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COEN 140

Bonus Homework 4

For each version of the data, fit a logistic regression model using gradient descent. Report the mean error rate on the training and test sets. Turn in your code and numerical results.

a. Standardize the columns so they all have mean 0 and unit variance.

After running my gradient descent function, I received the following output:

Mean Training Error Rate: 0.6939641109298532
Mean Testing Error Rate: 0.35889070146818924

For my gradient descent, I used an initial weight vector of zeros since gradient descent is kind to most initial weights as our curve will result in a global minima.

For the error function, I opted to use the Cross-Entropy Loss function because our sigmoid function is non-linear[1].

The error tolerance of my gradient descent formula was 1e-6.

b. Transform the features using log(xij + 0.1).

After running my gradient descent function, I received the following output:

Mean Training Error Rate: 0.9305057096247961
Mean Testing Error Rate: 0.4756933115823817

c. Binarize the features using I(xij > 0).

After running my gradient descent function, I received the following output:

Mean Training Error Rate: 0.9125611745513866
Mean Testing Error Rate: 0.4623164763458401

I suspect all my error rates are so high due to the fact I initialized with a weight vector of 0's.

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[1] https://www.quora.com/What-is-the-sigmoid-function-and-what-is-its-use-in-machine-learnings-neural-networks-How-about-the-sigmoid-derivative-function