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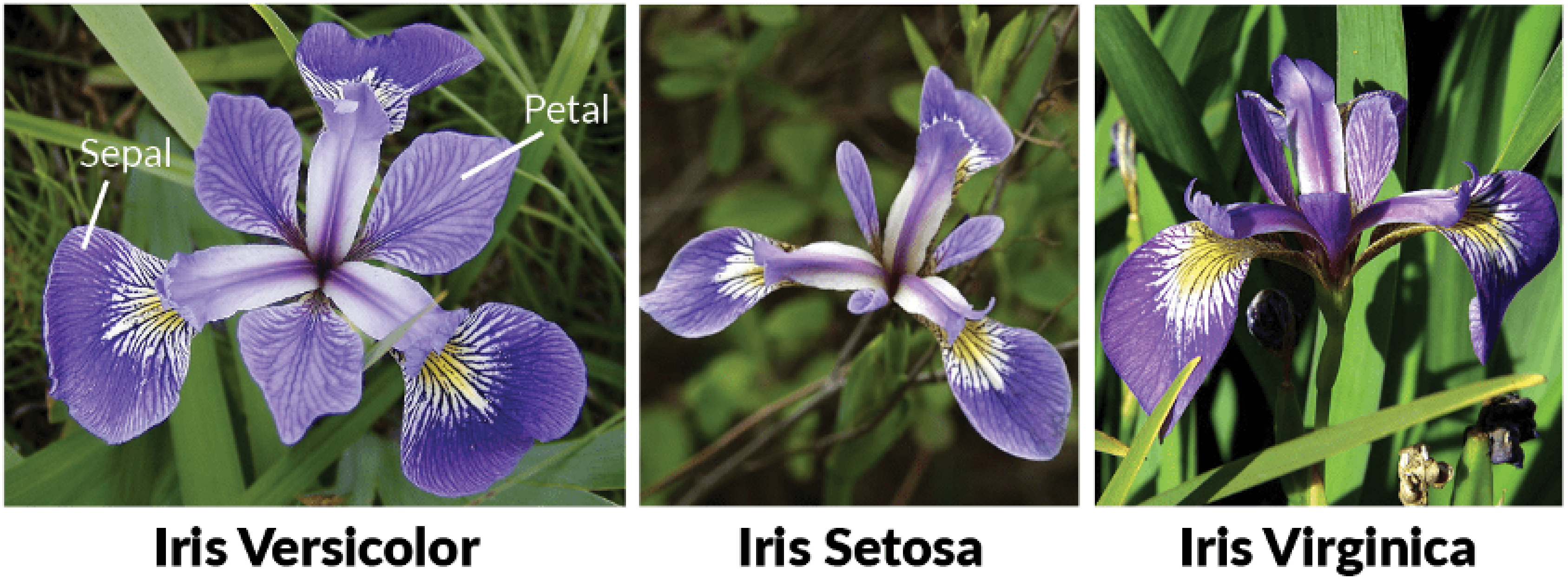
PROJECT TITLE

Iris data set: Predict the chess of the flower based on available attributes.



iris versicolor is a flowering herbaceous perennial plant, growing 10–80 cm (4–31 in) high. It tends to form large clumps from thick, creeping rhizomes. The unwinged, erect stems generally have basal leaves that are more than 1 cm ($\frac{1}{2}$ in) wide.

Iris setosa, the bristle-pointed iris, is a species of flowering plant inthe genus Iris of the family Iridaceae, it belongs the subgenus Limniris and the series Tripetalae.

Iris virginica, with the common name Virginia iris, is a perennial species of flowering plant, native to eastern North America. It is common

```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from pandas.plotting import parallel_coordinates
from sklearn.tree import DecisionTreeClassifier, plot_tree
from sklearn import metrics
from sklearn.naive_bayes import GaussianNB
from sklearn.discriminant_analysis import LinearDiscriminantAnalysis, QuadraticDiscriminantAnalysis
from sklearn.neighbors import KNeighborsClassifier
from sklearn.svm import SVC
from sklearn.linear_model import LogisticRegression
```

```
data = pd.read_csv('/Iris (1).csv')
```

```
data.head(5)
```

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
0	1	5.1	3.5	1.4	0.2	Iris-setosa
1	2	4.9	3.0	1.4	0.2	Iris-setosa

```
data.describe()
```

