ex4-logistic-regression

August 5, 2024

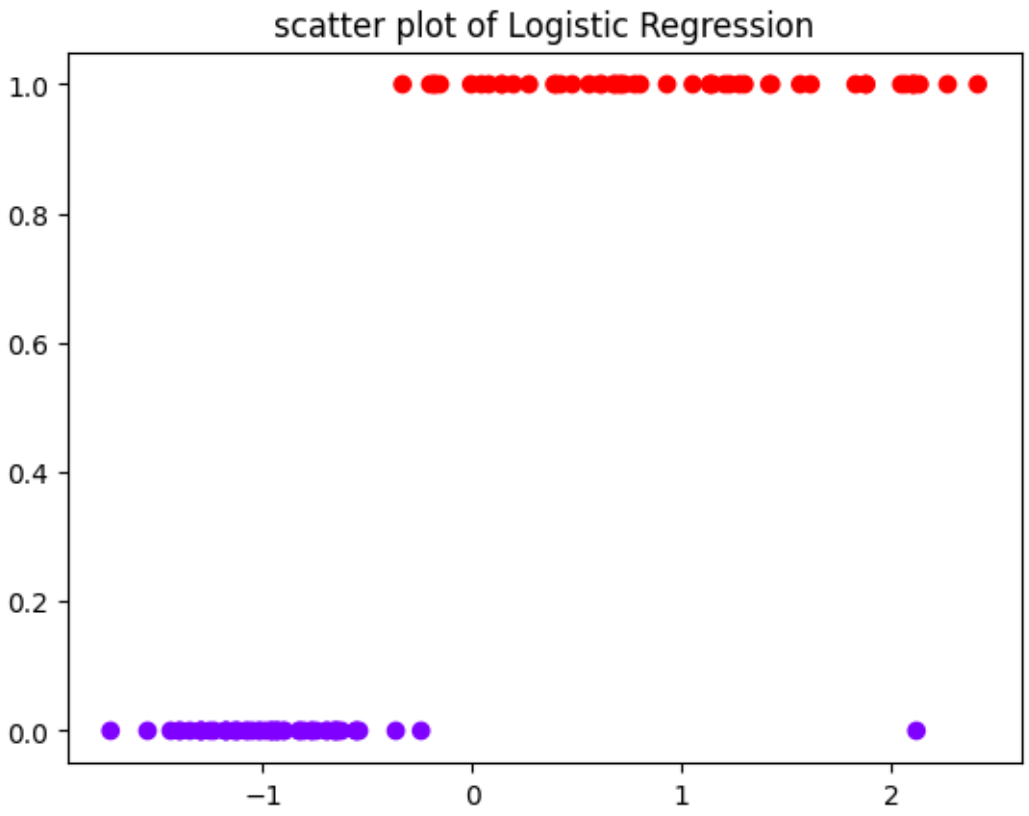
[1]:
```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import confusion_matrix

from sklearn.datasets import make_classification
from matplotlib import pyplot as plt
```

[2]:
```
x, y = make_classification(
    n_samples=100,
    n_features=1,
    n_classes=2,
    n_clusters_per_class=1,
    flip_y=0.03,
    n_informative=1,
    n_redundant=0,
    n_repeated=0,
)
print(y)
```

```
[0 0 1 0 0 1 0 1 0 0 0 0 0 1 0 1 1 0 1 1 0 1 1 1 1 1 0 1 1 1 1 1 1 0 0 0 1
 0 0 0 0 0 0 1 0 0 1 0 1 1 0 1 0 1 1 0 1 0 0 1 1 1 0 1 0 1 1 0 1 0 0 1 0 0
 1 0 0 1 1 1 1 0 0 0 1 0 0 0 0 1 1 1 1 0 1 0 1 1 1 0]
```

[3]:
```
plt.scatter(x, y, c=y, cmap="rainbow")
plt.title("scatter plot of Logistic Regression")
plt.show()
```



[4]:
```
x_train, x_test, y_train, y_test = train_test_split(x, y, random_state=1)
```

[5]:
```
x_train.shape
```

[5]:
```
(75, 1)
```

[6]:
```
# step 5 perform logidtic regression
log_reg = LogisticRegression()
log_reg.fit(x_train, y_train)
```

[6]:
```
LogisticRegression()
```

[7]:
```
# step 6 Make prediction using thr model
# performs prediction using the test dataset
y_pred = log_reg.predict(x_test)
```

[8]:
```
# step 7 Display the Confusion matrix
confusion_matrix(y_test, y_pred)
```

