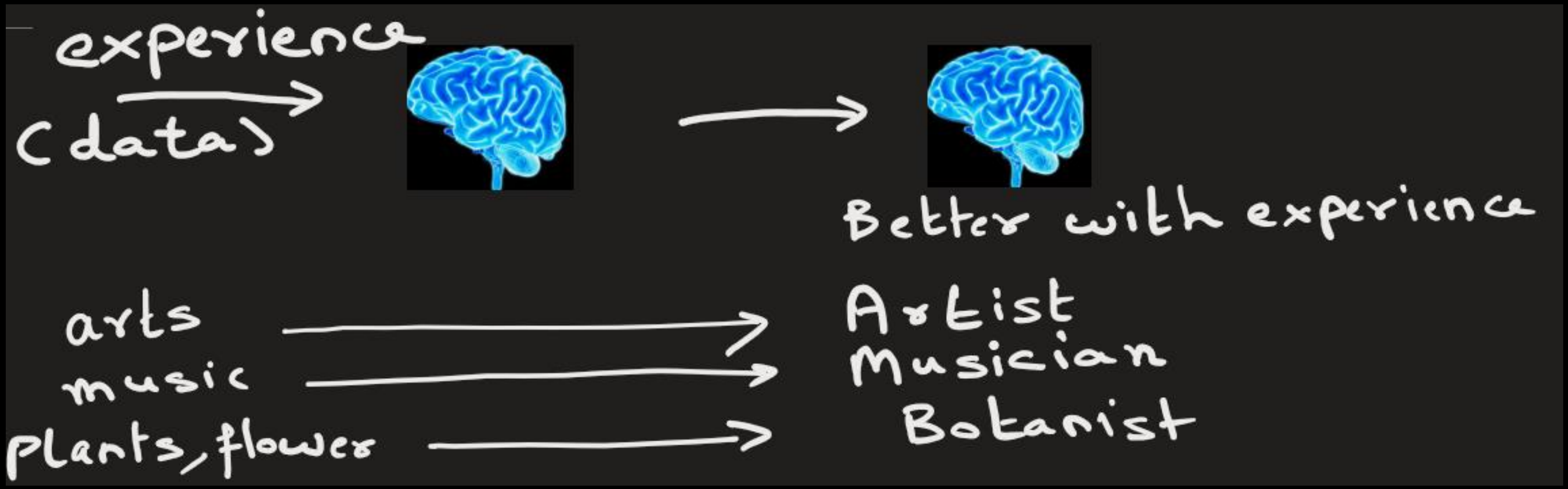
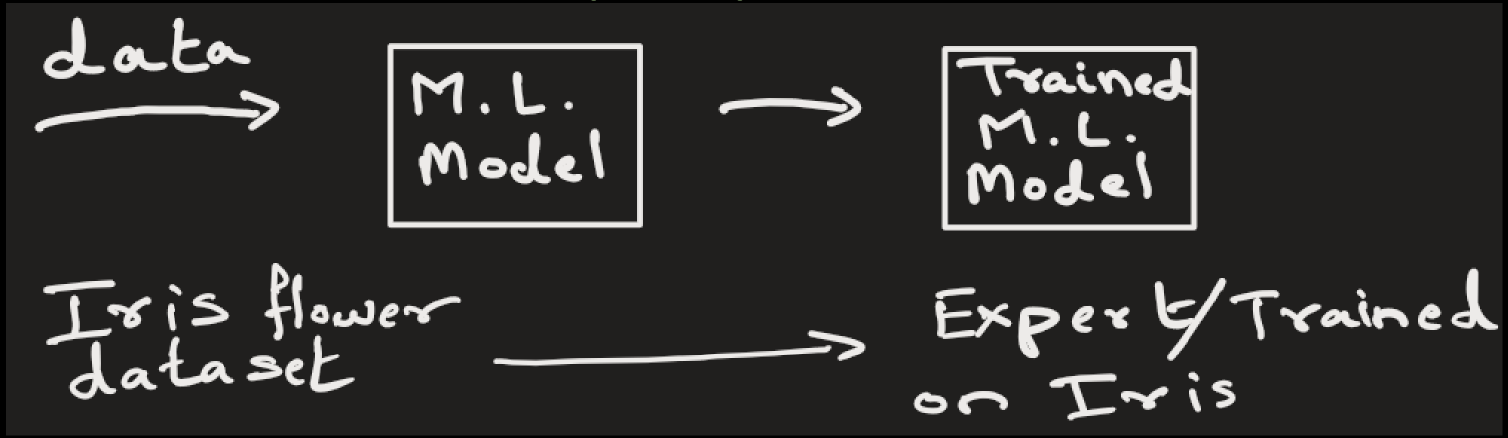
Machine Learning – General Idea

Human brain learns by experience.

This experience comes in the form of data. The brain becomes better with more data.

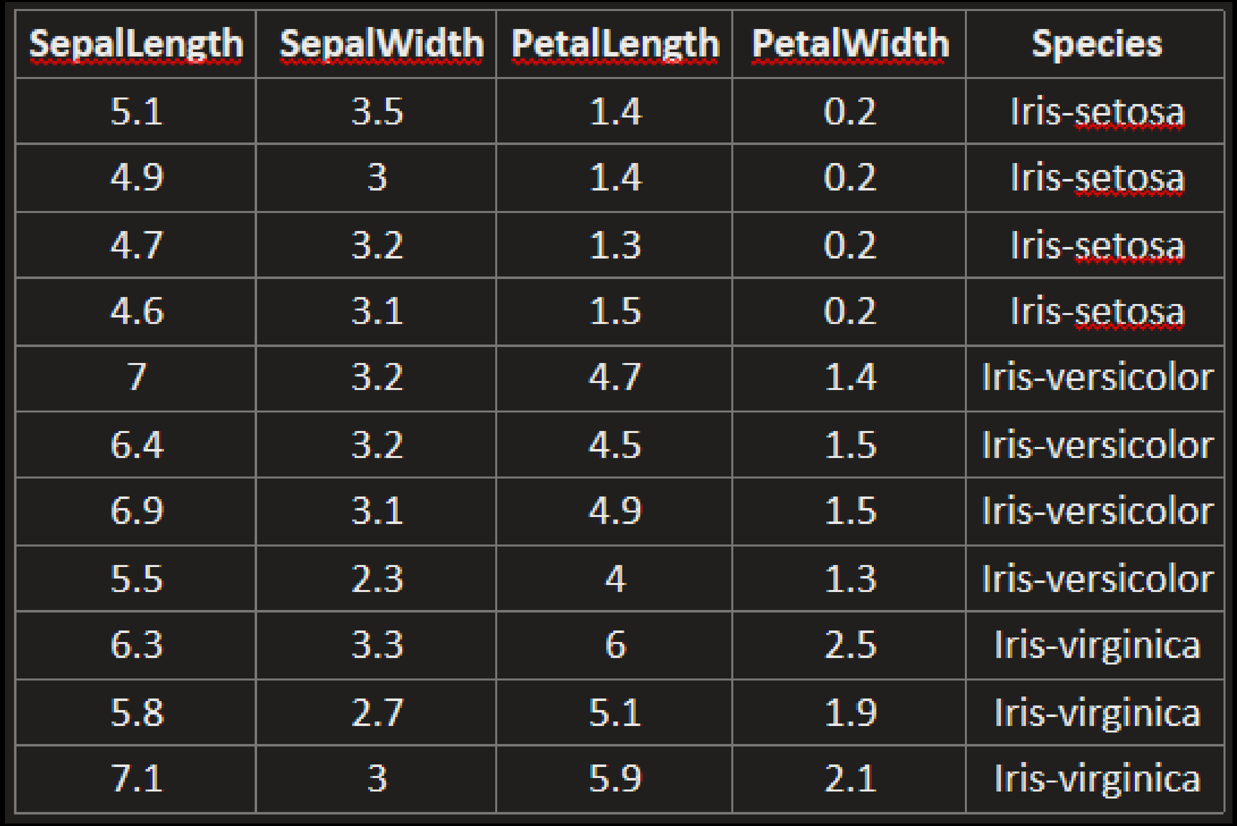


ML Model works on the same principle.



