```
import pandas as pd
import numpy as np

import matplotlib.pyplot as plt

df = pd.read_csv("iris.csv")
df=df.drop(['Id'],axis=1)
```

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

	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	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

```
df.describe()
```

	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm
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.columns
```

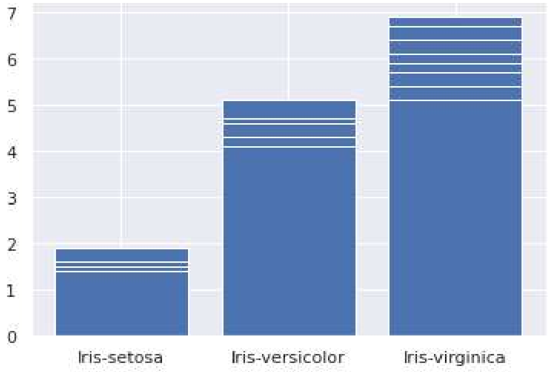
```
Index(['SepalLengthCm', 'SepalWidthCm', 'PetalLengthCm', 'PetalWidthCm',
       'Species'],
      dtype='object')
```

```
df.info()
```

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

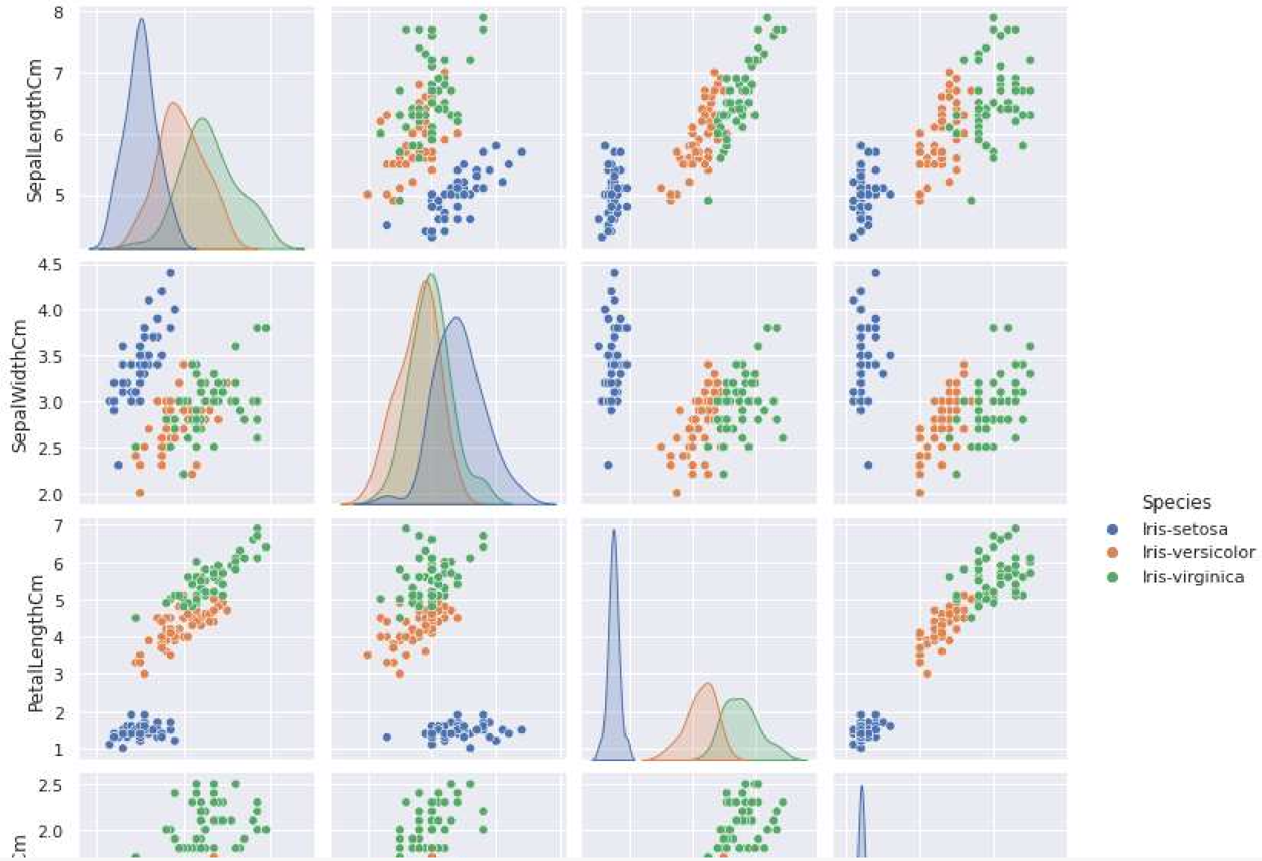
```
plt.bar(df['Species'],df['PetalLengthCm'])
```

```
<BarContainer object of 150 artists>
```



```
import seaborn as sns
sns.set()
sns.pairplot(df[['SepalLengthCm','SepalWidthCm','PetalLengthCm','PetalWidthCm','Species']],hue='Species', diag_kind="kde")
```

```
<seaborn.axisgrid.PairGrid at 0x7fa058dbcbe0>
```



```
x=df.drop(['Species'],axis=1)
y=df['Species']
```

```
from sklearn.preprocessing import LabelEncoder
le = LabelEncoder()
y = le.fit_transform(y)
print(y)
```

```
[0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2
 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
 2 2]
```

```
x
```

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

```
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, random_state = 0)
```

```
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import confusion_matrix, accuracy_score
```

```
classifier = KNeighborsClassifier(n_neighbors=1)
classifier.fit(x_train, y_train)
y_pred = classifier.predict(x_test)
print(y_pred)
```

```
[2 1 0 2 0 2 0 1 1 1 2 1 1 1 1 0 1 1 0 0 2 1 0 0 2 0 0 1 1 0]
```

```


confusion_matrix = confusion_matrix(y_test, y_pred)
print(confusion_matrix)
```

```
[[11  0  0]
 [ 0 13  0]
 [ 0  0  6]]
```

```
accuracy = accuracy_score(y_test, y_pred)*100
print('Accuracy of the model:' + str(round(accuracy, 2)) + ' %.')
```

```
Accuracy of the model:100.0 %.
```

```
from sklearn.metrics import precision_score, recall_score, f1_score

prec = precision_score(y_test, y_pred,average='macro')
print("Precision:", prec)

# recall
rec = recall_score(y_test, y_pred,average='macro')
print("Recall:", rec)

# f1-score
f1 = f1_score(y_test, y_pred,average='macro')
print("F1-score:", f1)
```

```
Precision: 1.0
Recall: 1.0
F1-score: 1.0
```

```
from sklearn.neighbors import KNeighborsClassifier
import joblib


knn = KNeighborsClassifier()
knn.fit(x_train, y_train)


filename = 'trained_model.pkl'
joblib.dump(knn, filename)


iris_species = ['setosa', 'versicolor', 'virginica']
le.fit(iris_species)


filename_classes = "label_classes.pkl"
joblib.dump(le.classes_, filename_classes)
```

```
['label_classes.pkl']
```

```


model = joblib.load("trained_model.pkl")

le = LabelEncoder()
le.classes_ = joblib.load("label_classes.pkl")


new_data = [[3.5, 6.5, 2.7, 4.1]]



predictions = model.predict(new_data)
predictions = le.inverse_transform(predictions)

print(predictions)
```

```
['setosa']
/usr/local/lib/python3.8/dist-packages/sklearn/base.py:450: UserWarning: X does not have valid feature names, but KNeighborsClassifier was fitted with feature
  warnings.warn(
```

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