In [5]:

```python
import pandas as p
from sklearn import metrics
from sklearn import svm
from sklearn.tree import DecisionTreeClassifier
from sklearn.model_selection import train_test_split
import matplotlib.pyplot as mplot
```

In [6]:

```python
iris = p.read_csv('IRIS.csv')
iris.head()
```

Out[6]:

|	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 [7]:

```python
species = ['Iris-virginica', 'Iris-setosa', 'Iris-versicolor']
slices = [8,11,7]
color = ['r','g','b']
mplot.pie(slices, labels=species, colors=color, shadow=True, startangle=90, explode=(1,0
mplot.legend()
mplot.show()
```
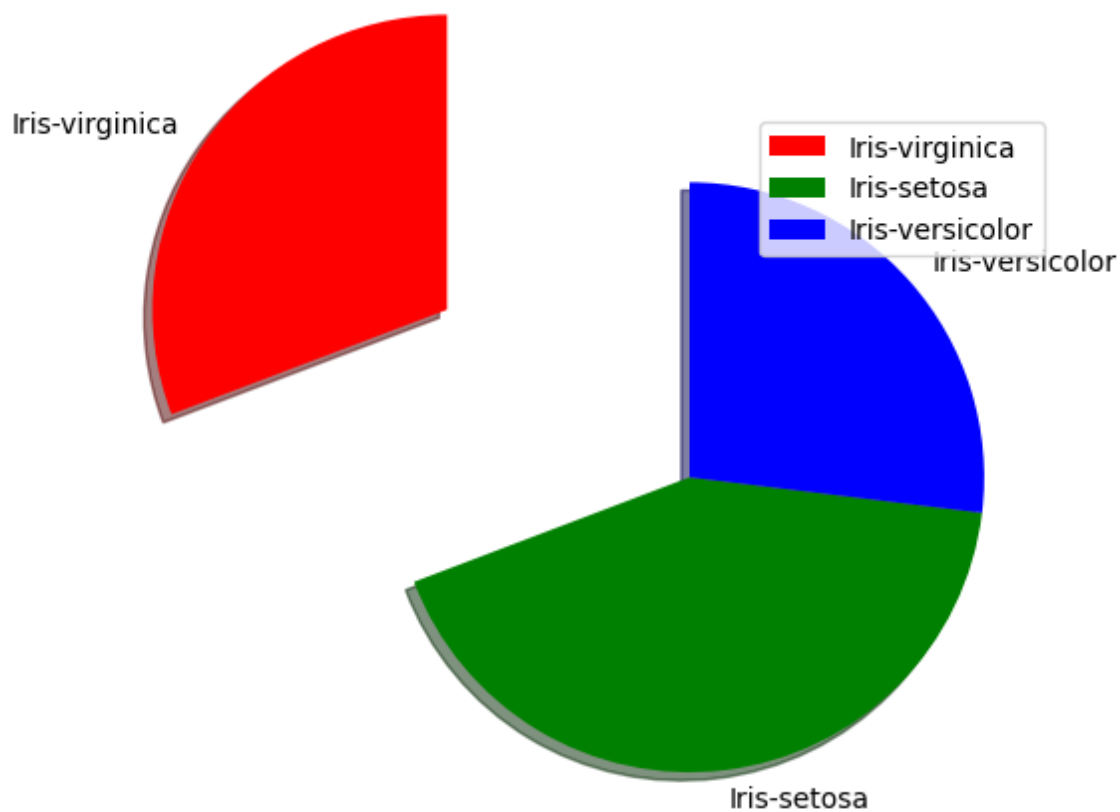
In [8]:

```python
species = ['Iris-virginica', 'Iris-setosa', 'Iris-versicolor']
slices = [8,11,7]
color = ['r','g','b']
mplot.pie(slices, labels=species, colors=color, shadow=True, startangle=90, explode=(0,0
mplot.legend()
mplot.show()
```
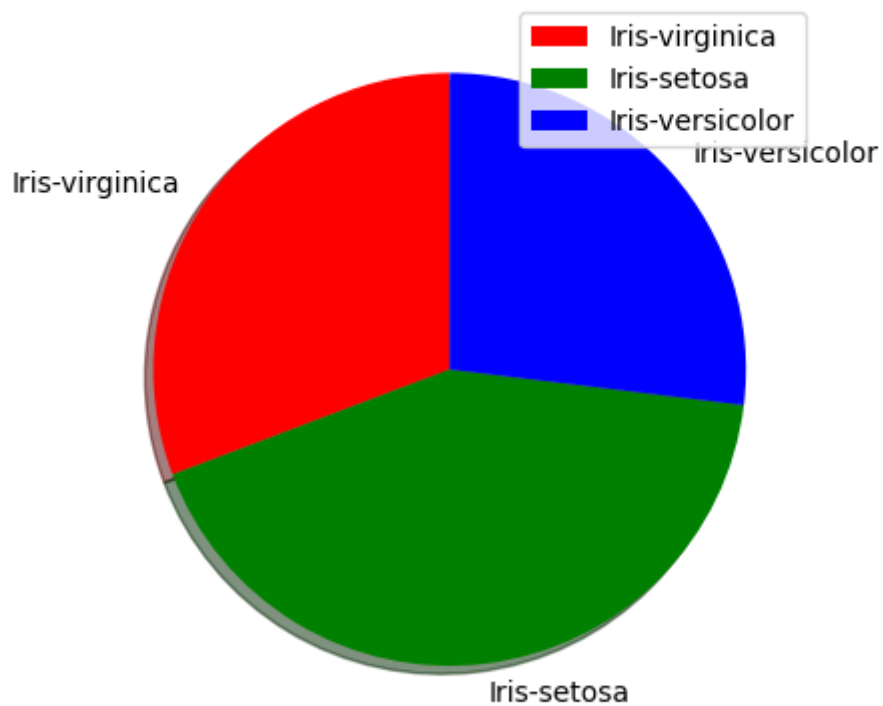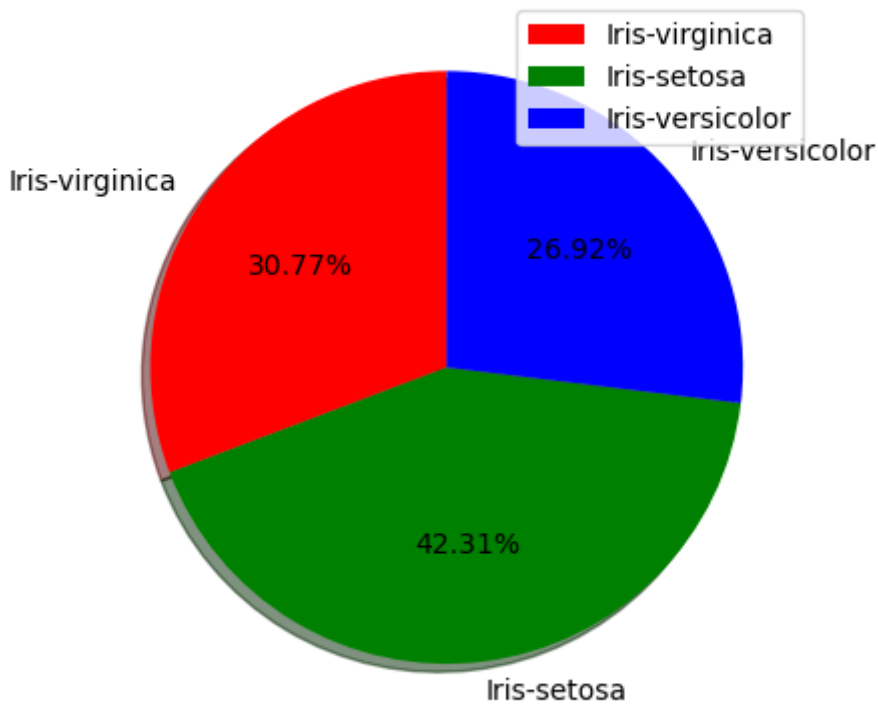
In [9]:

```python
species = ['Iris-virginica', 'Iris-setosa', 'Iris-versicolor']
slices = [8,11,7]
color = ['r','g','b']
mplot.pie(slices, labels=species, colors=color, shadow=True, startangle=90, autopct='%1.
mplot.legend()
mplot.show()
```