Task: Make a ML model that would become expert on Iris flower. You are given data of Iris flower.

The ML model should be able to recognize the type of flower (Setosa, Versicolor or Virginica) based on input: sepal and petal dimensions



SepalLength	SepalWidth	PetalLength	PetalWidth	Species
5.1	3.5	1.4	0.2	Iris-setosa
4.9	3	1.4	0.2	Iris-setosa
4.7	3.2	1.3	0.2	Iris-setosa
4.6	3.1	1.5	0.2	Iris-setosa
7	3.2	4.7	1.4	Iris-versicolor
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6.3	3.3	6	2.5	Iris-virginica
5.8	2.7	5.1	1.9	Iris-virginica
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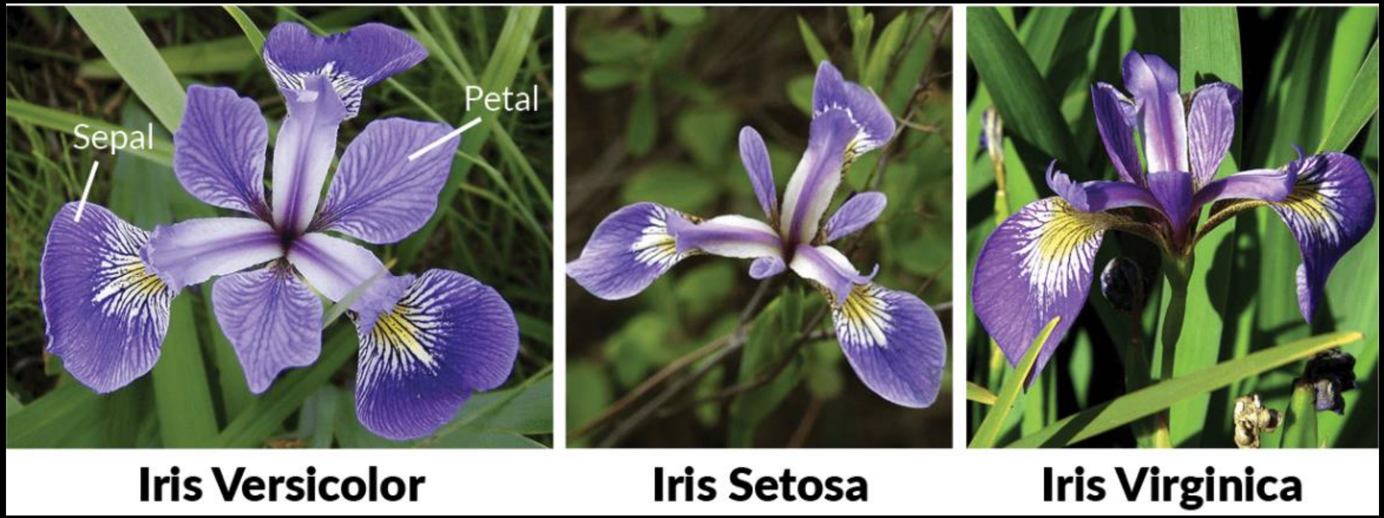
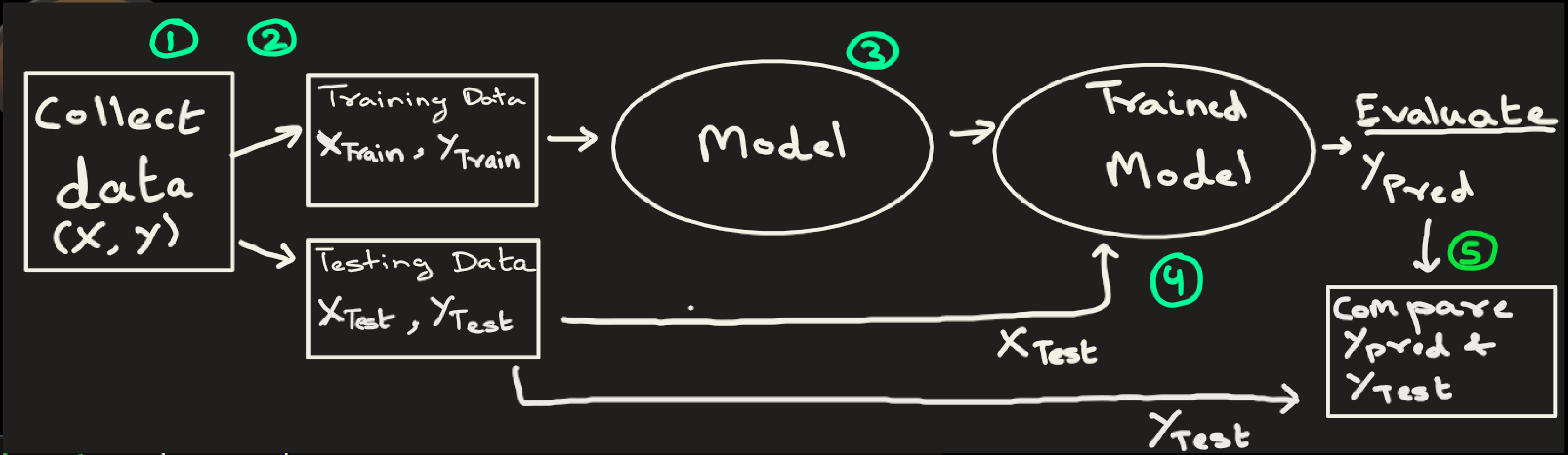
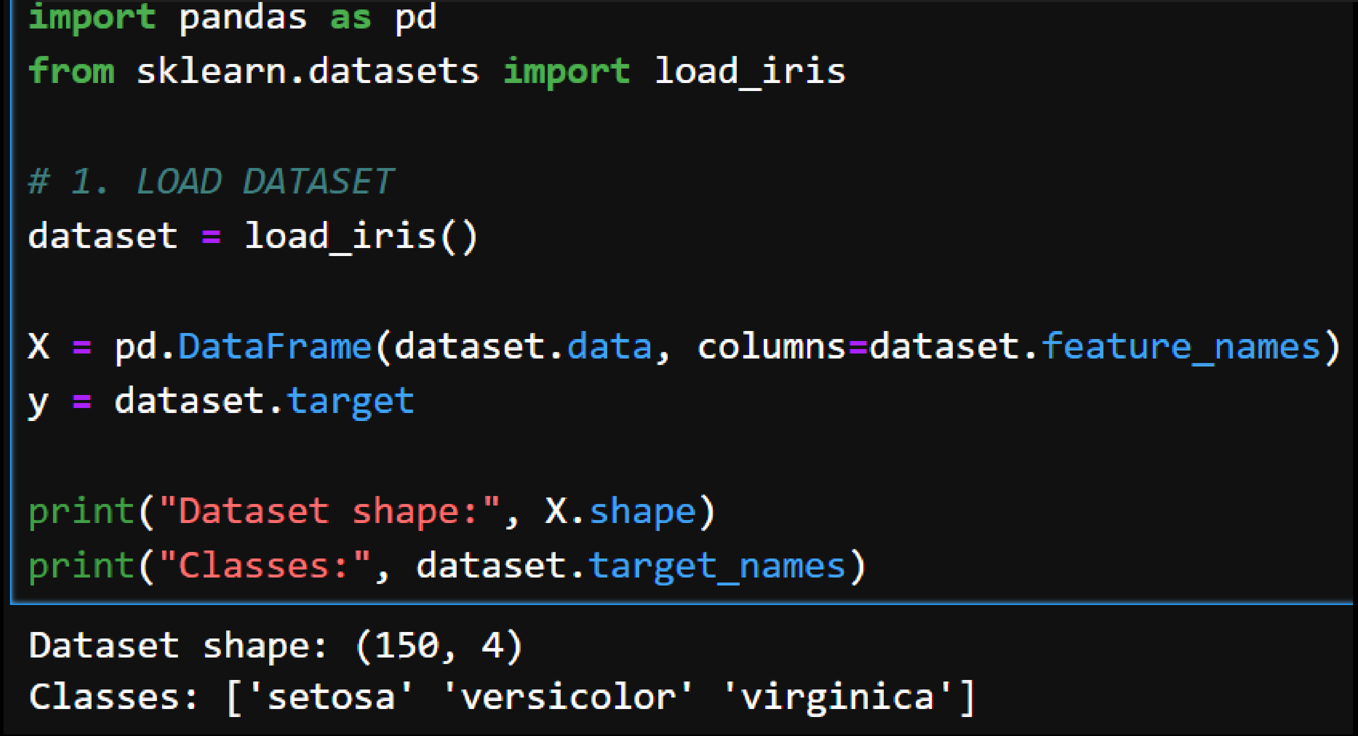


