Task-02 at TECHNOHACKS EDUTECH as Machine Learning intern

Project Name: Classify Iris Flowers

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Import necessary libraries

In [1]:
```
# to read and maintan with the data
import pandas as pd

# to visualize the data
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.metrics import confusion_matrix

# to model and classify the data
from sklearn.model_selection import train_test_split
from sklearn.svm import SVC
from sklearn.metrics import accuracy_score, classification_report
from sklearn.preprocessing import LabelEncoder
```

Load Data

In [11]:
```
df = pd.read_csv( 'iris.data', names = ['Sepal Length', 'Sepal Width', 'Pe
```

In [12]:
```
df.head()
```

Out[12]:

	Sepal Length	Sepal Width	Petal Length	Petal Width	Species
0	5.1	3.5	1.4	0.2	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
2	4.7	3.2	1.3	0.2	Iris-setosa
3	4.6	3.1	1.5	0.2	Iris-setosa
4	5.0	3.6	1.4	0.2	Iris-setosa

In [ ]:
```

```

In [13]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 5 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   Sepal Length  150 non-null    float64
 1   Sepal Width   150 non-null    float64
 2   Petal Length  150 non-null    float64
 3   Petal Width   150 non-null    float64
 4   Species       150 non-null    object 
dtypes: float64(4), object(1)
memory usage: 6.0+ KB
```

In [14]:
```
df.describe().T
```

Out[14]:

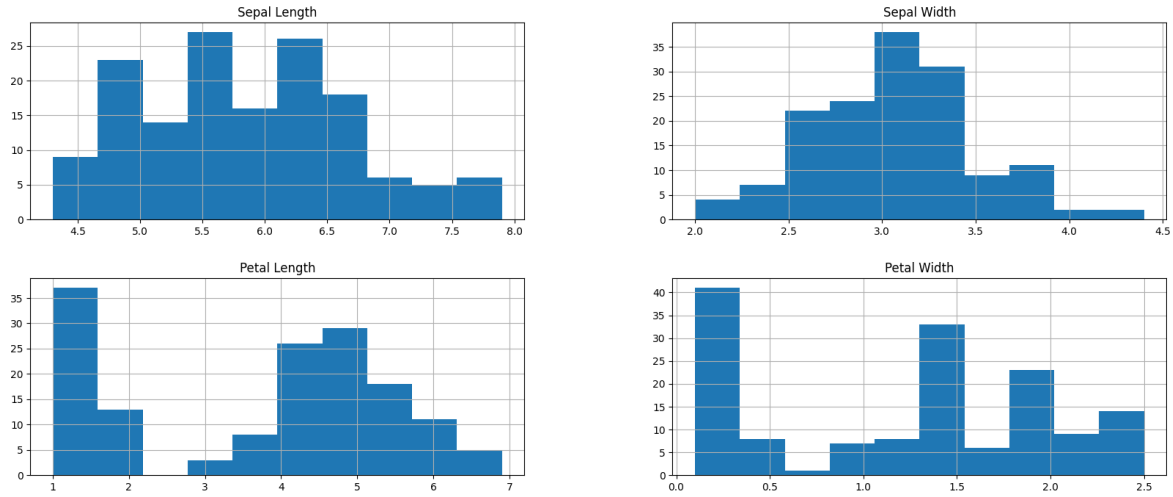
	count	mean	std	min	25%	50%	75%	max
Sepal Length	150.0	5.843333	0.828066	4.3	5.1	5.80	6.4	7.9
Sepal Width	150.0	3.054000	0.433594	2.0	2.8	3.00	3.3	4.4
Petal Length	150.0	3.758667	1.764420	1.0	1.6	4.35	5.1	6.9
