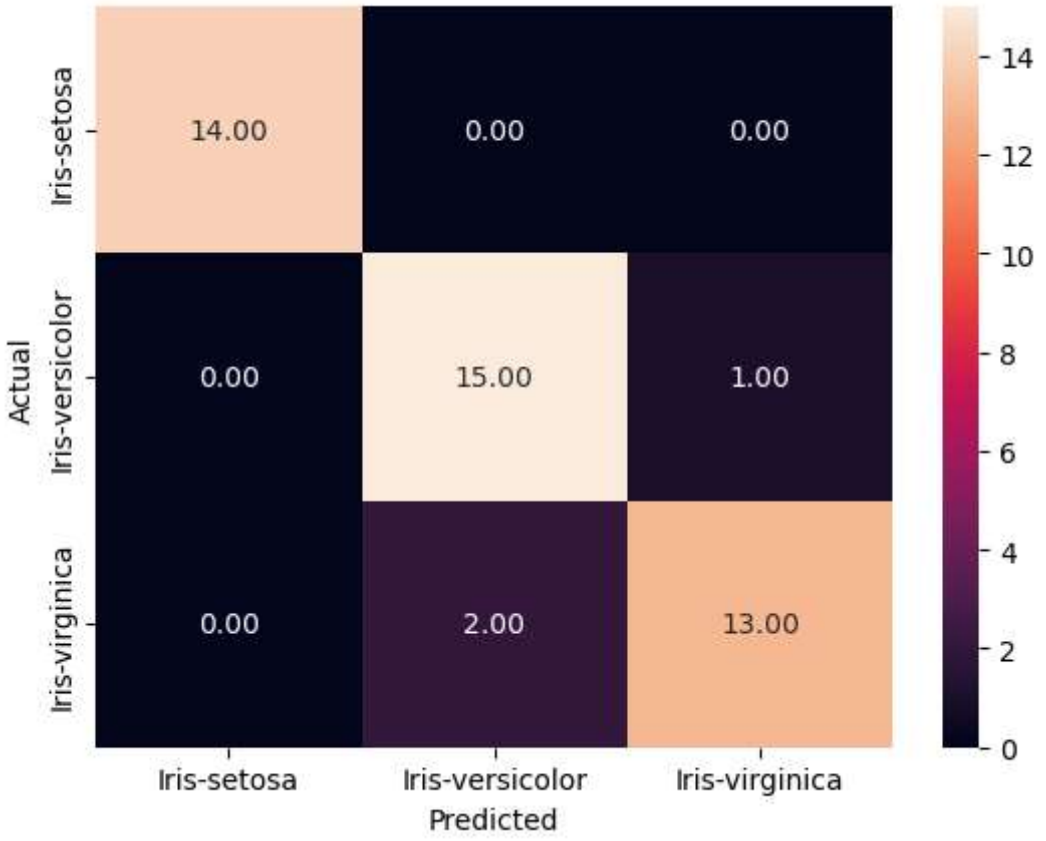
In [19]:
```
X = df.iloc[:,1:5]
y = df.iloc[:,5]

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

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

In [20]:
```
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='unifor

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 [21]:
```
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 [22]:
```
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
```