Iris Versicolor

Iris Setosa

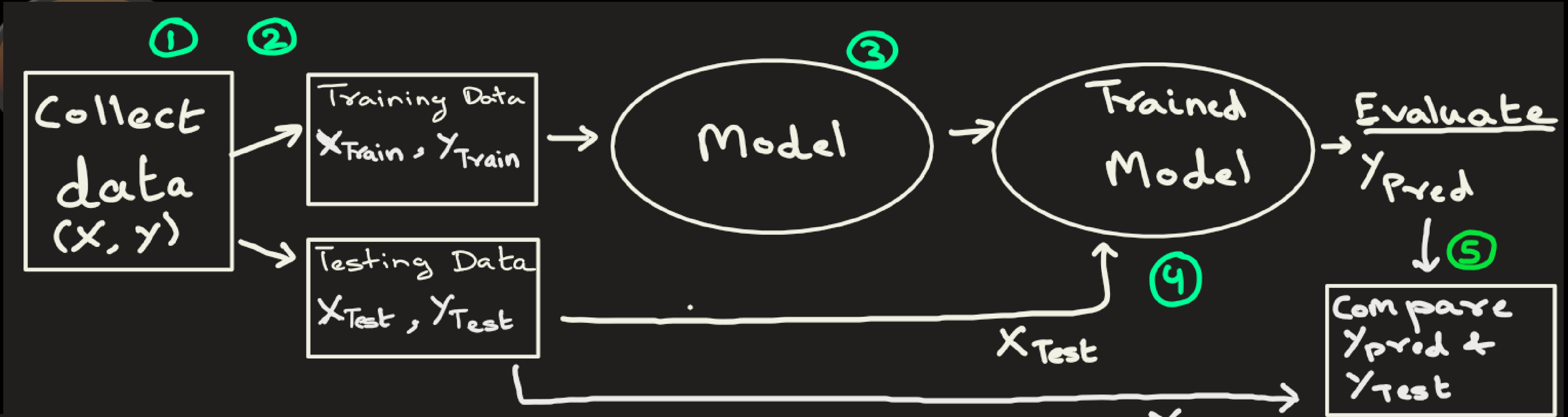
Iris Virginica

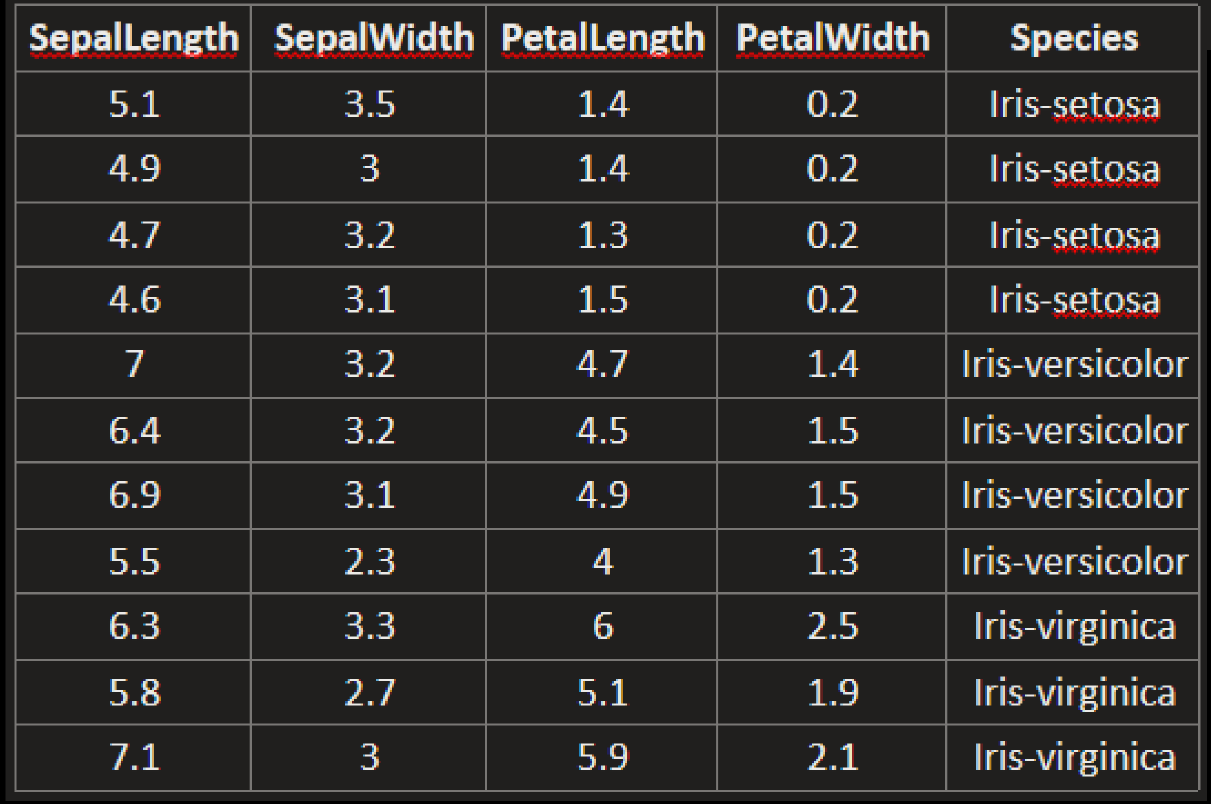




```
import pandas as pd
from sklearn.datasets import load_iris

# 1. LOAD DATASET
dataset = load_iris()

X = pd.DataFrame(dataset.data, columns=dataset.feature_names)
y = dataset.target

print("Dataset shape:", X.shape)
print("Classes:", dataset.target_names)
```

```
Dataset shape: (150, 4)
Classes: ['setosa' 'versicolor' 'virginica']
```