Petal Width	150.0	1.198667	0.763161	0.1	0.3	1.30	1.8	2.5

Visualizations

Histogram

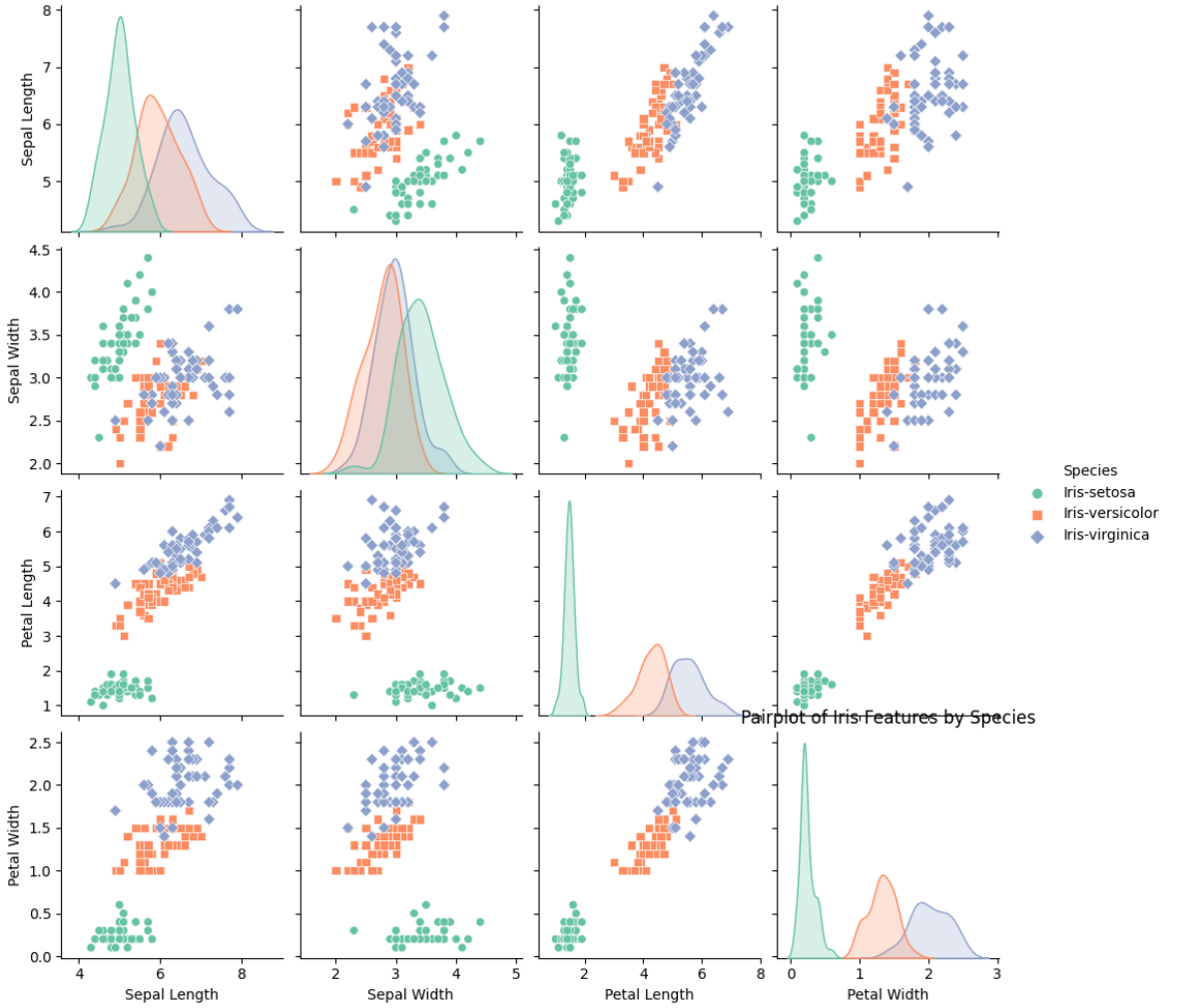
In [15]:
```
df.hist(figsize=(20, 8))
```

Out[15]:
```
array([[<AxesSubplot: title={'center': 'Sepal Length'}>,
        <AxesSubplot: title={'center': 'Sepal Width'}>],
       [<AxesSubplot: title={'center': 'Petal Length'}>,
        <AxesSubplot: title={'center': 'Petal Width'}>]], dtype=object)
```



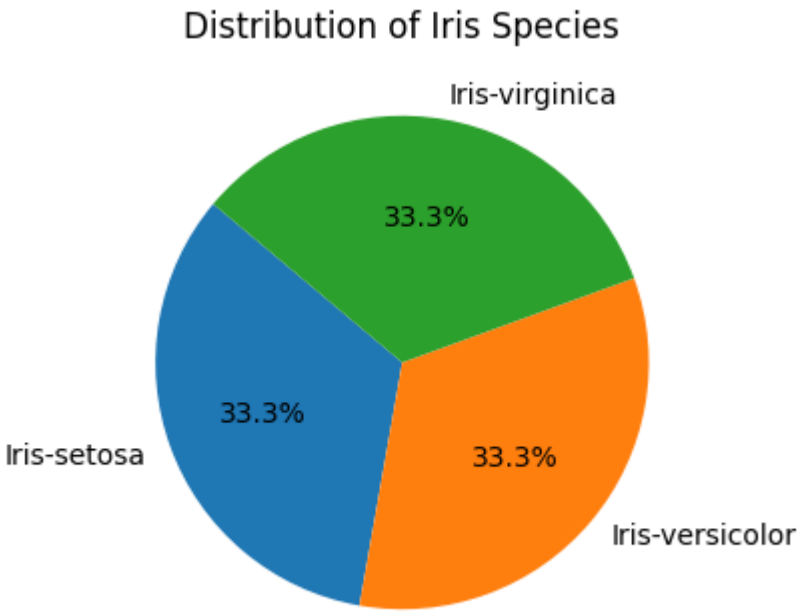
Pairplot for feature visualization

In [16]:
```
sns.pairplot(data=df, hue='Species', markers=['o', 's', 'D'], palette='Set
plt.title('Pairplot of Iris Features by Species')
plt.show()
```



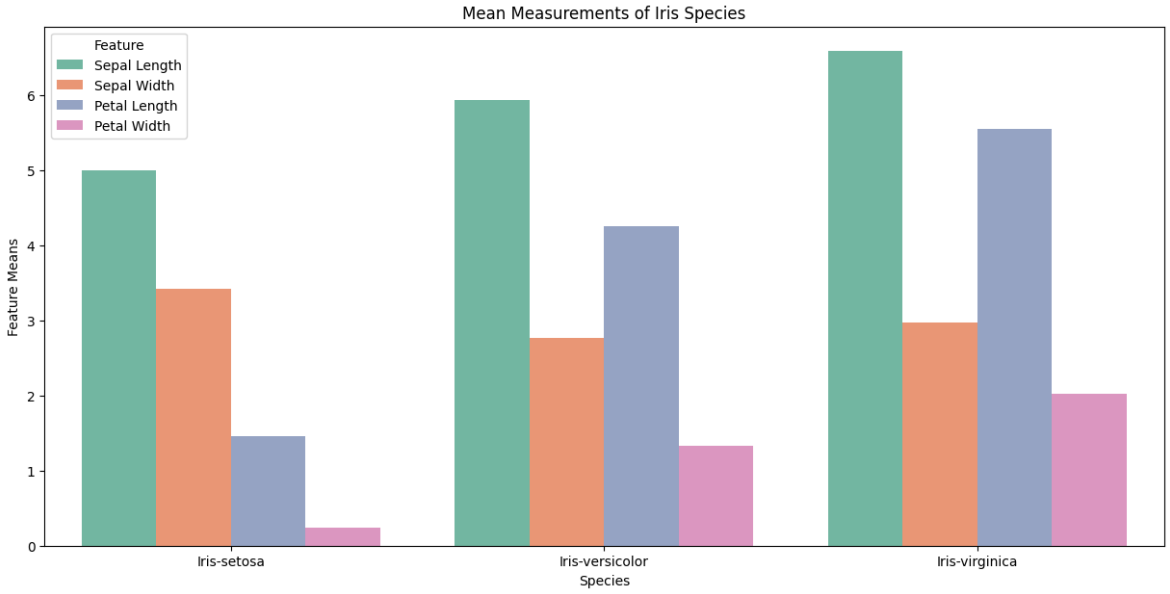
Pei Chart

In [17]:
```
# Count the number of occurrences of each species
species_counts = df['Species'].value_counts()

# Extract the species names and their respective counts
species = species_counts.index
counts = species_counts.values

# Create a pie chart using Matplotlib
plt.figure(figsize=(5, 4))
plt.pie(counts, labels=species, autopct='%1.1f%%', startangle=140)

# Add a title
plt.title('Distribution of Iris Species')

# Show the pie chart
plt.show()
```



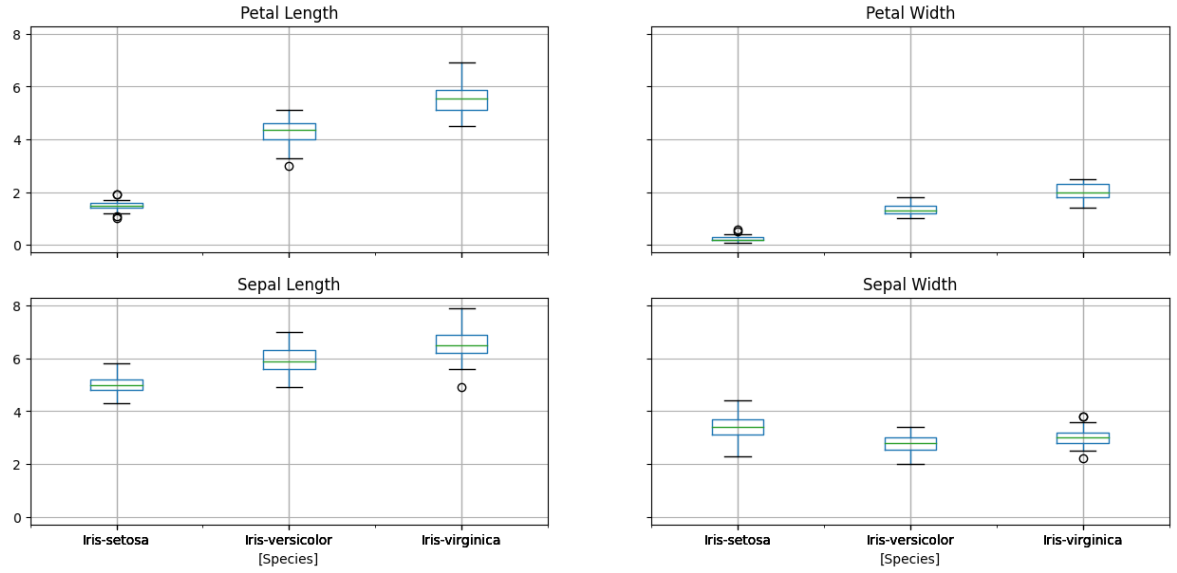
Bar Chart

In [18]:
```
# Group data by 'Species' and calculate the mean of each feature
grouped_data = df.groupby('Species').mean().reset_index()

# Melt the data for Seaborn's barplot
melted_data = pd.melt(grouped_data, id_vars=['Species'], var_name='Feature

# Define a custom color palette
custom_palette = sns.color_palette("Set2", len(melted_data['Feature'].uniq

# Create a grouped bar chart using Seaborn with custom colors
plt.figure(figsize=(15, 7))
sns.barplot(x='Species', y='Mean', hue='Feature', data=melted_data, palett

# Add labels and a legend
plt.xlabel('Species')
plt.ylabel('Feature Means')
plt.title('Mean Measurements of Iris Species')
plt.legend(title='Feature', loc='upper left')

# Show the chart
plt.show()
```



Box plot

In [19]:
```
df.boxplot(by='Species', figsize=(15, 7))
plt.suptitle('')
plt.show()
```



A ML Model To Calassify the Data

In [24]:
```
# Split data into features and target variable
X = df[['Sepal Length', 'Sepal Width', 'Petal Length', 'Petal Width']]
y = df['Species']

# Encode the target variable
label_encoder = LabelEncoder()
y = label_encoder.fit_transform(y)

# Split data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, r

# Initialize and train the SVM classifier
clf = SVC(kernel='linear', C=1)
clf.fit(X_train, y_train)

# Make predictions
y_pred = clf.predict(X_test)
```

Evaluate the model

In [25]:
```
accuracy = accuracy_score(y_test, y_pred)
print(f'Accuracy: {accuracy * 100 } %')
```

```
Accuracy: 100.0 %
```

classification report

In [26]:
```
# Get the classification report as a string
report_str = classification_report(y_test, y_pred, target_names=label_enco

# Convert the classification report to a DataFrame
report_df = pd.DataFrame(report_str).transpose()
report_df
```

Out[26]:

	precision	recall	f1-score	support
Iris-setosa	1.0	1.0	1.0	8.0
Iris-versicolor	1.0	1.0	1.0	12.0
Iris-virginica	1.0	1.0	1.0	10.0
accuracy	1.0	1.0	1.0	1.0
macro avg	1.0	1.0	1.0	30.0
weighted avg	1.0	1.0	1.0	30.0

Confusion Matrix

In [27]:
```
cm = confusion_matrix(y_test, y_pred)
plt.figure(figsize=(8, 6))
sns.heatmap(cm, annot=True, fmt='d', cmap='Blues', xticklabels=label_encod
plt.xlabel('Predicted')
plt.ylabel('Actual')
plt.title('Confusion Matrix')
plt.show()
```