

In []: Assigement no. -06
 Aim-
 1. Concepts used in Naïve Bayes classifier
 2. Naive Bayes Example
 3. Confusion Matrix Evaluation Metrics

In [23]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

In [24]:

```
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, pre
```

In [25]:

```
df = pd.read_csv("C:\\Users\\Welcome\\Downloads\\iris dataset\\iris.csv")
```

In [26]:

```
print(df.head())
```

	sepal_length	sepal_width	petal_length	petal_width	species
0	5.1	3.5	1.4	0.2	setosa
1	4.9	3.0	1.4	0.2	setosa
2	4.7	3.2	1.3	0.2	setosa
3	4.6	3.1	1.5	0.2	setosa
4	5.0	3.6	1.4	0.2	setosa

In [22]:

```
if df.select_dtypes(include=['object']).shape[1] > 0:
    df = pd.get_dummies(df, drop_first=True)
```

In [18]:

```
df.dropna(inplace=True)
```

In [27]:

```
X = df.drop(columns=['species']) # Assuming 'species' is the target variable
y = df['species']
```

In [28]:

```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
```

In [29]:

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

In [30]:

```
gaussian = GaussianNB()
gaussian.fit(X_train, y_train)
```

Out[30]:

GaussianNB ⓘ ?

(https://scikit-learn.org/1.4/modules/generated/sklearn.naive_bayes.GaussianNB.html)

GaussianNB()

```
In [31]: y_pred = gaussian.predict(X_test)
```

```
In [32]: accuracy = accuracy_score(y_test, y_pred)
```

```
In [33]: print("Accuracy:", accuracy)
```

Accuracy: 1.0

```
In [34]: precision = precision_score(y_test, y_pred, average='micro')
```

```
In [35]: print("Precision:", precision)
```

Precision: 1.0

```
In [36]: recall = recall_score(y_test, y_pred, average='micro')
```

```
In [37]: print("Recall:", recall)
```

Recall: 1.0

```
In [38]: conf_matrix = confusion_matrix(y_test, y_pred)
print("Confusion Matrix:\n", conf_matrix)
```

Confusion Matrix:

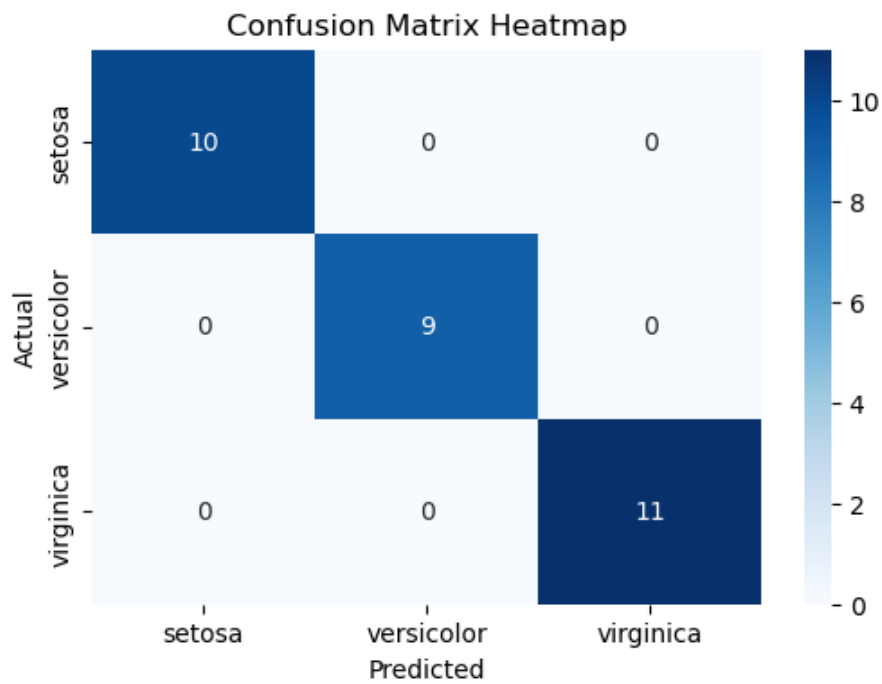
```
[[10  0  0]
 [ 0  9  0]
 [ 0  0 11]]
```

```
In [39]: class_report = classification_report(y_test, y_pred)
print("Classification Report:\n", class_report)
```

Classification Report:

	precision	recall	f1-score	support
setosa	1.00	1.00	1.00	10
versicolor	1.00	1.00	1.00	9
virginica	1.00	1.00	1.00	11
accuracy			1.00	30
macro avg	1.00	1.00	1.00	30
weighted avg	1.00	1.00	1.00	30

```
In [40]: plt.figure(figsize=(6,4))
sns.heatmap(conf_matrix, annot=True, fmt='d', cmap='Blues', xticklabels=np.unique(y_test)
plt.xlabel('Predicted')
plt.ylabel('Actual')
plt.title('Confusion Matrix Heatmap')
plt.show()
```



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