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5.5	2.3	4	1.3	Iris-versicolor
6.3	3.3	6	2.5	Iris-virginica
5.8	2.7	5.1	1.9	Iris-virginica
7.1	3	5.9	2.1	Iris-virginica

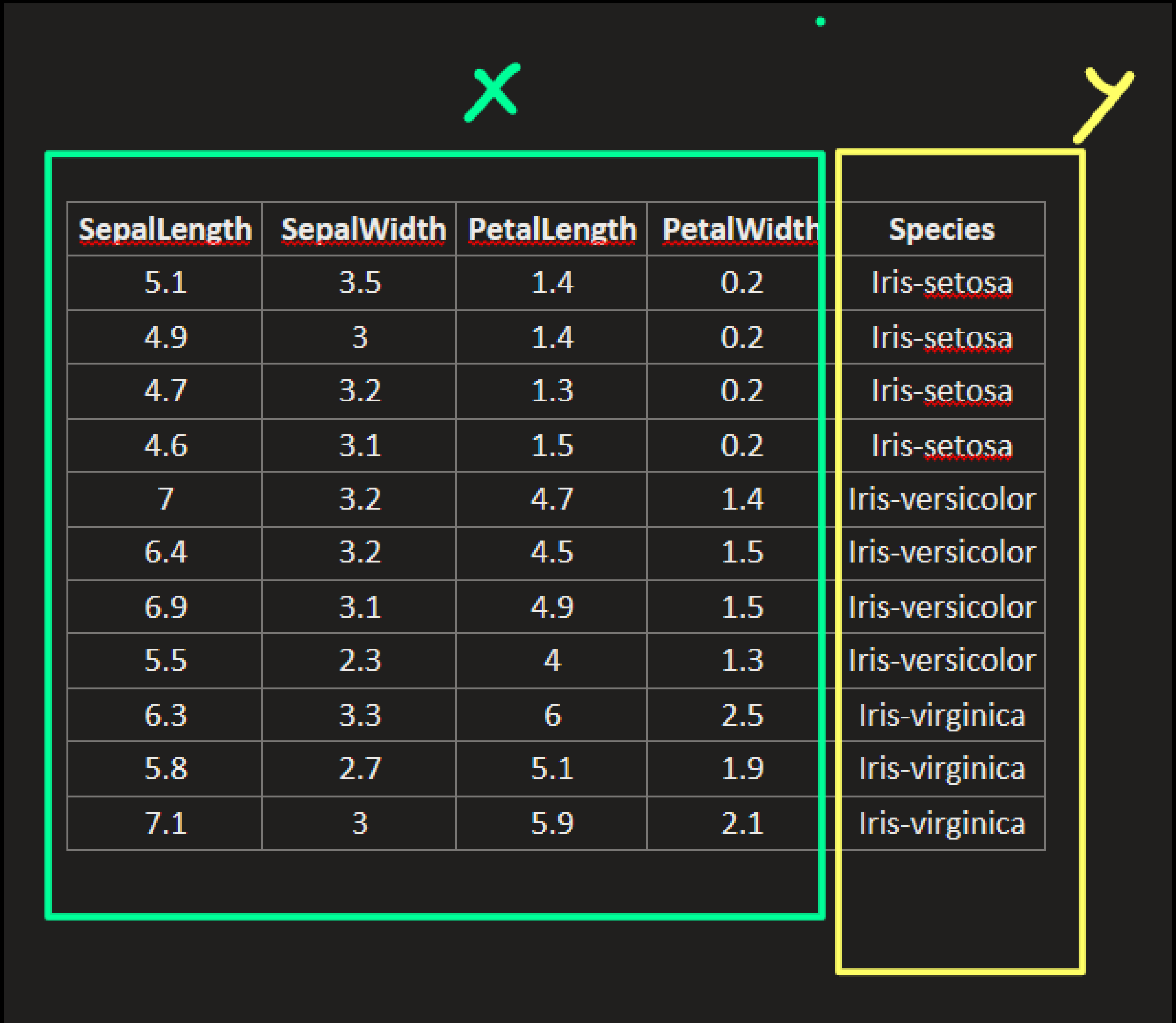
Following is a sample taken from Iris flower dataset.

- This dataset has total of 150 records
- It contains records for 3 types of flowers:
  Setosa, Versicolor and Virginica
- Each type of flower has 50 records.

X is called **features** (independent)

y is called **target/response/label** (dependent)

y is function of X.



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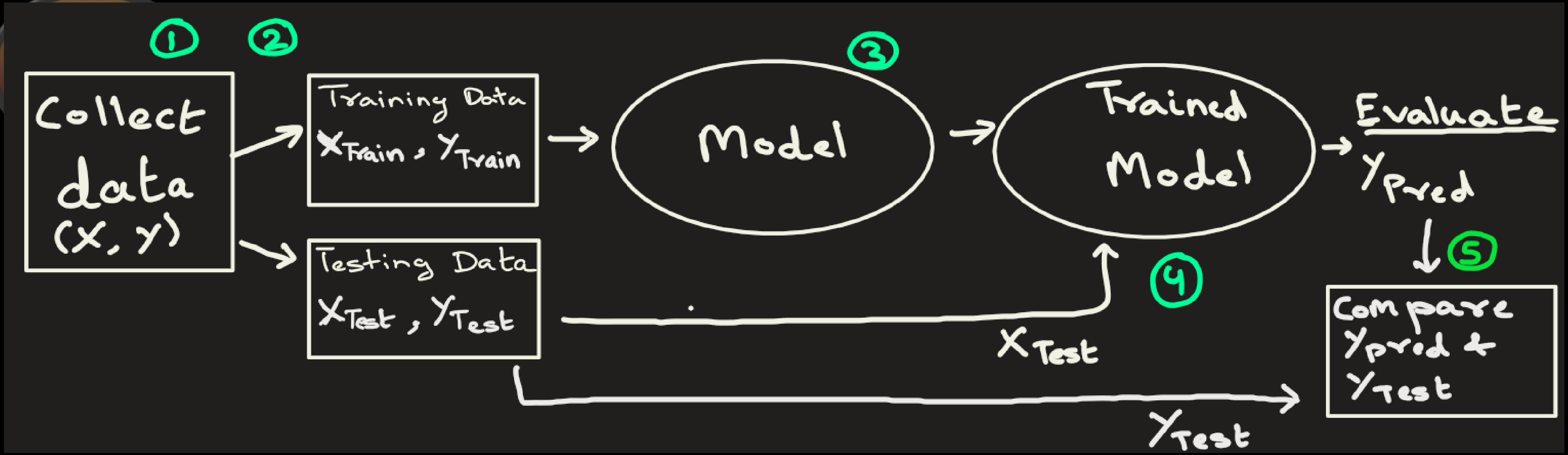
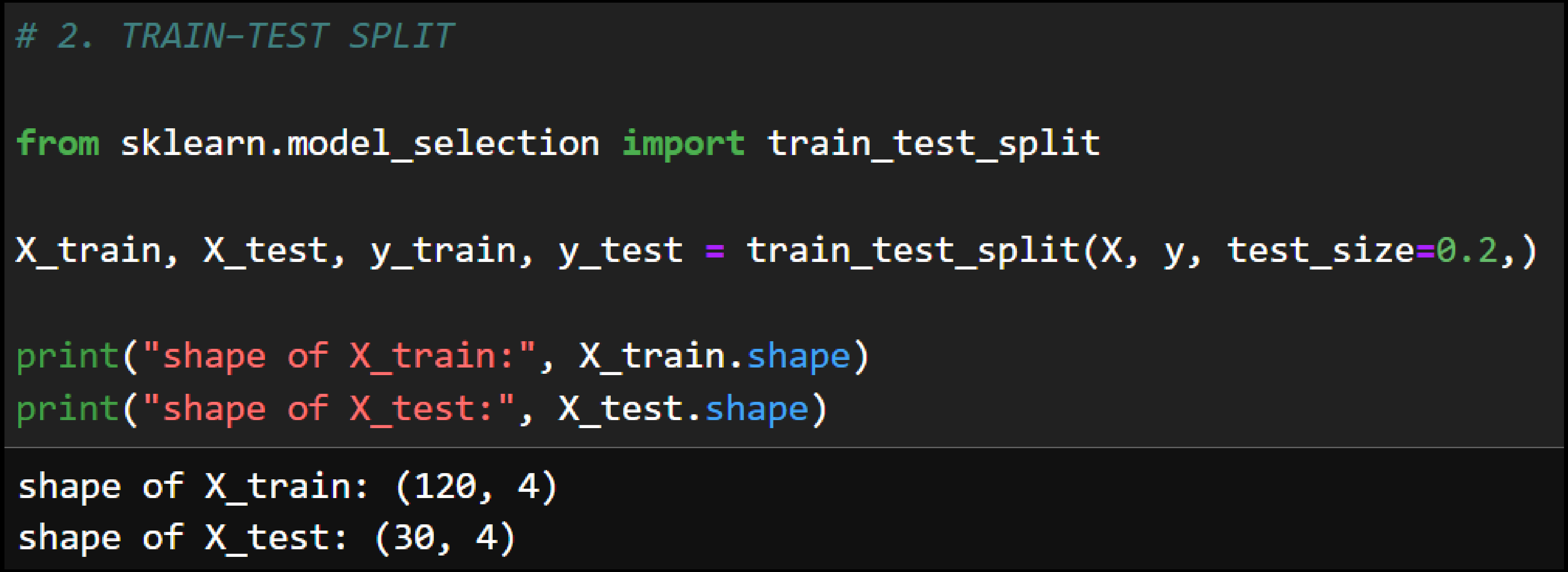


