DWDM Model Lab - 22/12/2021

Naive Bayes Classifier

18BCS102 Adithya G

Dataset: https://archive.ics.uci.edu/ml/datasets/iris

Imports

In [52]:
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.datasets import load_iris
from sklearn.naive_bayes import GaussianNB
from sklearn.metrics import accuracy_score, confusion_matrix
from sklearn.model_selection import train_test_split
```

Dataset

In [12]:
```
data = load_iris()
X, y = data['data'], data['target']
X = pd.DataFrame(X, columns=data['feature_names'])
X.head()
```

Out[12]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)
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

Data Exploration

In [30]:
```
data.target_names
```

Out[30]:
```
array(['setosa', 'versicolor', 'virginica'], dtype='<U10')
```

In [32]:
```
X.shape
```

Out[32]:
```
(150, 4)
```

In [26]:
```
X.describe()
```

Out[26]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)
count	150.000000	150.000000	150.000000	150.000000
mean	5.843333	3.057333	3.758000	1.199333
std	0.828066	0.435866	1.765298	0.762238
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 [33]:
```
X.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 4 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   sepal length (cm)  150 non-null    float64
 1   sepal width (cm)   150 non-null    float64
 2   petal length (cm)  150 non-null    float64
 3   petal width (cm)   150 non-null    float64
dtypes: float64(4)
memory usage: 4.8 KB
```

This dataset is already clean (no null values and proper dtypes), so we can proceed to classification

Splitting Dataset

In [13]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, ra
```

Naive Bayes Classifier

In [16]:
```
clf = GaussianNB()
```

In [17]:
```
clf.fit(X_train, y_train)
```

Out[17]:
```
GaussianNB()
```

In [37]:
```
print('Probability of each class')
print('0: %.2f' % clf.class_prior_[0])
print('1: %.2f' % clf.class_prior_[1])
print('2: %.2f' % clf.class_prior_[2])
```

```
Probability of each class
0: 0.34
1: 0.32
2: 0.34
```

In [49]:
```
y_pred = clf.predict(X_test)
print('Accuracy =', round(accuracy_score(y_test, y_pred) * 100), '%')
```

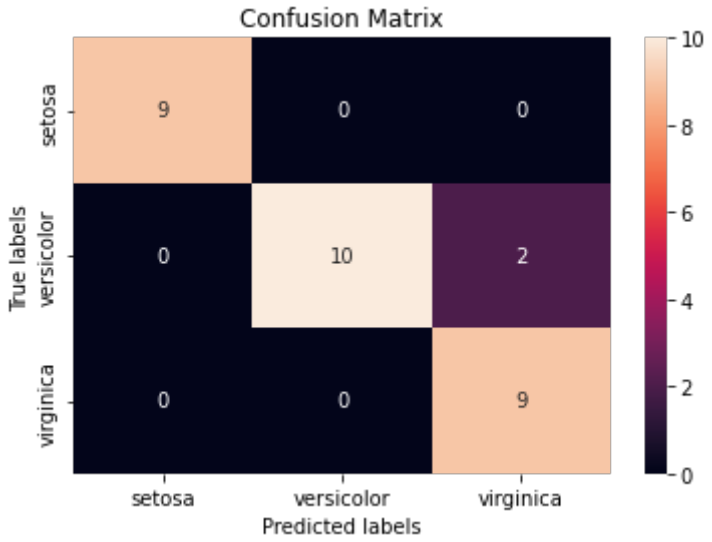
```
Accuracy = 93 %
```

In [50]:
```
# Test set prediction
y_pred
```

Out[50]:
```
array([1, 1, 0, 0, 2, 2, 2, 0, 0, 1, 0, 2, 0, 2, 1, 0, 1, 0, 1, 2, 2, 1,
       0, 2, 1, 2, 2, 1, 1, 2])
```

In [54]:
```
cm = confusion_matrix(y_test, y_pred)
```

In [59]:
```
ax= plt.subplot()
sns.heatmap(cm, annot=True, fmt='g', ax=ax)
ax.set_xlabel('Predicted labels')
ax.set_ylabel('True labels')
ax.set_title('Confusion Matrix')
ax.xaxis.set_ticklabels(data.target_names)
ax.yaxis.set_ticklabels(data.target_names);
```



In [ ]:
```
```