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm
count	150.000000	150.000000	150.000000	150.000000	150.000000
mean	75.500000	5.843333	3.054000	3.758667	1.198667
std	43.445368	0.828066	0.433594	1.764420	0.763161
min	1.000000	4.300000	2.000000	1.000000	0.100000
25%	38.250000	5.100000	2.800000	1.600000	0.300000
50%	75.500000	5.800000	3.000000	4.350000	1.300000
75%	112.750000	6.400000	3.300000	5.100000	1.800000
max	150.000000	7.900000	4.400000	6.900000	2.500000

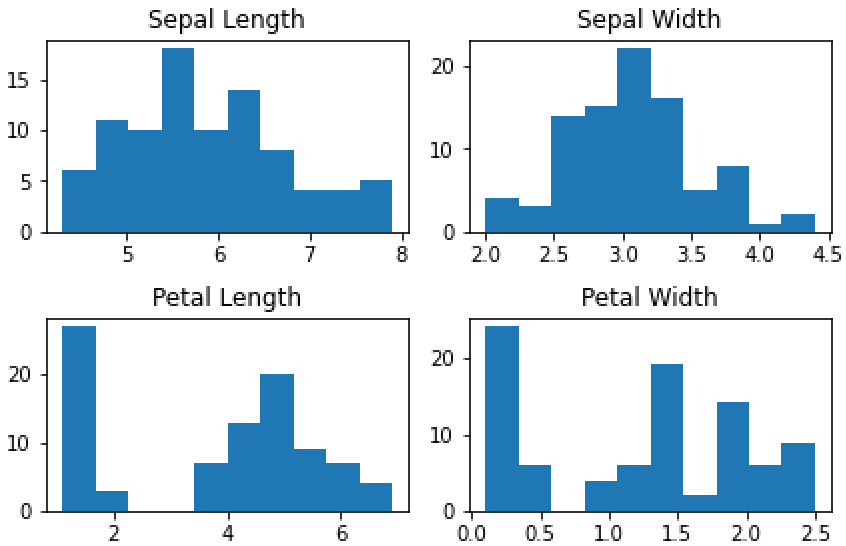
```
data.groupby('Species').size()
```

```
Species
Iris-setosa        50
Iris-versicolor    50
Iris-virginica     50
dtype: int64
```

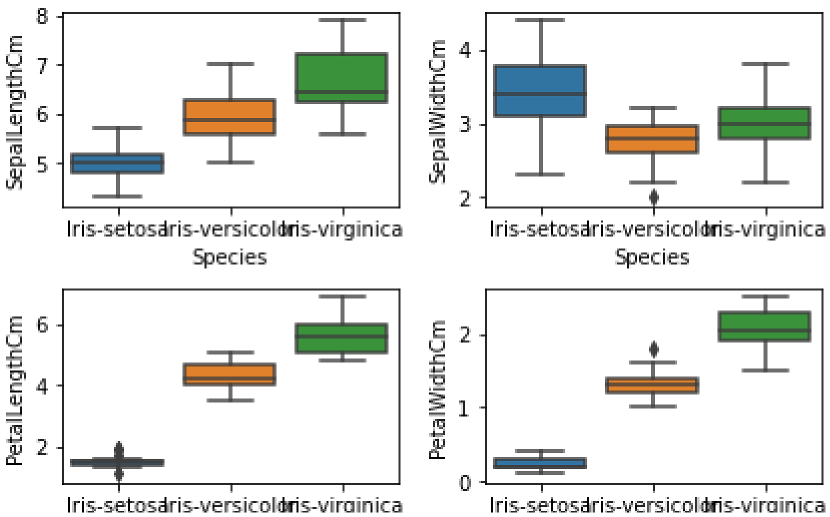
```
train, test = train_test_split(data, test_size = 0.4, stratify = data['Species'], random_state = 42)
```

```
n_bins = 10
fig, axs = plt.subplots(2, 2)
axs[0,0].hist(train['SepalLengthCm'], bins = n_bins);
axs[0,0].set_title('Sepal Length');
```