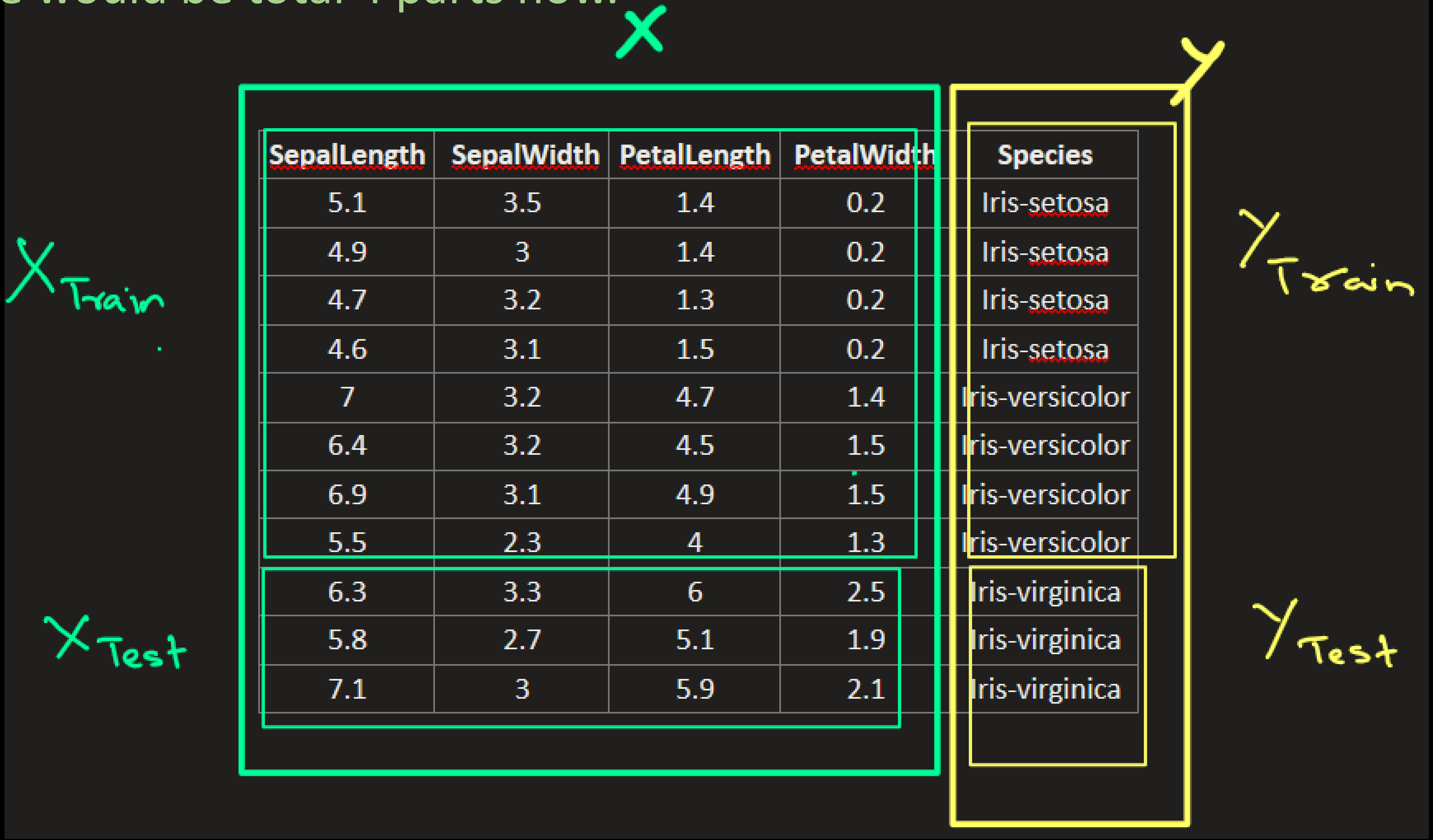


```
# 2. TRAIN-TEST SPLIT

from sklearn.model_selection import train_test_split

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,)

print("shape of X_train:", X_train.shape)
print("shape of X_test:", X_test.shape)
```

```
shape of X_train: (120, 4)
shape of X_test: (30, 4)
```

ML Overview

X and y are split into training and testing part.
There would be total 4 parts now.



