Nicolas Carpenter
CMPUT 466: Machine Learning

Coding Assignment #2

Question 1.

The training accuracies for linear and logistic regression on datasets A and B are:

- Linear Regression on Dataset A = 0.9175
- Logistic Regression on Dataset A = 0.9325
- Linear Regression on Dataset B = 0.75
- Logistic Regression on Dataset B = 0.9425

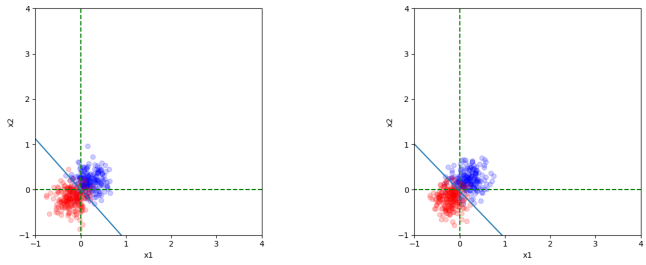

FIGURE 1. Decision Boundaries on Dataset A: linear (left), logistic (right)

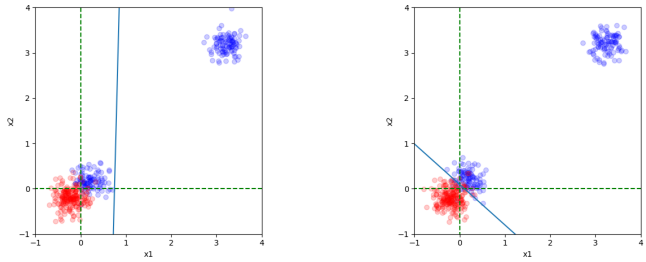

FIGURE 2. Decision Boundaries on Dataset B: linear (left), logistic (right)

Question 2.

Softmax Regression: alpha = 0.1, batch_size = 100, MaxEpoch = 50

Epoch with best validation performance :
Epoch 100 validation performance (risk) :
Epoch 100 test performance (risk) :

FIGURE 3. Training loss and validation accuracy learning curves.

Does 2-way softmax perform the same as Logistic regression? We can explore this question by reusing our code from Question One and replacing the linear classifier with a softmax classifier. Since there are only two classes in this problem this will become a 2-softmax classifier. If the two perform the same, we would expect to see similar accuracies on both datasets and similar decision boundaries.

The training accuracies for linear and logistic regression on datasets A and B are:

- Softmax Regression on Dataset A =
- Logistic Regression on Dataset A = 0.9325
- Softmax Regression on Dataset B =
- Logistic Regression on Dataset B = 0.9425

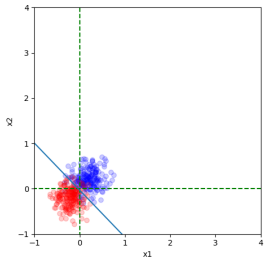

FIGURE 4. Decision Boundaries on Dataset A: softmax (left), logistic (right)

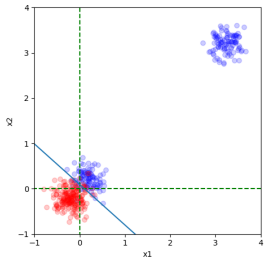

FIGURE 5. Decision Boundaries on Dataset B: softmax (left), logistic (right)

Based on the reported accuracies and decision boundaries, we can say that in practice, 2-way softmax is equivalent to logistic regression.