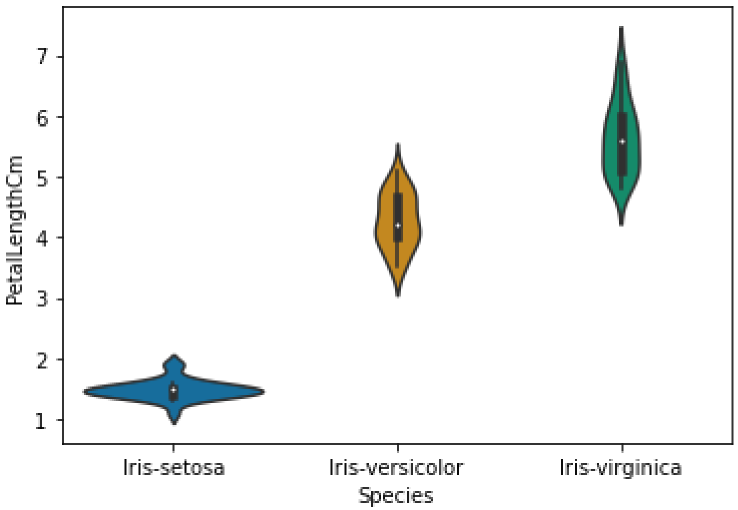
```
axs[0,1].hist(train['SepalWidthCm'], bins = n_bins);
axs[0,1].set_title('Sepal Width');
axs[1,0].hist(train['PetalLengthCm'], bins = n_bins);
axs[1,0].set_title('Petal Length');
axs[1,1].hist(train['PetalWidthCm'], bins = n_bins);
axs[1,1].set_title('Petal Width');
# add some spacing between subplots
fig.tight_layout(pad=1.0);
```



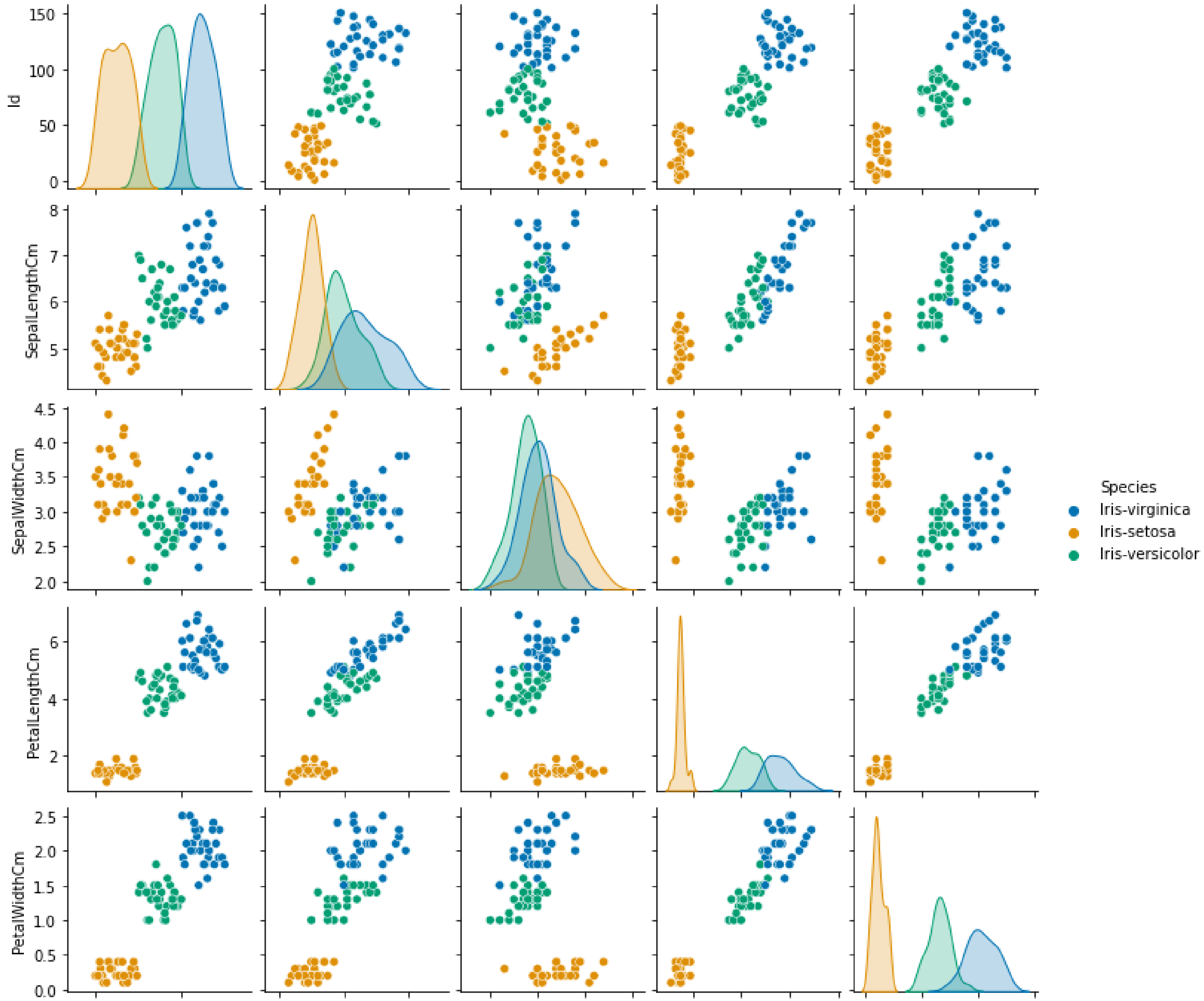

```
fig, axs = plt.subplots(2, 2)
fn = ["SepalLengthCm", "SepalWidthCm", "PetalLengthCm", "PetalWidthCm"]
cn = ['Iris-setosa', 'Iris-versicolor', 'Iris-virginica']
sns.boxplot(x = 'Species', y = 'SepalLengthCm', data = train, order = cn, ax = axs[0,0]);
sns.boxplot(x = 'Species', y = 'SepalWidthCm', data = train, order = cn, ax = axs[0,1]);
sns.boxplot(x = 'Species', y = 'PetalLengthCm', data = train, order = cn, ax = axs[1,0]);
sns.boxplot(x = 'Species', y = 'PetalWidthCm', data = train,  order = cn, ax = axs[1,1]);
# add some spacing between subplots
fig.tight_layout(pad=1.0);
```