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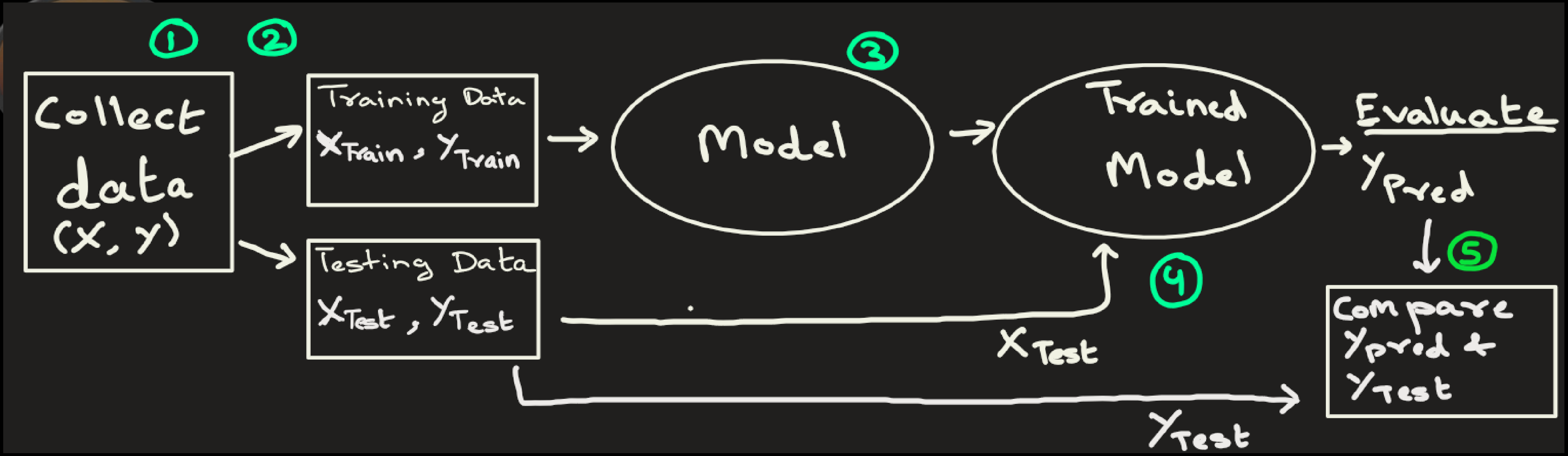
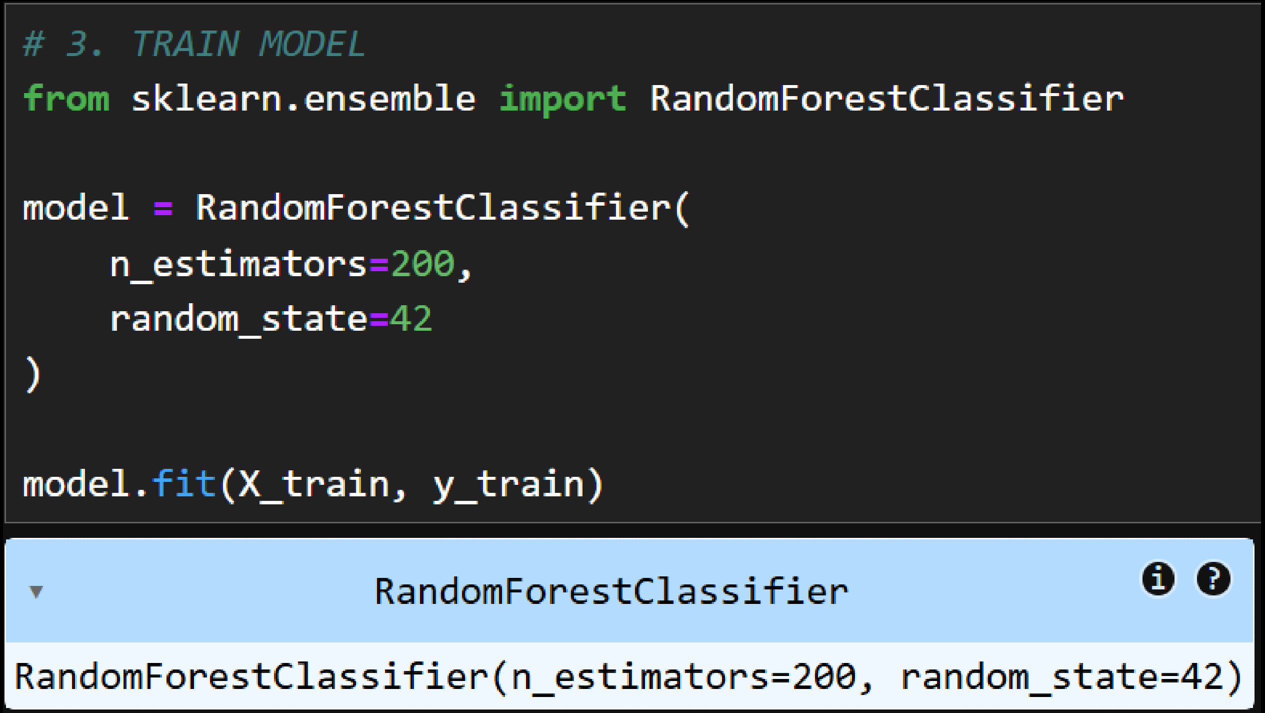
X
y
X Train
Y Train
X Test
Y Test





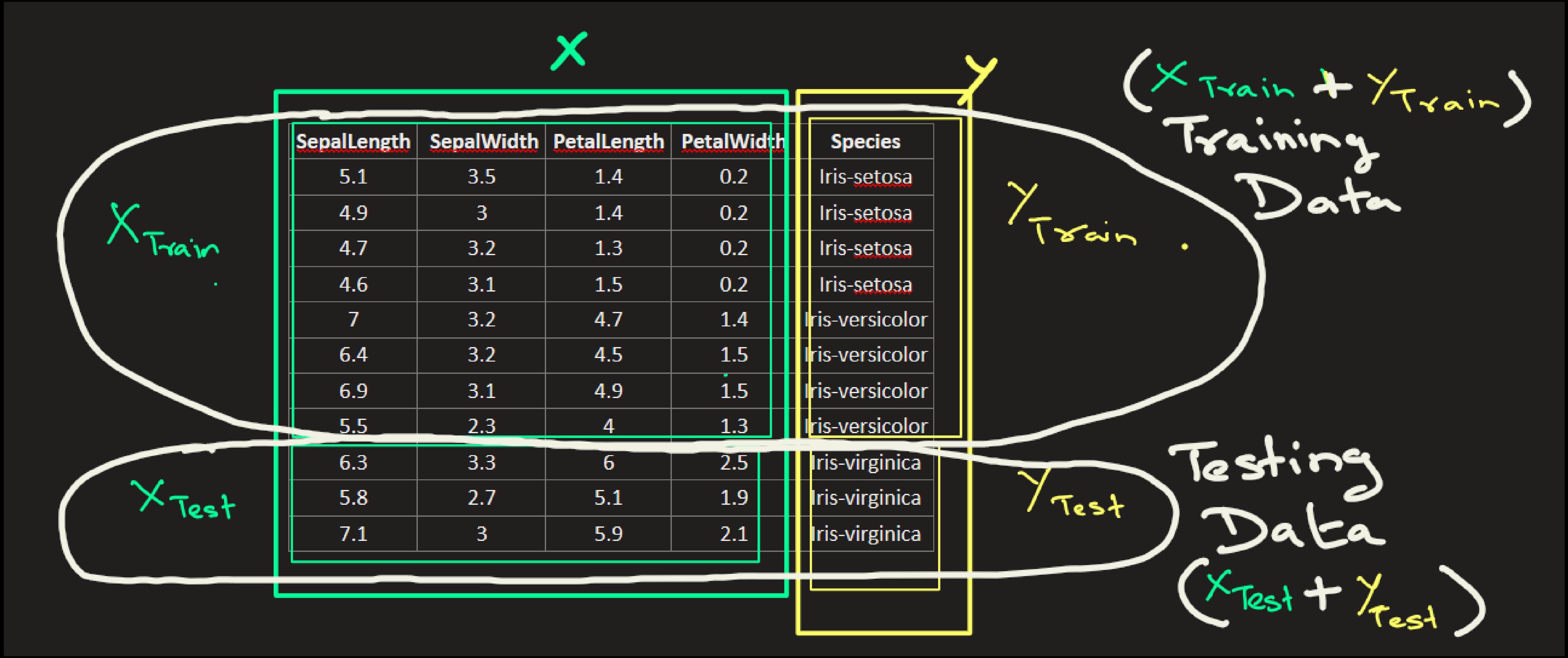
```python
# 3. TRAIN MODEL
from sklearn.ensemble import RandomForestClassifier

model = RandomForestClassifier(
    n_estimators=200,
    random_state=42
)

model.fit(X_train, y_train)
```

```
▾ RandomForestClassifier
RandomForestClassifier(n_estimators=200, random_state=42)
```

Training data is fed to the ML Model.
It may take some time for model to learn/train.



