Classification-NaiveBayes

April 9, 2022

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

[2]:
```
import pandas as pd

data = pd.read_csv('C:\\Users\\MSI␣
↪Stealth\\Downloads\\BMEN415Project\\Classification\\classification.csv')

print(data.head())
```

```
         id diagnosis  radius_mean  texture_mean  perimeter_mean  area_mean  \
0    842302         M        17.99         10.38          122.80     1001.0
1    842517         M        20.57         17.77          132.90     1326.0
2  84300903         M        19.69         21.25          130.00     1203.0
3  84348301         M        11.42         20.38           77.58      386.1
4  84358402         M        20.29         14.34          135.10     1297.0

   smoothness_mean  compactness_mean  concavity_mean  concave points_mean  \
0          0.11840           0.27760          0.3001              0.14710
1          0.08474           0.07864          0.0869              0.07017
2          0.10960           0.15990          0.1974              0.12790
3          0.14250           0.28390          0.2414              0.10520
4          0.10030           0.13280          0.1980              0.10430

   …  radius_worst  texture_worst  perimeter_worst  area_worst  \
0  …         25.38          17.33           184.60      2019.0
1  …         24.99          23.41           158.80      1956.0
2  …         23.57          25.53           152.50      1709.0
3  …         14.91          26.50            98.87       567.7
4  …         22.54          16.67           152.20      1575.0

   smoothness_worst  compactness_worst  concavity_worst  concave points_worst  \
0            0.1622             0.6656           0.7119                0.2654
1            0.1238             0.1866           0.2416                0.1860
2            0.1444             0.4245           0.4504                0.2430
3            0.2098             0.8663           0.6869                0.2575
4            0.1374             0.2050           0.4000                0.1625
```

```
   symmetry_worst  fractal_dimension_worst
0          0.4601                  0.11890
1          0.2750                  0.08902
2          0.3613                  0.08758
3          0.6638                  0.17300
4          0.2364                  0.07678

[5 rows x 32 columns]
```

[3]:
```
y = list(map(lambda v: 'yes' if v == 'B' else 'no', data['diagnosis'].values))␣
↪# target values as string

X = data[['radius_mean', 'texture_mean', 'perimeter_mean', 'area_mean',␣
↪'smoothness_mean','compactness_mean',
          'concavity_mean','concave␣
↪points_mean','symmetry_mean','fractal_dimension_mean',
        ␣
↪'radius_se','texture_se','perimeter_se','area_se','smoothness_se','compactness_se',
         'concavity_se','concave␣
↪points_se','symmetry_se','fractal_dimension_se','radius_worst',
        ␣
↪'texture_worst','perimeter_worst','area_worst','smoothness_worst','compactness_worst',
         'concavity_worst','concave␣
↪points_worst','symmetry_worst','fractal_dimension_worst']].values # features␣
↪values
```

[4]:
```
print(len(y))

# We'll take 400 examples to train and the rest to the validation process
y_train = y[:400]
y_val = y[400:]

X_train = X[:400]
X_val = X[400:]
```

```
569
```

[9]:
```
gnb = GaussianNB()
y_pred = gnb.fit(X_train, y_train).predict(X_val)
print("Number of mislabeled points out of a total %d points : %d"
       % (X_val.shape[0], (y_val != y_pred).sum()))
total_cases = len(y_val) # size of validation set


# import the metrics class
from sklearn import metrics
cnf_matrix = metrics.confusion_matrix(y_val, y_pred)
```

```
cnf_matrix
```

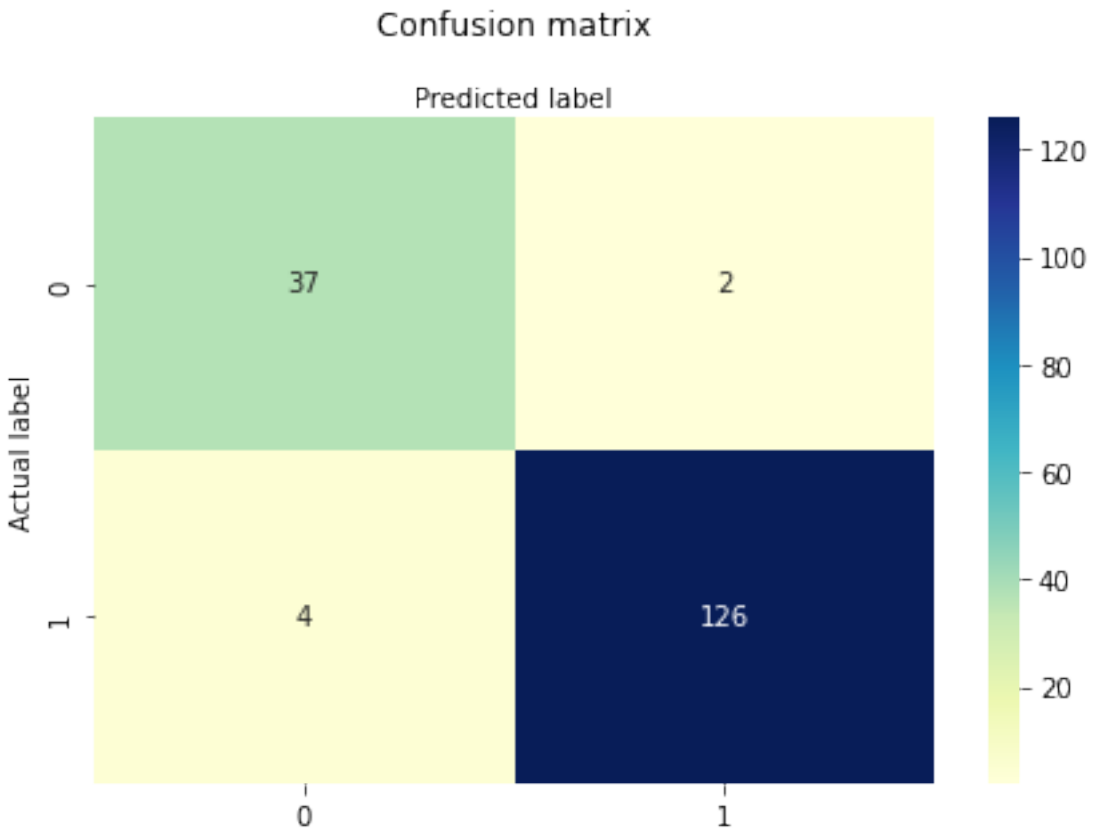
```
Number of mislabeled points out of a total 169 points : 6
```

[9]:
```
array([[ 37,   2],
       [  4, 126]], dtype=int64)
```

[10]:
```
# import required modules
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline

class_names=[0,1] # name  of classes
fig, ax = plt.subplots()
tick_marks = np.arange(len(class_names))
plt.xticks(tick_marks, class_names)
plt.yticks(tick_marks, class_names)
# create heatmap
sns.heatmap(pd.DataFrame(cnf_matrix), annot=True, cmap="YlGnBu" ,fmt='g')
ax.xaxis.set_label_position("top")
plt.tight_layout()
plt.title('Confusion matrix', y=1.1)
plt.ylabel('Actual label')
plt.xlabel('Predicted label')
```

[10]:
```
Text(0.5, 257.44, 'Predicted label')
```



[11]:
```
# Model Accuracy, how often is the classifier correct?
print("Accuracy:",metrics.accuracy_score(y_val, y_pred))
```

```
Accuracy: 0.9644970414201184
```

[ ]:
```

```