

NaiveBayes

April 16, 2023

```
[1]: from sklearn.datasets import load_iris
      from sklearn.model_selection import train_test_split
      from sklearn.naive_bayes import GaussianNB
```

```
[2]: X, y = load_iris(return_X_y=True)
      X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.5,
      ↪random_state=0)
      gnb = GaussianNB()
      y_pred = gnb.fit(X_train, y_train).predict(X_test)
      print("Number of mislabeled points out of a total %d points : %d" % (X_test.
      ↪shape[0], (y_test != y_pred).sum()))
```

Number of mislabeled points out of a total 75 points : 4

```
[4]: len(X)
```

```
[4]: 150
```

```
[5]: len(X_test)
```

```
[5]: 75
```

```
[6]: n = gnb.fit(X,y)
```

```
[8]: X
```

```
[8]: array([[5.1, 3.5, 1.4, 0.2],
           [4.9, 3. , 1.4, 0.2],
           [4.7, 3.2, 1.3, 0.2],
           [4.6, 3.1, 1.5, 0.2],
           [5. , 3.6, 1.4, 0.2],
           [5.4, 3.9, 1.7, 0.4],
           [4.6, 3.4, 1.4, 0.3],
           [5. , 3.4, 1.5, 0.2],
           [4.4, 2.9, 1.4, 0.2],
           [4.9, 3.1, 1.5, 0.1],
           [5.4, 3.7, 1.5, 0.2],
           [4.8, 3.4, 1.6, 0.2],
```

[4.8, 3. , 1.4, 0.1],
[4.3, 3. , 1.1, 0.1],
[5.8, 4. , 1.2, 0.2],
[5.7, 4.4, 1.5, 0.4],
[5.4, 3.9, 1.3, 0.4],
[5.1, 3.5, 1.4, 0.3],
[5.7, 3.8, 1.7, 0.3],
[5.1, 3.8, 1.5, 0.3],
[5.4, 3.4, 1.7, 0.2],
[5.1, 3.7, 1.5, 0.4],
[4.6, 3.6, 1. , 0.2],
[5.1, 3.3, 1.7, 0.5],
[4.8, 3.4, 1.9, 0.2],
[5. , 3. , 1.6, 0.2],
[5. , 3.4, 1.6, 0.4],
[5.2, 3.5, 1.5, 0.2],
[5.2, 3.4, 1.4, 0.2],
[4.7, 3.2, 1.6, 0.2],
[4.8, 3.1, 1.6, 0.2],
[5.4, 3.4, 1.5, 0.4],
[5.2, 4.1, 1.5, 0.1],
[5.5, 4.2, 1.4, 0.2],
[4.9, 3.1, 1.5, 0.2],
[5. , 3.2, 1.2, 0.2],
[5.5, 3.5, 1.3, 0.2],
[4.9, 3.6, 1.4, 0.1],
[4.4, 3. , 1.3, 0.2],
[5.1, 3.4, 1.5, 0.2],
[5. , 3.5, 1.3, 0.3],
[4.5, 2.3, 1.3, 0.3],
[4.4, 3.2, 1.3, 0.2],
[5. , 3.5, 1.6, 0.6],
[5.1, 3.8, 1.9, 0.4],
[4.8, 3. , 1.4, 0.3],
[5.1, 3.8, 1.6, 0.2],
[4.6, 3.2, 1.4, 0.2],
[5.3, 3.7, 1.5, 0.2],
[5. , 3.3, 1.4, 0.2],
[7. , 3.2, 4.7, 1.4],
[6.4, 3.2, 4.5, 1.5],
[6.9, 3.1, 4.9, 1.5],
[5.5, 2.3, 4. , 1.3],
[6.5, 2.8, 4.6, 1.5],
[5.7, 2.8, 4.5, 1.3],
[6.3, 3.3, 4.7, 1.6],
[4.9, 2.4, 3.3, 1.],
[6.6, 2.9, 4.6, 1.3],