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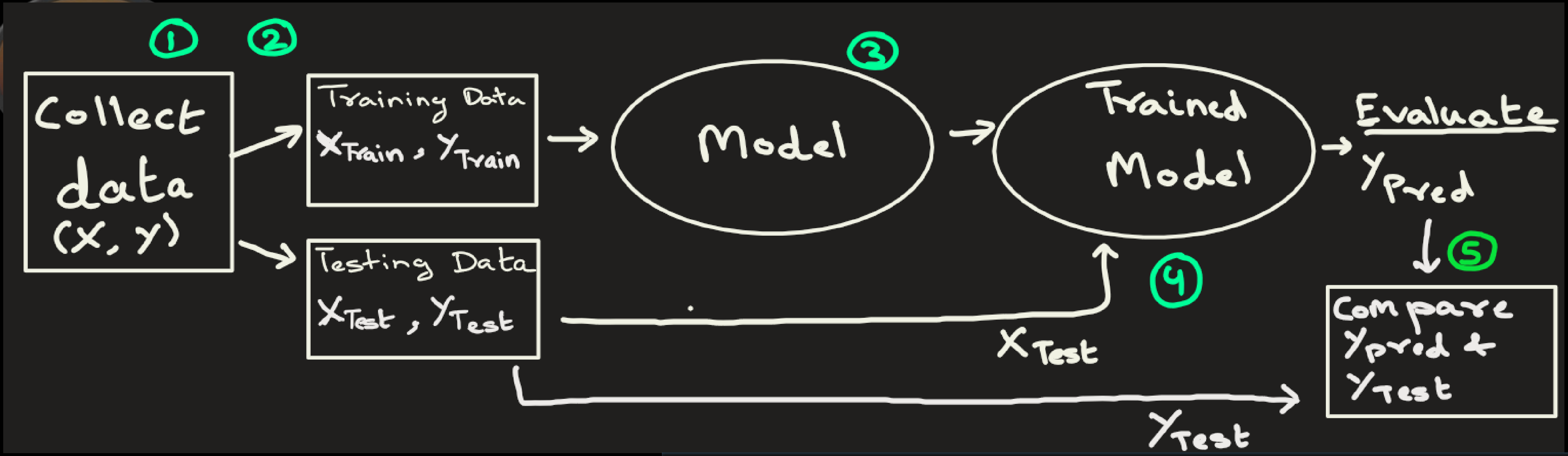
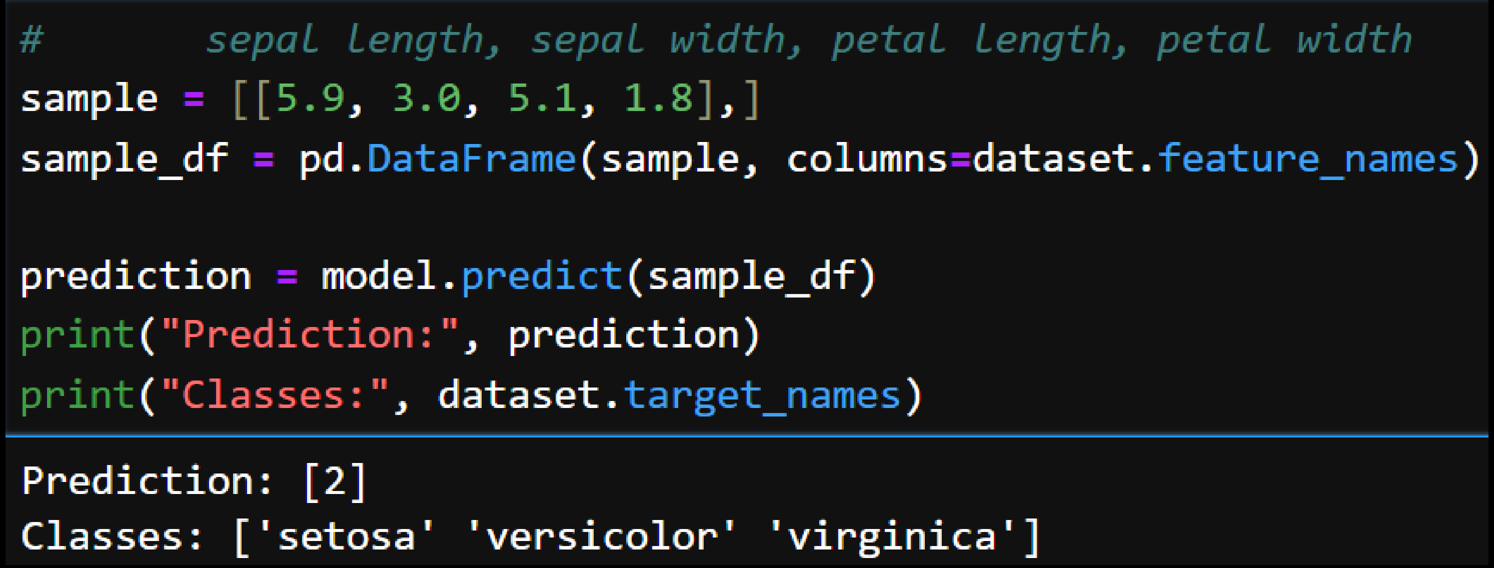


