

SMAI-2020-Homework

September 2020

1 Objective Question [1 mark]

Consider a K class classification problem. Total number of binary classifier trained in a one-vs-all setting are _____, and for one-vs-one classifier setting are _____.

2 Objective Question [2 mark]

Which of the following methods do we use to best fit the data in Logistic Regression?

1. Least Square Error
2. Maximum Likelihood
3. Jaccard Distance
4. Both A and B

3 Programming Question [2 marks]

In tutorial, we saw how to build a multi-class classifier using a one-vs-all setting. In this problem you are required to construct a one-vs-one classifier for the same problem. The starter code is provided in ‘Logistic Regression Exercise 1.ipynb’.

4 Subjective Question [2 marks]

Suppose you train a logistic regression classifier and your hypothesis function h is

$$h_{\theta}(x) = g(\theta_0 + \theta_1 x_1 + \theta_2 x_2)$$

where,

$$\theta_0 = 6, \theta_1 = 0, \theta_2 = -1$$

Draw the decision boundary for the given classifier (a rough sketch is sufficient). What would happen to the decision boundary if you replace the coefficient of x_1 and x_2 ? Draw the decision boundary for the second case as well.

5 Programming Question [3 marks]

You have been given a dataset of handwritten digits, the MNIST dataset. The dataset consists of 28×28 pixel images consisting of one of 10 digits ($0, 1, \dots, 9$) that are handwritten. Using logistic regression in one-vs-one and one-vs-all setting construct a 10-class classifier. Report the test accuracy for one-vs-one and one-vs-all classifier. The starter code is provided in 'Logistic Regression Exercise 2.ipynb'.