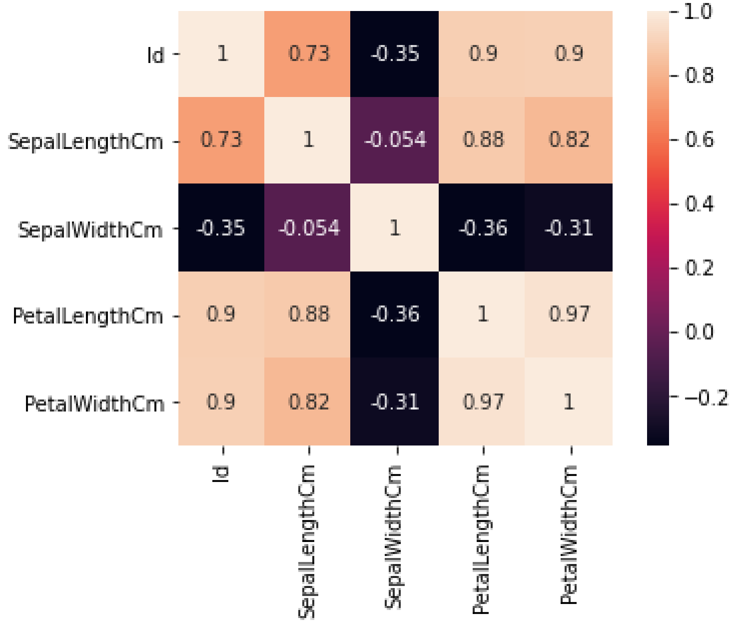

```python
sns.violinplot(x="Species", y="PetalLengthCm", data=train, size=5, order = cn, palette = 'colorblind');
```