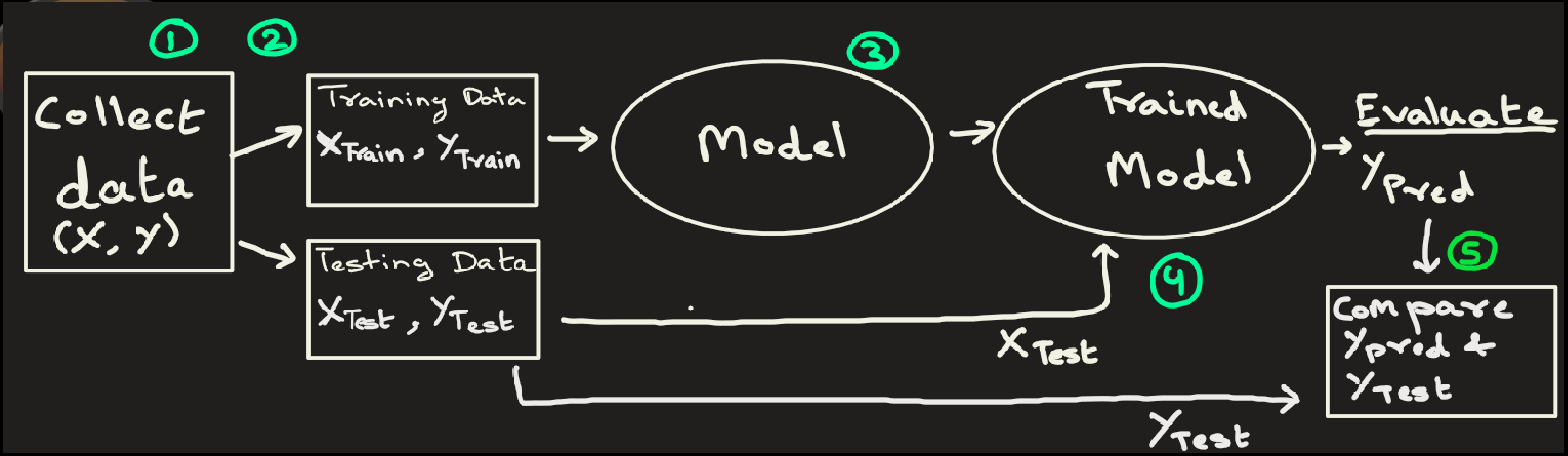


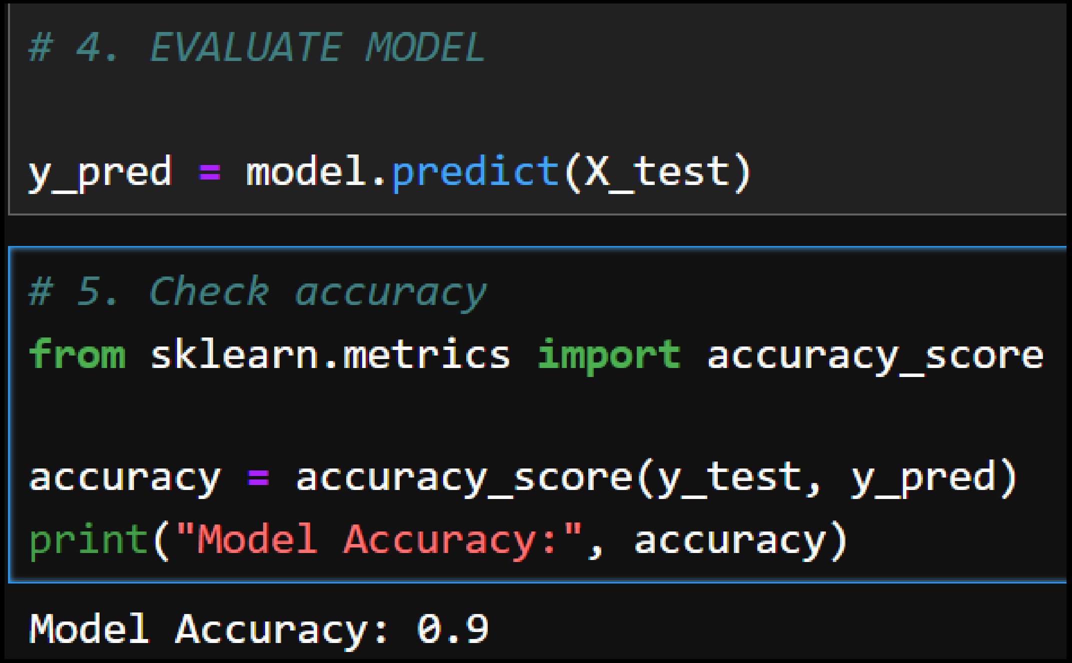
```
#        sepal length, sepal width, petal length, petal width
sample = [[5.9, 3.0, 5.1, 1.8],]
sample_df = pd.DataFrame(sample, columns=dataset.feature_names)

prediction = model.predict(sample_df)
print("Prediction:", prediction)
print("Classes:", dataset.target_names)
```

```
Prediction: [2]
Classes: ['setosa' 'versicolor' 'virginica']
```

Iris Versicolor **Iris Setosa** **Iris Virginica**





```
# 4. EVALUATE MODEL

y_pred = model.predict(X_test)
```

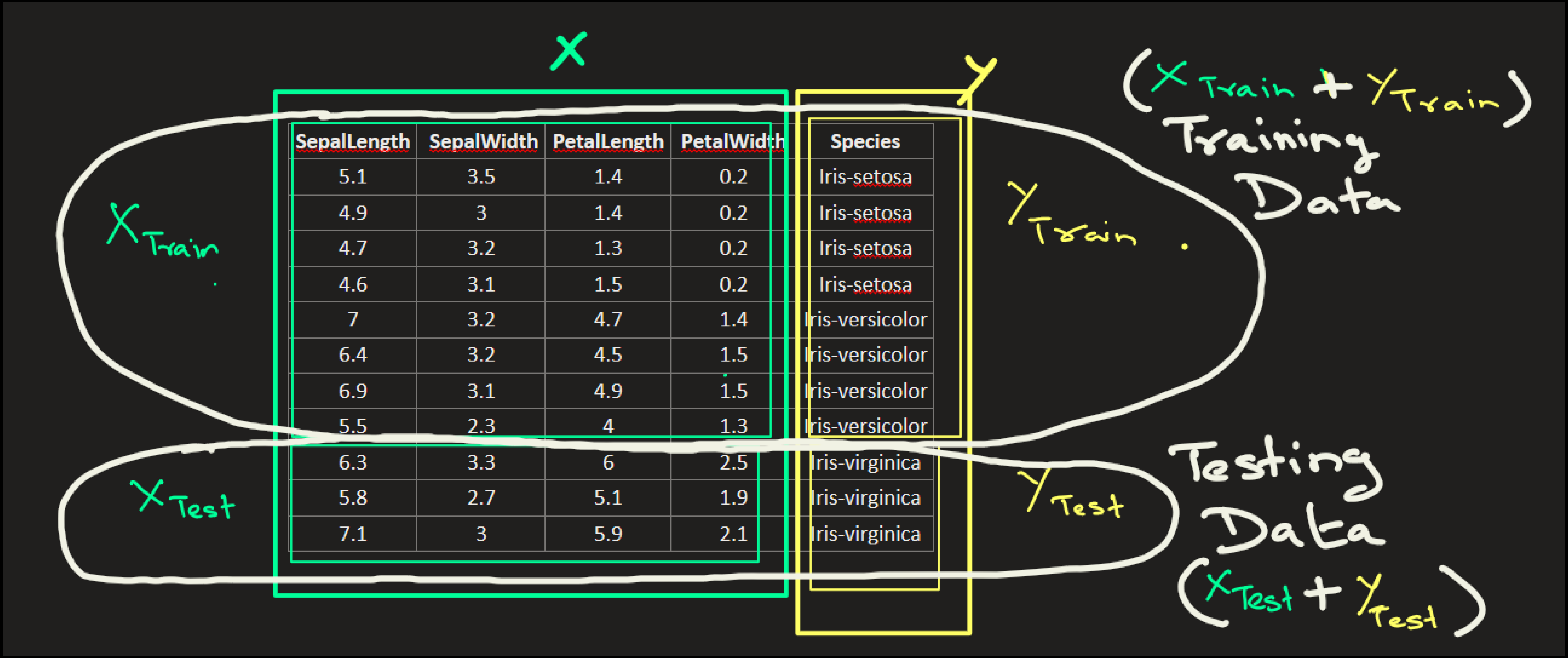
```
# 5. Check accuracy
from sklearn.metrics import accuracy_score

accuracy = accuracy_score(y_test, y_pred)
print("Model Accuracy:", accuracy)
```

```
Model Accuracy: 0.9
```

Evaluate

- X_test is fed to the model. Model makes prediction y_predict.
- Compare y_predict with y_test.



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