9b15fa09 **Homework Report 2** CS1420 – Spring 2018 March 3, 2018

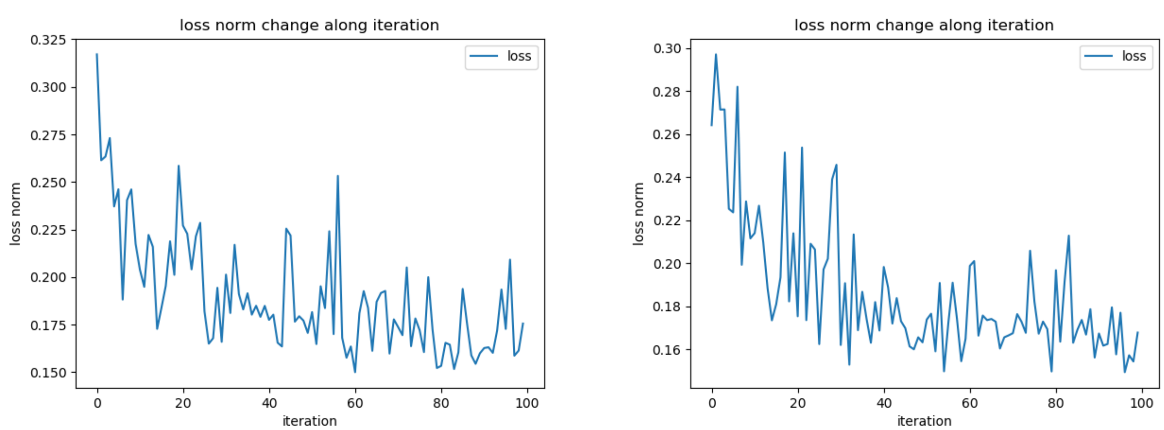
Problem 1

	Naive Bayes		Logistic Regression	
	test	train	test	train
1	82.0%	80.9%	86.2%	87.3%
2	82.0%	80.9%	88.5%	89.7%
3	82.0%	80.9%	87.6%	88.5%
4	82.0%	80.9%	86.2%	86.9%
Average	82.0%	80.9%	87.125%	88.1%

We could see that the accuracy of **Logistic Regression** if higher than that of **Naive Bayes**. It is obvious that **Logistic Regression** classifier outperforms **Naive Bayers** classifier, and we can improve **Logistic Regression** classifier more by increasing epochs. But in the chart, the training accuracy of **Naive Bayes** is slightly lower than the test accuracy, this may caused by the specific testing dataset.

Problem 2

Figure 1: Loss chart where learning rate $alpha = 0.5$(left) and $alpha = 0.1$(right)



Since the loss calculated during every 1000 iteration is a 10-dimensional vector, I used *np.linalg.norm()* to make it a scalar.

From the plots from **Figure 1**, we could see that with a higher learning rate($alpha = 0.5$), the loss will decrease more rapidly which is shown in the chart as a long and sharp downtrend curve. With a lower learning rate($alpha = 0.1$), we went though more up and downs in the chart and finally got a finer result than what we've got with a higher rate(89.8% testing accuracy vs. 86.8% testing accuracy). And apparently due to our rough estimation of $D(L)$, we could see that our loss function is not convex.