

AIM: Apply Naive Bayes Classifier algorithm on a sample case study and data set and analyse the prediction result

```
import numpy as np
import pandas as pd
from sklearn import datasets
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.naive_bayes import GaussianNB
from sklearn.metrics import accuracy_score, confusion_matrix, classification_report
import matplotlib.pyplot as plt
import seaborn as sns
```

```
iris = datasets.load_iris()
X = iris.data
y = iris.target
```

```
X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=0.25, random_state=42, stratify=y)
```

```
scaler = StandardScaler()
X_train_scaled = scaler.fit_transform(X_train)
X_test_scaled = scaler.transform(X_test)
```

```
model = GaussianNB()
model.fit(X_train_scaled, y_train)
```

* GaussianNB  

```
y_pred = model.predict(X_test_scaled)
```

```
accuracy = accuracy_score(y_test, y_pred)
print(f"\n✓ Model Accuracy: {accuracy*100:.2f}%")
```

✓ Model Accuracy: 92.11%

```
cm = confusion_matrix(y_test, y_pred)
print("\nConfusion Matrix:\n", cm)
```

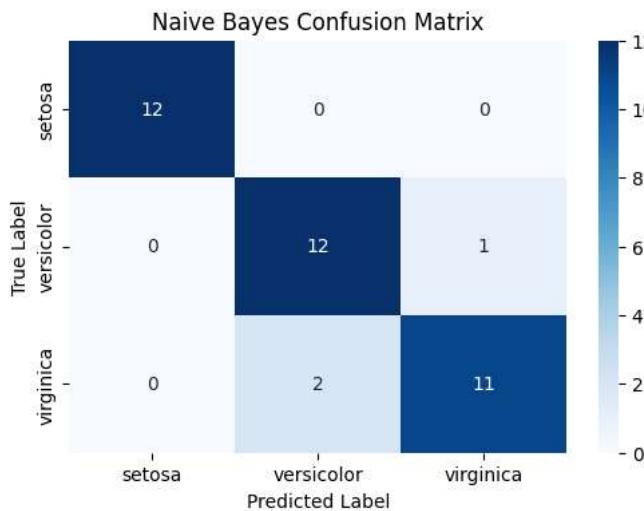
```
Confusion Matrix:
[[12  0  0]
 [ 0 12  1]
 [ 0  2 11]]
```

```
print("\nClassification Report:\n", classification_report(y_test, y_pred, target_names=iris.target_names))
```

Classification Report:				
	precision	recall	f1-score	support
setosa	1.00	1.00	1.00	12
versicolor	0.86	0.92	0.89	13
virginica	0.92	0.85	0.88	13
accuracy			0.92	38
macro avg	0.92	0.92	0.92	38
weighted avg	0.92	0.92	0.92	38

```
plt.figure(figsize=(6,4))
sns.heatmap(cm, annot=True, fmt='d', cmap='Blues',
            xticklabels=iris.target_names,
            yticklabels=iris.target_names)
plt.xlabel("Predicted Label")
plt.ylabel("True Label")
```

```
plt.title("Naive Bayes Confusion Matrix")
plt.show()
```



```
comparison = pd.DataFrame({
    "Actual": [iris.target_names[i] for i in y_test],
    "Predicted": [iris.target_names[i] for i in y_pred]
})
print("\nSample comparison of actual vs predicted labels:")
print(comparison.head(10))
```

Sample comparison of actual vs predicted labels:

	Actual	Predicted
0	setosa	setosa
1	versicolor	versicolor
2	versicolor	versicolor
3	versicolor	versicolor
4	setosa	setosa
5	versicolor	versicolor
6	virginica	versicolor
7	virginica	virginica
8	virginica	virginica
9	virginica	virginica