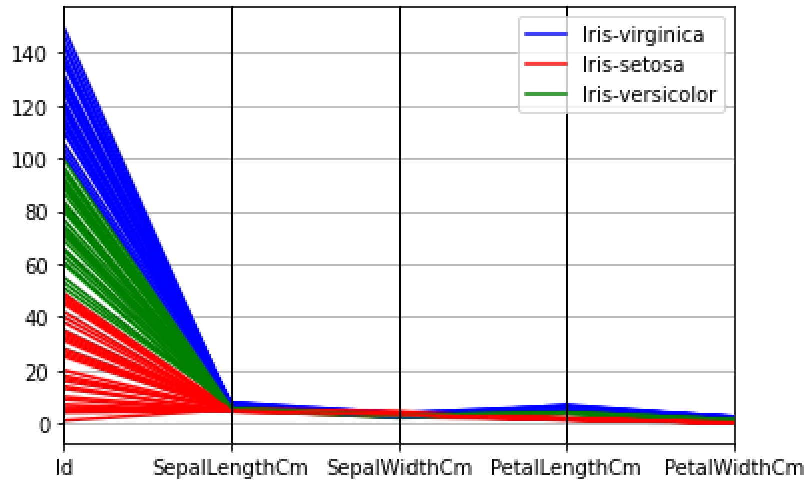

```python
sns.pairplot(train, hue="Species", height = 2, palette = 'colorblind');
```




```
corrmat = train.corr()
sns.heatmap(corrmat, annot = True, square = True);
```




```
parallel_coordinates(train, "Species", color = ['blue', 'red', 'green']);
```




```
X_train = train[['SepalLengthCm','SepalWidthCm','PetalLengthCm','PetalWidthCm']]
y_train = train.Species
```

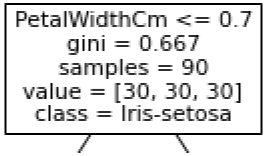
```
X_test = test[['SepalLengthCm','SepalWidthCm','PetalLengthCm','PetalWidthCm']]
y_test = test.Species


mod_dt = DecisionTreeClassifier(max_depth = 3, random_state = 1)
mod_dt.fit(X_train,y_train)
prediction=mod_dt.predict(X_test)
print('The accuracy of the Decision Tree is',"{:.3f}".format(metrics.accuracy_score(prediction,y_test)))
```

```
The accuracy of the Decision Tree is 0.983
```