In [10]:

```python
#scatterplot
colors=['red', 'blue','black']
species =['Iris-virginica', 'Iris-setosa', 'Iris-versicolor']
```
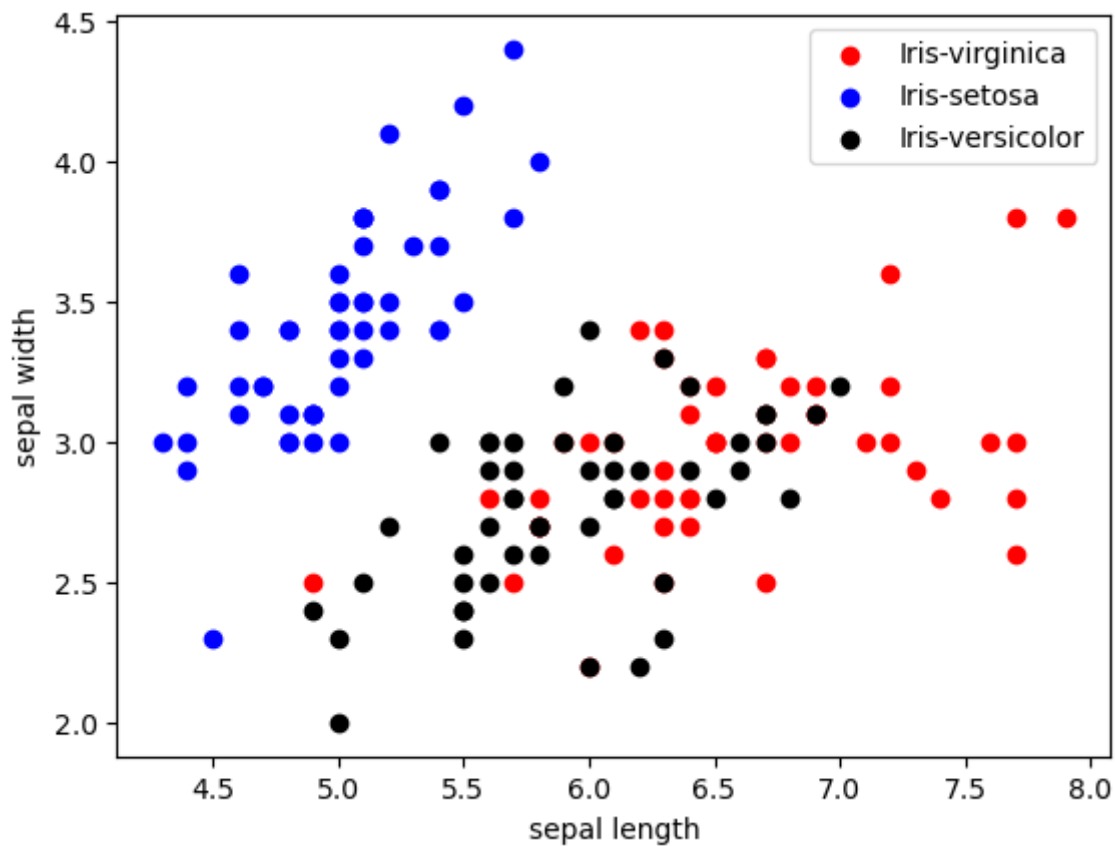
In [11]:

```python
for i in range(3):
    x=iris[iris['species']==species[i]]
    mplot.scatter(x['sepal_length'], x['sepal_width'], c=colors[i], label=species[i])
mplot.xlabel("sepal length")
mplot.ylabel("sepal width")
mplot.legend()
```

Out[11]:

<matplotlib.legend.Legend at 0x1fc8a2b3940>

In [12]:

```python
for i in range(3):
    x=iris[iris['species']==species[i]]
    mplot.scatter(x['petal_length'], x['petal_width'], c=colors[i], label=species[i])
mplot.xlabel("Petal length")
mplot.ylabel("Petal width")
mplot.legend()
```
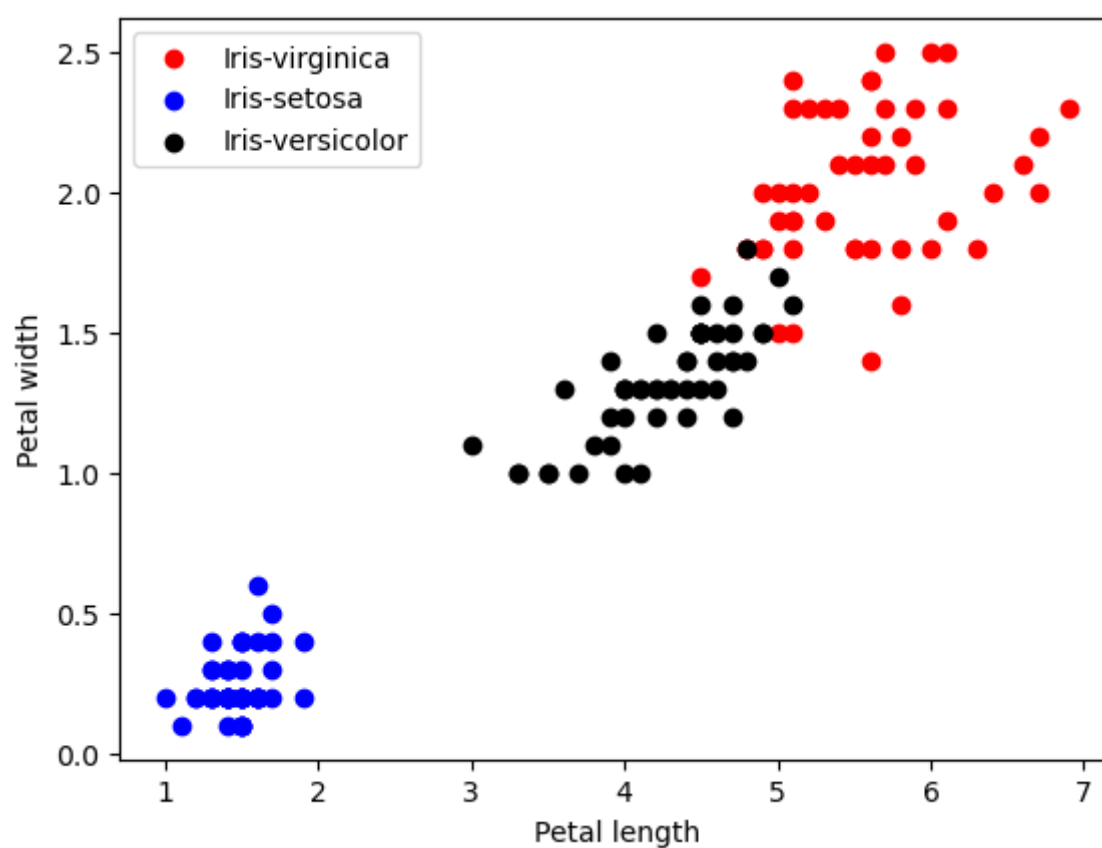
Out[12]:

<matplotlib.legend.Legend at 0x1fc8a4be460>

In [13]:

```python
#histrogram
iris['sepal_length'].hist(color="black")
```

Out[13]:

<AxesSubplot:>
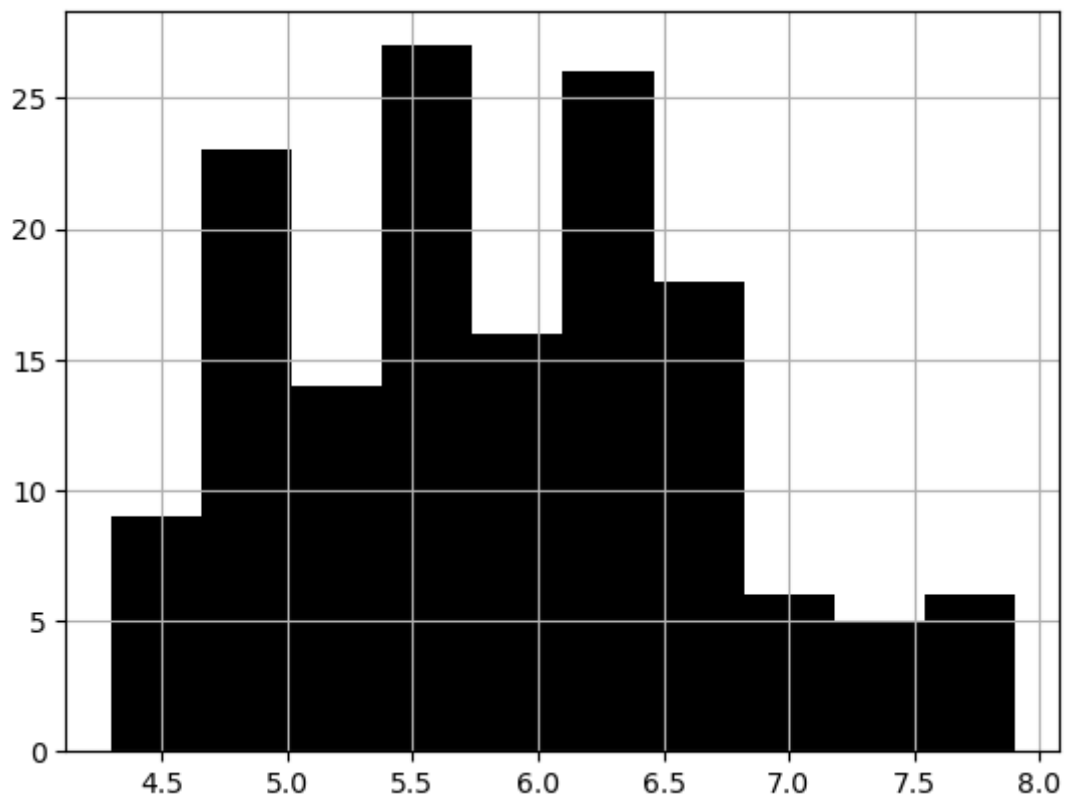
In [14]:

```python
iris['sepal_width'].hist(color="green")
```