[5.2, 2.7, 3.9, 1.4],
[5. , 2. , 3.5, 1.],
[5.9, 3. , 4.2, 1.5],
[6. , 2.2, 4. , 1.],
[6.1, 2.9, 4.7, 1.4],
[5.6, 2.9, 3.6, 1.3],
[6.7, 3.1, 4.4, 1.4],
[5.6, 3. , 4.5, 1.5],
[5.8, 2.7, 4.1, 1.],
[6.2, 2.2, 4.5, 1.5],
[5.6, 2.5, 3.9, 1.1],
[5.9, 3.2, 4.8, 1.8],
[6.1, 2.8, 4. , 1.3],
[6.3, 2.5, 4.9, 1.5],
[6.1, 2.8, 4.7, 1.2],
[6.4, 2.9, 4.3, 1.3],
[6.6, 3. , 4.4, 1.4],
[6.8, 2.8, 4.8, 1.4],
[6.7, 3. , 5. , 1.7],
[6. , 2.9, 4.5, 1.5],
[5.7, 2.6, 3.5, 1.],
[5.5, 2.4, 3.8, 1.1],
[5.5, 2.4, 3.7, 1.],
[5.8, 2.7, 3.9, 1.2],
[6. , 2.7, 5.1, 1.6],
[5.4, 3. , 4.5, 1.5],
[6. , 3.4, 4.5, 1.6],
[6.7, 3.1, 4.7, 1.5],
[6.3, 2.3, 4.4, 1.3],
[5.6, 3. , 4.1, 1.3],
[5.5, 2.5, 4. , 1.3],
[5.5, 2.6, 4.4, 1.2],
[6.1, 3. , 4.6, 1.4],
[5.8, 2.6, 4. , 1.2],
[5. , 2.3, 3.3, 1.],
[5.6, 2.7, 4.2, 1.3],
[5.7, 3. , 4.2, 1.2],
[5.7, 2.9, 4.2, 1.3],
[6.2, 2.9, 4.3, 1.3],
[5.1, 2.5, 3. , 1.1],
[5.7, 2.8, 4.1, 1.3],
[6.3, 3.3, 6. , 2.5],
[5.8, 2.7, 5.1, 1.9],
[7.1, 3. , 5.9, 2.1],
[6.3, 2.9, 5.6, 1.8],
[6.5, 3. , 5.8, 2.2],
[7.6, 3. , 6.6, 2.1],

```

[4.9, 2.5, 4.5, 1.7],
[7.3, 2.9, 6.3, 1.8],
[6.7, 2.5, 5.8, 1.8],
[7.2, 3.6, 6.1, 2.5],
[6.5, 3.2, 5.1, 2. ],
[6.4, 2.7, 5.3, 1.9],
[6.8, 3. , 5.5, 2.1],
[5.7, 2.5, 5. , 2. ],
[5.8, 2.8, 5.1, 2.4],
[6.4, 3.2, 5.3, 2.3],
[6.5, 3. , 5.5, 1.8],
[7.7, 3.8, 6.7, 2.2],
[7.7, 2.6, 6.9, 2.3],
[6. , 2.2, 5. , 1.5],
[6.9, 3.2, 5.7, 2.3],
[5.6, 2.8, 4.9, 2. ],
[7.7, 2.8, 6.7, 2. ],
[6.3, 2.7, 4.9, 1.8],
[6.7, 3.3, 5.7, 2.1],
[7.2, 3.2, 6. , 1.8],
[6.2, 2.8, 4.8, 1.8],
[6.1, 3. , 4.9, 1.8],
[6.4, 2.8, 5.6, 2.1],
[7.2, 3. , 5.8, 1.6],
[7.4, 2.8, 6.1, 1.9],
[7.9, 3.8, 6.4, 2. ],
[6.4, 2.8, 5.6, 2.2],
[6.3, 2.8, 5.1, 1.5],
[6.1, 2.6, 5.6, 1.4],
[7.7, 3. , 6.1, 2.3],
[6.3, 3.4, 5.6, 2.4],
[6.4, 3.1, 5.5, 1.8],
[6. , 3. , 4.8, 1.8],
[6.9, 3.1, 5.4, 2.1],
[6.7, 3.1, 5.6, 2.4],
[6.9, 3.1, 5.1, 2.3],
[5.8, 2.7, 5.1, 1.9],
[6.8, 3.2, 5.9, 2.3],
[6.7, 3.3, 5.7, 2.5],
[6.7, 3. , 5.2, 2.3],
[6.3, 2.5, 5. , 1.9],
[6.5, 3. , 5.2, 2. ],
[6.2, 3.4, 5.4, 2.3],
[5.9, 3. , 5.1, 1.8]])

```

```
[13]: n.predict([[5.9, 3. , 5.1, 1.8]])
```

```
[13]: array([2])
```

```
[14]: n.predict([[7.7, 2.8, 6.7, 2. ]])
```

```
[14]: array([2])
```

```
[15]: n.predict([[5.8, 2.7, 3.9, 1.2]])
```

```
[15]: array([1])
```

```
[16]: n.predict([[5.1, 3.5, 1.4, 0.2]])
```

```
[16]: array([0])
```

```
[11]: y
```

```
[11]: array([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, 2, 2])
```

```
[17]: X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.8,
         random_state=0)
n = gnb.fit(X_train, y_train)
y = n.predict(X_test)
y
```

```
[17]: array([2, 1, 0, 2, 0, 2, 0, 1, 1, 1, 1, 1, 1, 1, 1, 0, 1, 1, 0, 0, 2, 1,
         0, 0, 1, 0, 0, 1, 1, 0, 2, 1, 0, 1, 2, 1, 0, 1, 1, 1, 2, 0, 2, 0,
         0, 1, 2, 2, 1, 2, 1, 2, 1, 1, 1, 1, 1, 2, 1, 2, 1, 0, 2, 1, 1, 1,
         1, 2, 0, 0, 2, 1, 0, 0, 1, 0, 2, 1, 0, 1, 2, 1, 0, 2, 2, 2, 2, 0,
         0, 2, 2, 0, 2, 0, 2, 2, 0, 0, 2, 0, 0, 0, 1, 2, 2, 0, 0, 0, 1, 1,
         0, 0, 1, 0, 2, 1, 2, 1, 0, 1])
```

```
[18]: len(y)
```

```
[18]: 120
```

```
[22]: X, y = load_iris(return_X_y=True)
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.4,
         random_state=0)
n = gnb.fit(X_train, y_train)
y = n.predict(X_test)
y
```

```
[22]: array([2, 1, 0, 2, 0, 2, 0, 1, 1, 1, 1, 1, 1, 1, 1, 0, 1, 1, 0, 0, 2, 1,  
            0, 0, 2, 0, 0, 1, 1, 0, 2, 1, 0, 2, 2, 1, 0, 1, 1, 1, 2, 0, 2, 0,  
            0, 1, 2, 2, 1, 2, 1, 2, 1, 1, 2, 1, 1, 2, 1, 2])
```

```
[23]: len(y)
```

```
[23]: 60
```

```
[ ]:
```