In [1]:

```
import pandas as pd
import matplotlib.pyplot as plt
from sklearn import datasets
import numpy as np
```

In [2]:

```
iris = datasets.load_iris()
```

In [3]:

```
iris_data = pd.DataFrame({
    'Sepal length':iris.data[:,0],
    'Sepal width':iris.data[:,1],
    'Petal length':iris.data[:,2],
    'Petal width':iris.data[:,3],
    'class':iris.target
})
```

In [4]:

```
iris_data
# iris dataset link: https://github.com/dotnet/machinelearning/blob/main/test/data/iris.txt
# class 0 = Iris-setosa
# class 1 = Iris-versicolor
# calss 2 = Iris-virginica
```

Out[4]:

	Sepal length	Sepal width	Petal length	Petal width	class
0	5.1	3.5	1.4	0.2	0
1	4.9	3.0	1.4	0.2	0
2	4.7	3.2	1.3	0.2	0
3	4.6	3.1	1.5	0.2	0
4	5.0	3.6	1.4	0.2	0
...	...	...	...	...	...
145	6.7	3.0	5.2	2.3	2
146	6.3	2.5	5.0	1.9	2
147	6.5	3.0	5.2	2.0	2
148	6.2	3.4	5.4	2.3	2
149	5.9	3.0	5.1	1.8	2

150 rows × 5 columns

In [5]:

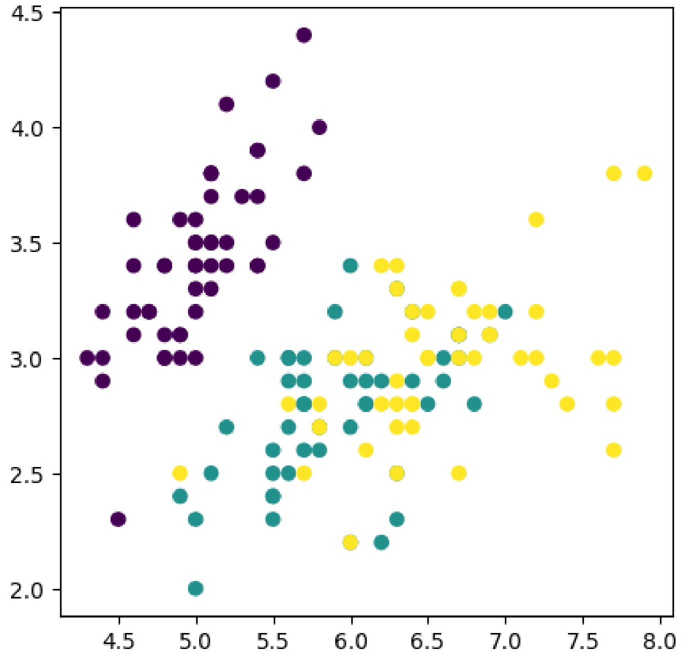
```
fig = plt.figure(figsize=(5,5))
plt.scatter(iris_data['Sepal length'],iris_data['Sepal width'],c=iris.target)
```

Out[5]:

```
<matplotlib.collections.PathCollection at 0x7fc4ba0e2fd0>
```

In [6]:

```
plt.show()
```

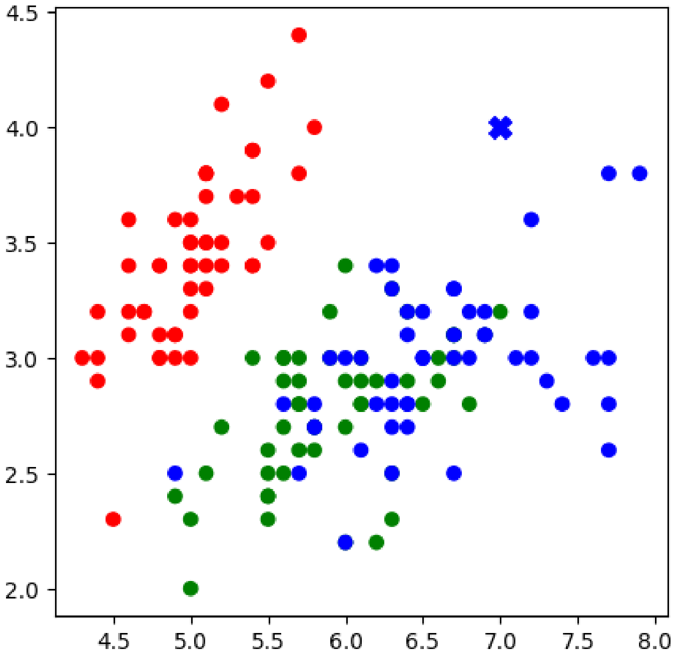


```
In [7]: def predict(k : int, attr : str, pair : tuple) -> int:
            """brute force"""
            attr_l, attr_w = iris_data[attr +' length'], iris_data[attr +' width']
            selected_data = np.array([attr_l, attr_w])

            def linalg_norm(a : tuple, b : tuple):
                return ((a[0] - b[0]) ** 2 + (a[1] - b[1]) ** 2) ** (1/2)

            dist = [(linalg_norm(pair, (selected_data[0][i], selected_data[1][i])), i) for i in range(len(se
            dist.sort()

            vote_box = [0, 0, 0]
            for _, i in dist[:k]:
                vote_box[int(iris_data.loc[i]['class'])] += 1
            return vote_box.index(max(vote_box))
```

```
In [8]: def show_result(k : int, attr : str, pair : tuple) -> None:
            iris_class = ['Iris-setosa', 'Iris-versicolor', 'Iris-virginica']
            pred = predict(k, attr, pair)
            print("The vlass is {}.".format(iris_class[pred]))

            color_plane = ('r', 'g', 'b')
            fig = plt.figure(figsize=(5,5))
            plt.scatter(iris_data[attr + ' length'],iris_data[attr + ' width'], c=[color_plane[c] for c in i
            plt.scatter(pair[0], pair[1], c=color_plane[pred], marker='X', s=100)
            plt.show()
```

```
In [9]: show_result(6, 'Sepal', (7, 4))
```

```
The vlass is Iris-virginica.
```



```
In [ ]:
```