Out[14]:

```
<AxesSubplot:>
```
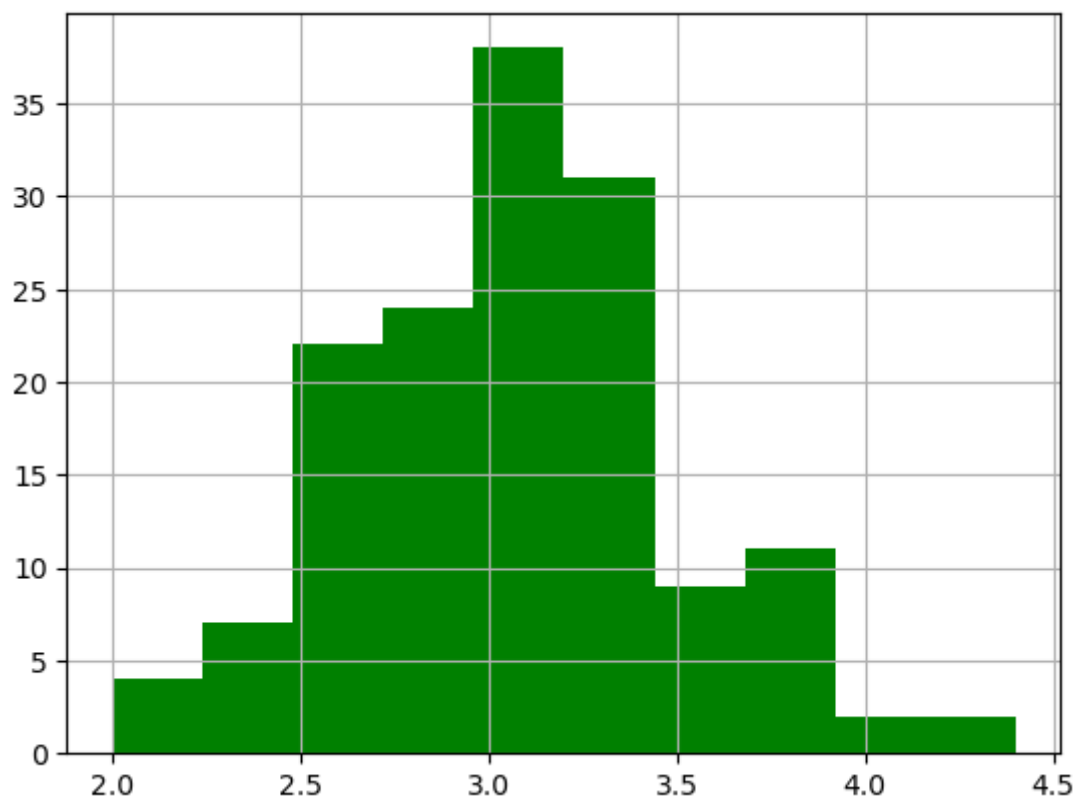

In [15]:

```python
iris.describe()
```

Out[15]:

	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

In [16]:

```python
iris.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 [17]:

```python
iris['species'].value_counts()
```

Out[17]:

```
Iris-setosa        50
Iris-versicolor    50
Iris-virginica     50
Name: species, dtype: int64
```

In [18]:

```python
iris.isnull().sum()
```

Out[18]:

```
sepal_length    0
sepal_width     0
petal_length    0
petal_width     0
species         0
dtype: int64
```

In [19]:

```python
train, test = train_test_split (iris, test_size=0.25)
```

In [20]:

```
train
```

Out[20]:

	sepal_length	sepal_width	petal_length	petal_width	species
40	5.0	3.5	1.3	0.3	Iris-setosa
126	6.2	2.8	4.8	1.8	Iris-virginica
88	5.6	3.0	4.1	1.3	Iris-versicolor
125	7.2	3.2	6.0	1.8	Iris-virginica
82	5.8	2.7	3.9	1.2	Iris-versicolor
...	...	...	...	...	...
113	5.7	2.5	5.0	2.0	Iris-virginica
27	5.2	3.5	1.5	0.2	Iris-setosa
36	5.5	3.5	1.3	0.2	Iris-setosa
87	6.3	2.3	4.4	1.3	Iris-versicolor
15	5.7	4.4	1.5	0.4	Iris-setosa

112 rows × 5 columns

In [21]:

```
test
```

Out[21]:

	sepal_length	sepal_width	petal_length	petal_width	species
134	6.1	2.6	5.6	1.4	Iris-virginica
99	5.7	2.8	4.1	1.3	Iris-versicolor
33	5.5	4.2	1.4	0.2	Iris-setosa
137	6.4	3.1	5.5	1.8	Iris-virginica
26	5.0	3.4	1.6	0.4	Iris-setosa
140	6.7	3.1	5.6	2.4	Iris-virginica
37	4.9	3.1	1.5	0.1	Iris-setosa
7	5.0	3.4	1.5	0.2	Iris-setosa
56	6.3	3.3	4.7	1.6	Iris-versicolor
77	6.7	3.0	5.0	1.7	Iris-versicolor
136	6.3	3.4	5.6	2.4	Iris-virginica
60	5.0	2.0	3.5	1.0	Iris-versicolor
20	5.4	3.4	1.7	0.2	Iris-setosa
84	5.4	3.0	4.5	1.5	Iris-versicolor
41	4.5	2.3	1.3	0.3	Iris-setosa
68	6.2	2.2	4.5	1.5	Iris-versicolor
19	5.1	3.8	1.5	0.3	Iris-setosa
10	5.4	3.7	1.5	0.2	Iris-setosa
102	7.1	3.0	5.9	2.1	Iris-virginica
123	6.3	2.7	4.9	1.8	Iris-virginica
141	6.9	3.1	5.1	2.3	Iris-virginica
48	5.3	3.7	1.5	0.2	Iris-setosa
120	6.9	3.2	5.7	2.3	Iris-virginica
79	5.7	2.6	3.5	1.0	Iris-versicolor
25	5.0	3.0	1.6	0.2	Iris-setosa
112	6.8	3.0	5.5	2.1	Iris-virginica
104	6.5	3.0	5.8	2.2	Iris-virginica
143	6.8	3.2	5.9	2.3	Iris-virginica
34	4.9	3.1	1.5	0.1	Iris-setosa
31	5.4	3.4	1.5	0.4	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
129	7.2	3.0	5.8	1.6	Iris-virginica
107	7.3	2.9	6.3	1.8	Iris-virginica
70	5.9	3.2	4.8	1.8	Iris-versicolor
128	6.4	2.8	5.6	2.1	Iris-virginica
49	5.0	3.3	1.4	0.2	Iris-setosa
54	6.5	2.8	4.6	1.5	Iris-versicolor

	sepal_length	sepal_width	petal_length	petal_width	species
69	5.6	2.5	3.9	1.1	Iris-versicolor

In [22]:

```python
train_x = train[['sepal_length', 'sepal_width', 'petal_length', 'petal_width']]
```

In [23]:

```python
train_y = train.species
```

In [24]:

```python
train_x
```

Out[24]:

	sepal_length	sepal_width	petal_length	petal_width
40	5.0	3.5	1.3	0.3
126	6.2	2.8	4.8	1.8
88	5.6	3.0	4.1	1.3
125	7.2	3.2	6.0	1.8
82	5.8	2.7	3.9	1.2
...	...	...	...	...
113	5.7	2.5	5.0	2.0
27	5.2	3.5	1.5	0.2
36	5.5	3.5	1.3	0.2
87	6.3	2.3	4.4	1.3
15	5.7	4.4	1.5	0.4

112 rows × 4 columns

In [25]:

```python
train_y
```

Out[25]:

```
40         Iris-setosa
126     Iris-virginica
88     Iris-versicolor
125     Iris-virginica
82     Iris-versicolor
            ...
113     Iris-virginica
27         Iris-setosa
36         Iris-setosa
87     Iris-versicolor
15         Iris-setosa
Name: species, Length: 112, dtype: object
```

In [26]:

```python
test_x = test[['sepal_length', 'sepal_width', 'petal_length', 'petal_width']]
```

In [27]:

```python
test_y = test.species
```

In [28]:

```
test_x
```

Out[28]:

	sepal_length	sepal_width	petal_length	petal_width
134	6.1	2.6	5.6	1.4
99	5.7	2.8	4.1	1.3
33	5.5	4.2	1.4	0.2
137	6.4	3.1	5.5	1.8
26	5.0	3.4	1.6	0.4
140	6.7	3.1	5.6	2.4
37	4.9	3.1	1.5	0.1
7	5.0	3.4	1.5	0.2
56	6.3	3.3	4.7	1.6
77	6.7	3.0	5.0	1.7
136	6.3	3.4	5.6	2.4
60	5.0	2.0	3.5	1.0
20	5.4	3.4	1.7	0.2
84	5.4	3.0	4.5	1.5
41	4.5	2.3	1.3	0.3
68	6.2	2.2	4.5	1.5
19	5.1	3.8	1.5	0.3
10	5.4	3.7	1.5	0.2
102	7.1	3.0	5.9	2.1
123	6.3	2.7	4.9	1.8
141	6.9	3.1	5.1	2.3
48	5.3	3.7	1.5	0.2
120	6.9	3.2	5.7	2.3
79	5.7	2.6	3.5	1.0
25	5.0	3.0	1.6	0.2
112	6.8	3.0	5.5	2.1
104	6.5	3.0	5.8	2.2
143	6.8	3.2	5.9	2.3
34	4.9	3.1	1.5	0.1
31	5.4	3.4	1.5	0.4
1	4.9	3.0	1.4	0.2
129	7.2	3.0	5.8	1.6
107	7.3	2.9	6.3	1.8
70	5.9	3.2	4.8	1.8
128	6.4	2.8	5.6	2.1
49	5.0	3.3	1.4	0.2
54	6.5	2.8	4.6	1.5

	sepal_length	sepal_width	petal_length	petal_width
69	5.6	2.5	3.9	1.1

In [29]:

```
test_y
```

Out[29]:

```
134       Iris-virginica
99      Iris-versicolor
33          Iris-setosa
137       Iris-virginica
26          Iris-setosa
140       Iris-virginica
37          Iris-setosa
7           Iris-setosa
56      Iris-versicolor
77      Iris-versicolor
136       Iris-virginica
60      Iris-versicolor
20          Iris-setosa
84      Iris-versicolor
41          Iris-setosa
68      Iris-versicolor
19          Iris-setosa
10          Iris-setosa
102       Iris-virginica
123       Iris-virginica
141       Iris-virginica
48          Iris-setosa
120       Iris-virginica
79      Iris-versicolor
25          Iris-setosa
112       Iris-virginica
104       Iris-virginica
143       Iris-virginica
34          Iris-setosa
31          Iris-setosa
1           Iris-setosa
129       Iris-virginica
107       Iris-virginica
70      Iris-versicolor
128       Iris-virginica
49          Iris-setosa
54      Iris-versicolor
69      Iris-versicolor
Name: species, dtype: object
```

In [30]:

```python
model = svm.SVC()
```

In [31]:

```python
model.fit(train_x,train_y)
prediction = model.predict(test_x)
```

In [32]:

```
prediction
```

Out[32]:

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

In [33]:

```
metrics.accuracy_score(prediction,test_y)*100
```

Out[33]:

```
94.73684210526315
```

In [34]:

```
model = DecisionTreeClassifier()
```

In [35]:

```
model.fit(train_x,train_y)
```

Out[35]:

```
DecisionTreeClassifier()
```

In [36]:

```
metrics.accuracy_score(prediction,test_y)*100
```

Out[36]:

```
94.73684210526315
```

In [ ]:

In [ ]:

In [ ]: