```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder
from sklearn.svm import SVC
from sklearn.metrics import accuracy_score, classification_report
```

```
df = pd.read_csv('IRIS.csv')
df
```

	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
...	...	...	...	...	...
145	6.7	3.0	5.2	2.3	Iris-virginica
146	6.3	2.5	5.0	1.9	Iris-virginica
147	6.5	3.0	5.2	2.0	Iris-virginica
148	6.2	3.4	5.4	2.3	Iris-virginica
149	5.9	3.0	5.1	1.8	Iris-virginica

150 rows × 5 columns

Next steps: Generate code with df View recommended plots New interactive sheet

```
df.head(10)
```

	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
5	5.4	3.9	1.7	0.4	Iris-setosa
6	4.6	3.4	1.4	0.3	Iris-setosa
7	5.0	3.4	1.5	0.2	Iris-setosa
8	4.4	2.9	1.4	0.2	Iris-setosa
9	4.9	3.1	1.5	0.1	Iris-setosa

Next steps: Generate code with df View recommended plots New interactive sheet

```
df.tail(10)
```

	sepal_length	sepal_width	petal_length	petal_width	species
140	6.7	3.1	5.6	2.4	Iris-virginica
141	6.9	3.1	5.1	2.3	Iris-virginica
142	5.8	2.7	5.1	1.9	Iris-virginica
143	6.8	3.2	5.9	2.3	Iris-virginica
144	6.7	3.3	5.7	2.5	Iris-virginica
145	6.7	3.0	5.2	2.3	Iris-virginica
146	6.3	2.5	5.0	1.9	Iris-virginica
147	6.5	3.0	5.2	2.0	Iris-virginica
148	6.2	3.4	5.4	2.3	Iris-virginica
149	5.9	3.0	5.1	1.8	Iris-virginica

```
df.shape
```

```
(150, 5)
```

```
df.size
```

```
750
```

```
df.columns
```

```
Index(['sepal_length', 'sepal_width', 'petal_length', 'petal_width',
       'species'],
      dtype='object')
```

```
df.dtypes
```

	0
sepal_length	float64
sepal_width	float64
petal_length	float64
petal_width	float64
species	object

```
dtype: object
```

```
df.describe()
```

	sepal_length	sepal_width	petal_length	petal_width
count	150.000000	150.000000	150.000000	150.000000
mean	5.843333	3.054000	3.758667	1.198667
std	0.828066	0.433594	1.764420	0.763161
min	4.300000	2.000000	1.000000	0.100000
25%	5.100000	2.800000	1.600000	0.300000
50%	5.800000	3.000000	4.350000	1.300000
75%	6.400000	3.300000	5.100000	1.800000
max	7.900000	4.400000	6.900000	2.500000

```
df.isnull().sum()
```

```
              0
sepal_length  0
 sepal_width  0
petal_length  0
 petal_width  0
     species  0

dtype: int64
```

```
df.duplicated().sum()
```

```
3
```

```
df  = df.drop_duplicates()
```

```
df.empty
```

```
False
```

```
df.dropna()
```

```
     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
 ...          ...          ...           ...          ...             ...
145           6.7          3.0           5.2          2.3  Iris-virginica
146           6.3          2.5           5.0          1.9  Iris-virginica
147           6.5          3.0           5.2          2.0  Iris-virginica
148           6.2          3.4           5.4          2.3  Iris-virginica
149           5.9          3.0           5.1          1.8  Iris-virginica

147 rows × 5 columns
```

```
X = df.iloc[:, :-1]
Y = df.iloc[:, -1]
```

```
if Y.dtype == 'object':
    le = LabelEncoder()
    Y = le.fit_transform(Y)
```

```
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.2, random_state=42)
```

```
model = SVC(kernel='linear')
```

```
model.fit(X_train, Y_train)
```

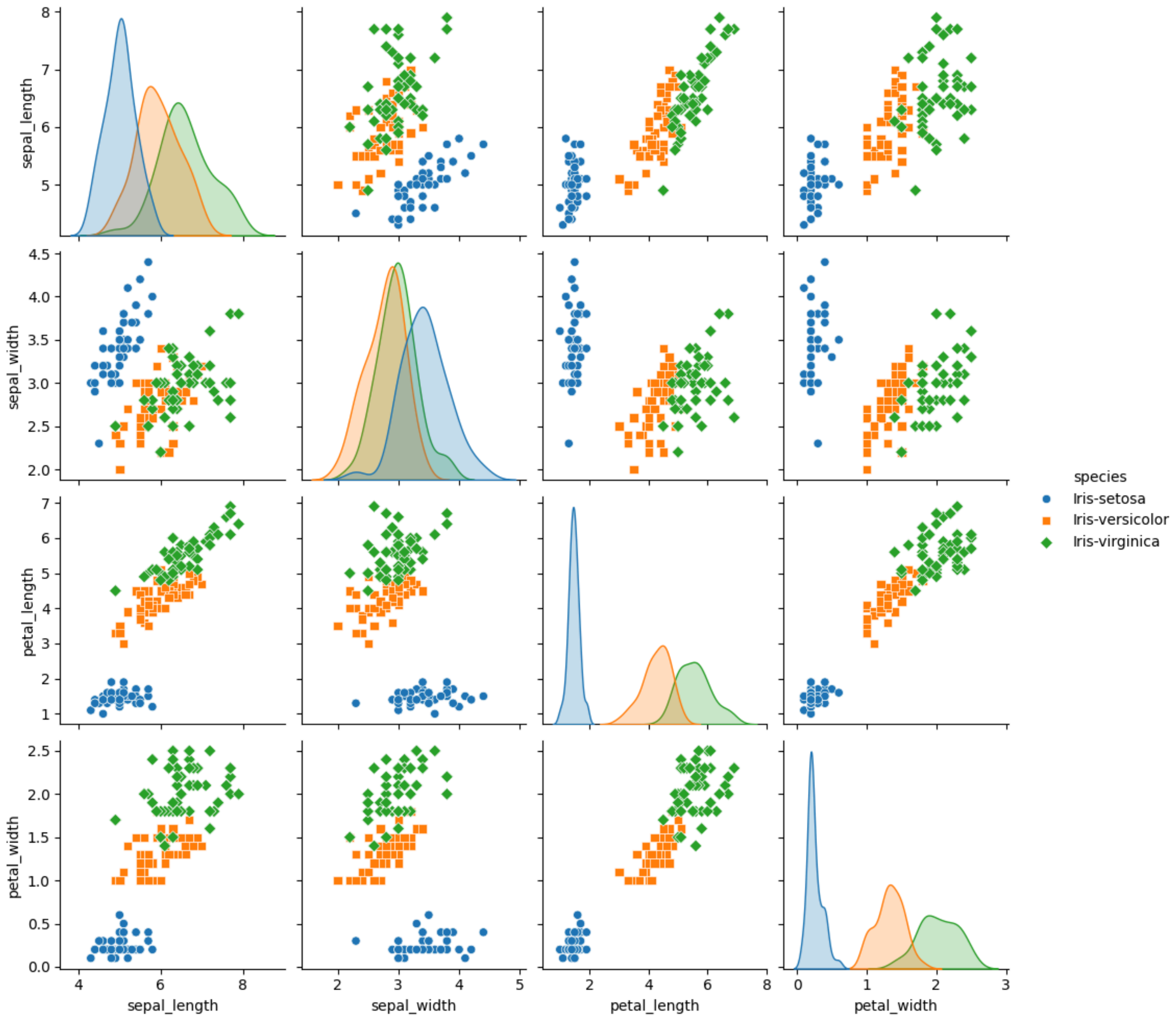
```
▾     SVC
SVC(kernel='linear')
```

```
y_pred = model.predict(X_test)
```

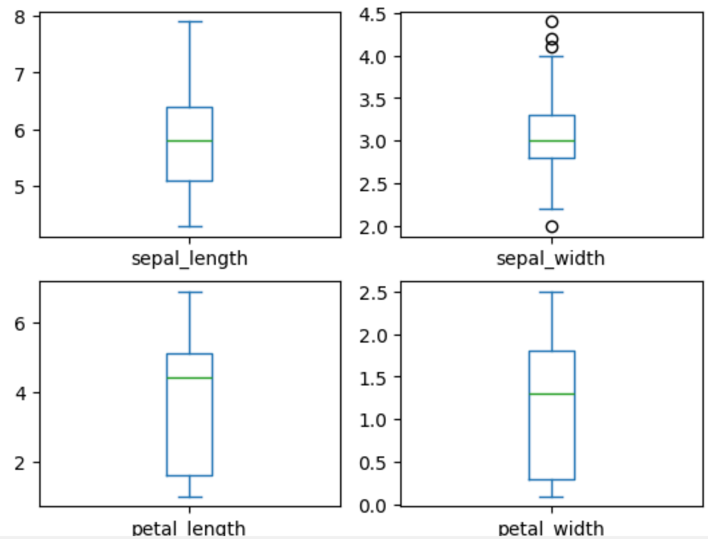
```
print("Accuracy:", accuracy_score(Y_test, y_pred))
print("Classification Report:\n", classification_report(Y_test, y_pred))
```

```
Accuracy: 0.9666666666666667
Classification Report:
               precision    recall  f1-score   support

           0       1.00      1.00      1.00        11
           1       1.00      0.90      0.95        10
           2       0.90      1.00      0.95         9

    accuracy                           0.97        30
   macro avg       0.97      0.97      0.96        30
weighted avg       0.97      0.97      0.97        30
```

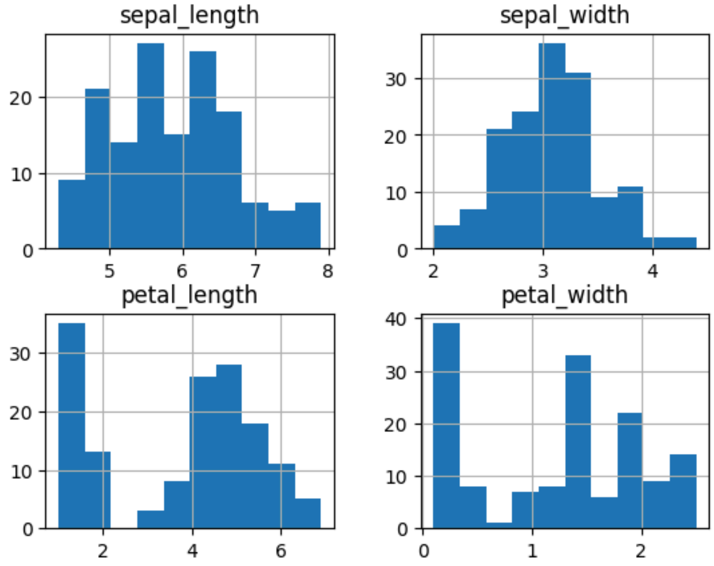
```
sns.pairplot(df, hue='species', markers=["o", "s", "D"])
plt.show()
```



```
df.plot(kind='box', subplots=True, layout=(2,2), sharex=False, sharey=False)
plt.show()
```



```
df.hist()
plt.show()
```


sepal_length
sepal_width
petal_length
petal_width