

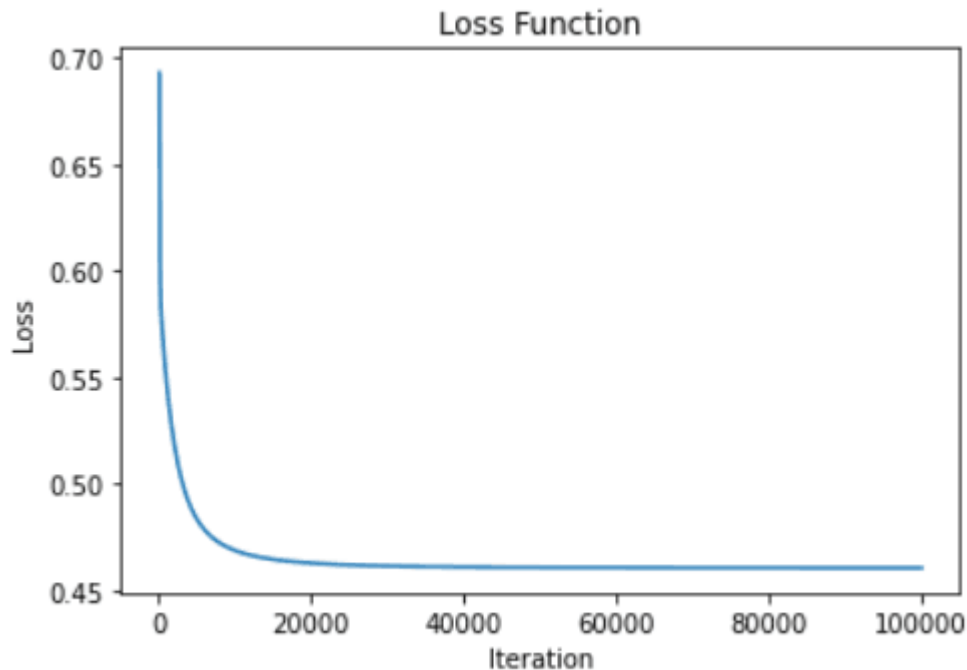
# Machine Learning Lab1

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Logistic Regression

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## 1 The loss curve of one train process



## 2 The comparison table of different parameters

$l_1$  and  $l_2$  show the method of the regularization, the number in the blank shows the parameter lamada of the regularization. After doing 5 times bootstrapping and get the mean, we have the comparison table as below:

| Train Accuracy | Test Accuracy | $l_1$ | $l_2$ | learning rate | iteration |
|----------------|---------------|-------|-------|---------------|-----------|
| 0.8004         | 0.8131        | /     | /     | 0.01          | 10000     |
| 0.6938         | 0.7104        | /     | /     | 0.01          | 1000      |
| 0.8021         | 0.8086        | /     | /     | 0.01          | 100000    |
| 0.8174         | 0.7941        | 1     | /     | 0.01          | 10000     |
| 0.7971         | 0.8295        | /     | 1     | 0.01          | 10000     |
| 0.7104         | 0.6904        | /     | /     | 0.001         | 10000     |
| 0.8017         | 0.8053        | /     | 2     | 0.01          | 10000     |
| 0.8065         | 0.8104        | /     | /     | 0.05          | 10000     |
| 0.7942         | 0.7816        | /     | 1     | 0.01          | 5000      |

| Train Accuracy | Test Accuracy | l1 | l2 | learning rate | iteration |
|----------------|---------------|----|----|---------------|-----------|
| 0.8050         | 0.8154        | /  | 1  | 0.01          | 20000     |

### 3 The best accuracy of test data

- We use accuracy as the metric, and among all different parameters we train with, the best accuracy of test data is 0.8295, (By using 5 times bootstrapping) with parameters: l2 regularization( $\lambda=1$ ), learning rate 0.01 and 10000 iteration times.