

# Machine Learning Algorithms: From Math to Code

## Assignment for Logistic Regression

Kang Wang, Yuheng Zhang

### Problem 1

Implement the method of logistic regression for binary classification, based on both (a) the gradient descent and (b) the Newton-Raphson methods. Then apply the code to the dataset

- 2ClassData.txt

which contains three columns for  $x_1, x_2, y$ , respectively. Here  $y$  is the binary labeling (1 or -1), indicating to which of the two classes point  $\mathbf{x} = [x_1, x_2]^T$  belongs.

### Requirements

For this problem, you should complete the missing code for Ch7\_1.m. After that, you should get the following output in command line:

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```
>> Ch7_1
Confusion matrix LogisticGD:
    178     2
     3   117

Number of iterations LogisticGD: 455
Elapsed time is 0.154175 seconds.
Confusion matrix LogisticNR:
    178     2
     3   117

Number of iterations LogisticNR: 189
Elapsed time is 0.150917 seconds.
accuracy: 98.33%, 98.33%.
```

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and figures like Figure 1 and Figure 2.

You should submit:

- Matlab Code: Ch7\_1.m (or code file in other programming languages).

### Attention

The Elapsed time is for reference only. You may get a totally different result, but it doesn't matter.

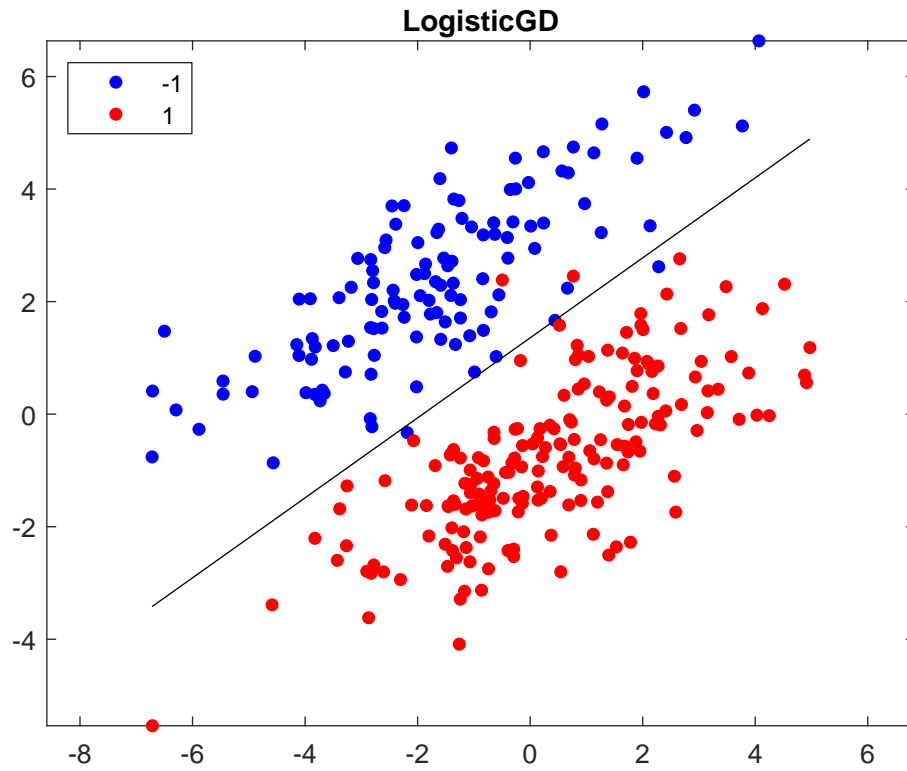


Figure 1: Logistic Regression by gradient descent

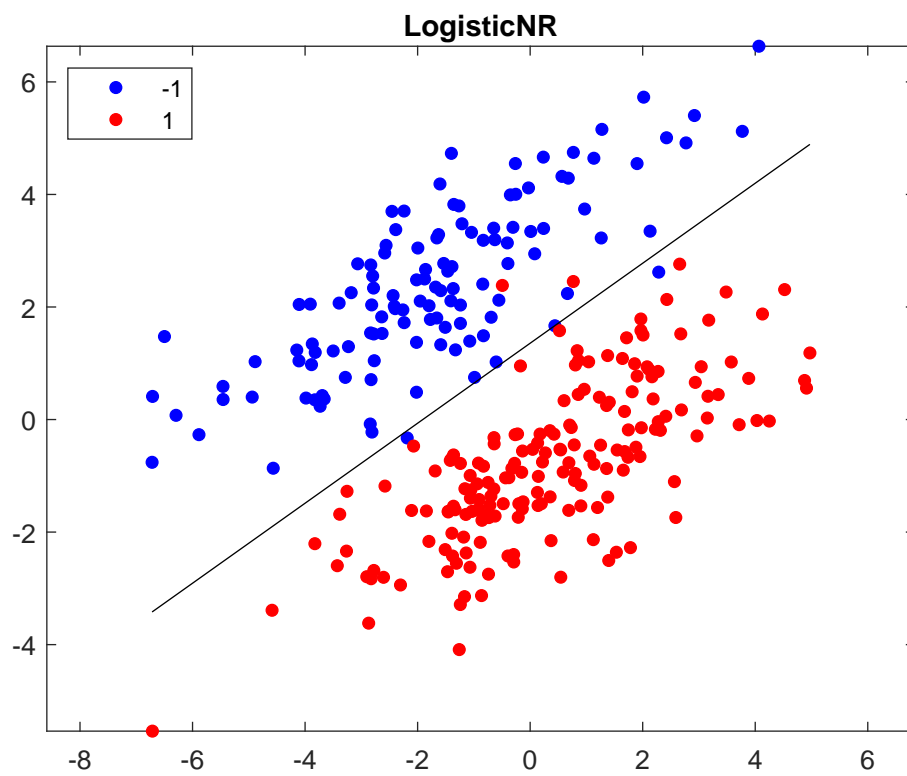


Figure 2: Logistic Regression by Newton-Raphson