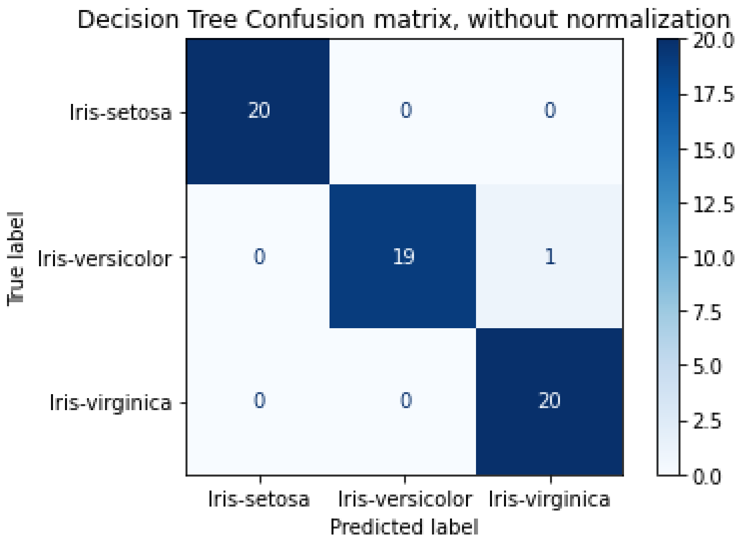
```
mod_dt.feature_importances_
```

```
array([0.        , 0.        , 0.42430866, 0.57569134])
```

```
plt.figure(figsize = (10,8))
plot_tree(mod_dt, feature_names = fn, class_names = cn, filled = True);
```




```
disp = metrics.plot_confusion_matrix(mod_dt, X_test, y_test,
                                 display_labels=cn,
                                 cmap=plt.cm.Blues,
                                 normalize=None)
disp.ax_.set_title('Decision Tree Confusion matrix, without normalization');
```




```
from sklearn.metrics import confusion_matrix
from sklearn.metrics import classification_report
```

```
X = data.iloc[:, :-1].values
y = data.iloc[:, -1].values

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size = 0.2, random_state = 0)
```

```
from sklearn.linear_model import LogisticRegression
classifier = LogisticRegression()
classifier.fit(X_train, y_train)
y_pred = classifier.predict(X_test)
print(classification_report(y_test, y_pred))
print(confusion_matrix(y_test, y_pred))
from sklearn.metrics import accuracy_score
print('accuracy is',accuracy_score(y_pred,y_test))
```

```
                 precision    recall  f1-score   support

    Iris-setosa       1.00      1.00      1.00        11
Iris-versicolor       1.00      1.00      1.00        13
 Iris-virginica       1.00      1.00      1.00         6

       accuracy                           1.00        30
      macro avg       1.00      1.00      1.00        30
   weighted avg       1.00      1.00      1.00        30

[[11  0  0]
 [ 0 13  0]
 [ 0  0  6]]
accuracy is 1.0
/usr/local/lib/python3.6/dist-packages/sklearn/linear_model/_logistic.py:940: ConvergenceWarning: lbfgs failed to converge (sta
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regression
  extra_warning_msg=_LOGISTIC_SOLVER_CONVERGENCE_MSG)
```

```
# Naive Bayes
from sklearn.naive_bayes import GaussianNB
classifier = GaussianNB()
classifier.fit(X_train, y_train)
```

```
y_pred = classifier.predict(X_test)

# Summary of the predictions made by the classifier
print(classification_report(y_test, y_pred))
print(confusion_matrix(y_test, y_pred))
# Accuracy score
from sklearn.metrics import accuracy_score
print('accuracy is',accuracy_score(y_pred,y_test))
```

```
                 precision    recall  f1-score   support

    Iris-setosa       1.00      1.00      1.00        11
Iris-versicolor       1.00      1.00      1.00        13
 Iris-virginica       1.00      1.00      1.00         6

       accuracy                           1.00        30
      macro avg       1.00      1.00      1.00        30
   weighted avg       1.00      1.00      1.00        30

[[11  0  0]
 [ 0 13  0]
 [ 0  0  6]]
accuracy is 1.0
```

```
from sklearn.svm import SVC

classifier = SVC()
classifier.fit(X_train, y_train)

y_pred = classifier.predict(X_test)

# Summary of the predictions made by the classifier
print(classification_report(y_test, y_pred))
print(confusion_matrix(y_test, y_pred))
# Accuracy score
from sklearn.metrics import accuracy_score
print('accuracy is',accuracy_score(y_pred,y_test))
```

```
                 precision    recall  f1-score   support

    Iris-setosa       1.00      1.00      1.00        11
Iris-versicolor       1.00      1.00      1.00        13
 Iris-virginica       1.00      1.00      1.00         6

       accuracy                           1.00        30
      macro avg       1.00      1.00      1.00        30
   weighted avg       1.00      1.00      1.00        30

[[11  0  0]
 [ 0 13  0]
 [ 0  0  6]]
accuracy is 1.0
```

```
from sklearn.neighbors import KNeighborsClassifier

classifier = KNeighborsClassifier(n_neighbors=8)
classifier.fit(X_train, y_train)

y_pred = classifier.predict(X_test)

# Summary of the predictions made by the classifier
print(classification_report(y_test, y_pred))
print(confusion_matrix(y_test, y_pred))
# Accuracy score
from sklearn.metrics import accuracy_score
print('accuracy is',accuracy_score(y_pred,y_test))
```

```
                 precision    recall  f1-score   support

    Iris-setosa       1.00      1.00      1.00        11
Iris-versicolor       1.00      1.00      1.00        13
 Iris-virginica       1.00      1.00      1.00         6

       accuracy                           1.00        30
      macro avg       1.00      1.00      1.00        30
   weighted avg       1.00      1.00      1.00        30
```

```
[[11  0  0]
 [ 0 13  0]
 [ 0  0  6]]
accuracy is 1.0
```

```
dict={'S.No':[1,2,3,4,5],'Model':['Decision Tree','LogisticRegression','GaussianNB','Support Vector Machine','K Nearest Neighbours']
```

```
dict
```

```
{'Accuracy': [0.983, 1.0, 1.0, 1.0, 1.0],
 'Model': ['Decision Tree',
  'LogisticRegression',
  'GaussianNB',
  'Support Vector Machine',
  'K Nearest Neighbours'],
 'S.No': [1, 2, 3, 4, 5]}
```

```
data=pd.DataFrame.from_dict(dict)
```

```
data
```

	S.No	Model	Accuracy
0	1	Decision Tree	0.983
1	2	LogisticRegression	1.000
2	3	GaussianNB	1.000
3	4	Support Vector Machine	1.000
4	5	K Nearest Neighbours	1.000