[8]:
```
array([[12,  0],
       [ 1, 12]])
```

[9]:
```
df = pd.read_csv("datasets/insurance_data.csv")
```

[10]:
```
df
```

[10]:

	age	bought_insurance
0	22	0
1	25	0
2	47	1
3	52	0
4	46	1
5	56	1
6	55	0
7	60	1
8	62	1
9	61	1
10	18	0
11	28	0
12	27	0
13	29	0
14	49	1
15	55	1
16	25	1
17	58	1
18	19	0
19	18	0
20	21	0
21	26	0
22	40	1
23	45	1
24	50	1
25	54	1
26	23	0

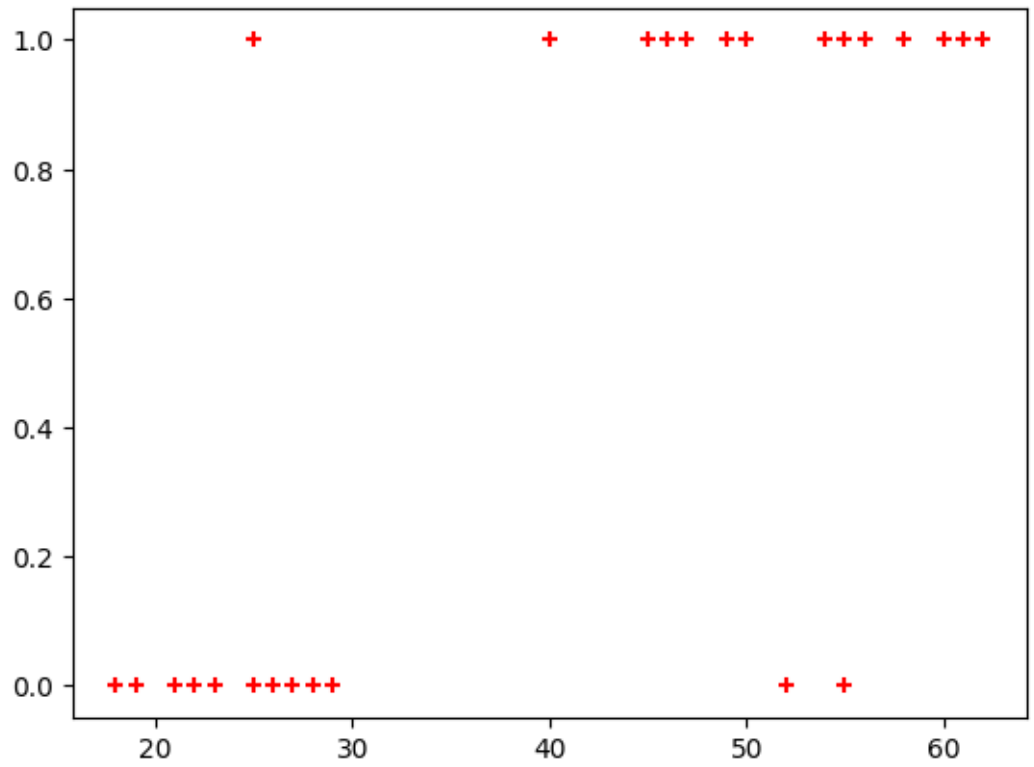
[11]:
```
df.head()
```

[11]:

	age	bought_insurance
0	22	0
1	25	0
2	47	1
3	52	0
4	46	1

[12]:
```
plt.scatter(df.age, df.bought_insurance, marker="+", color="red")
```

[12]:
```
<matplotlib.collections.PathCollection at 0x7fa2d6831850>
```



[13]:
```
df.shape
```

[13]:
```
(27, 2)
```

[14]:
```
x_train, x_test, y_train, y_test = train_test_split(
    df[["age"]], df.bought_insurance, test_size=0.1
)
```

[15]:
```
x_test
```

[15]:
```
    age
3    52
0    22
13   29
```

[16]:
```
model = LogisticRegression()
```

[17]:
```
model.fit(x_train, y_train)
```

[17]:
```
LogisticRegression()
```

[18]:
```
model.predict(x_test)
```

[18]:
```
array([1, 0, 0])
```

[19]:
```
model.score(x_test, y_test)
```

[19]:
```
0.6666666666666666
```

[20]:
```
model.predict_proba(x_test)
```

[20]:
```
array([[0.07346226, 0.92653774],
       [0.89442771, 0.10557229],
       [0.74015574, 0.25984426]])
```

[21]:
```
df.describe()
```

[21]:

	age	bought_insurance
count	27.000000	27.000000
mean	39.666667	0.518519
std	15.745573	0.509175
min	18.000000	0.000000
25%	25.000000	0.000000
50%	45.000000	1.000000
75%	54.500000	1.000000
max	62.000000	1.000000