# DS 222 Assignment-2

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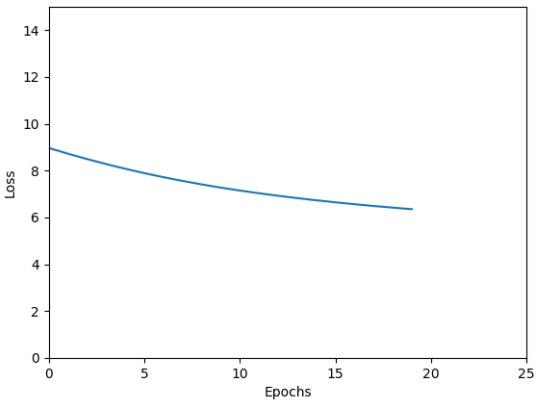
## 1 Part a

Numnber of epochs - 20

### 1.1 Decreasing Learning Rate

Initial Learning Rate = 0.3
Regularization = 0.003
Feature Vector Size - 5000

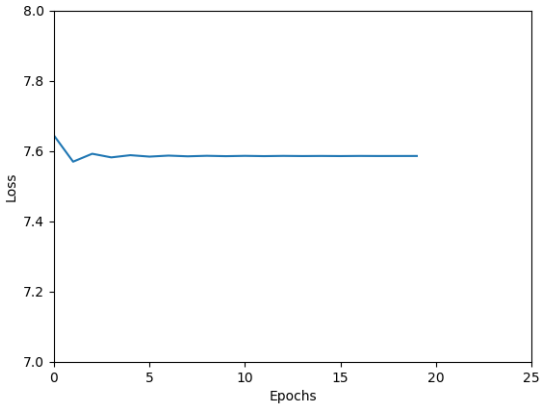
- Decreasing Factor : 0.95
- Train Time : 524.92 secs
- Test Time : 1.53 secs
- Train Accuracy : 56.56 %
- Test Accuracy : 51.82 %



### 1.2 Constant Learning Rate

Initial Learning Rate = 0.3
Regularization = 0.001
Feature Vector Size - 250000

- Train Time : 715.033 secs
- Test Time : 1.928 secs
- Train Accuracy : 57.9 %
- Test Accuracy : 52.1 %



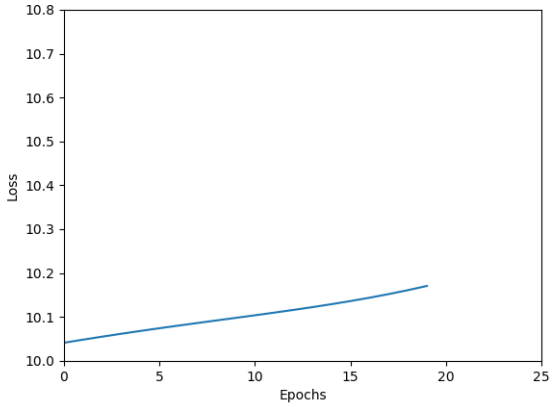

Increased accuracy is due to increase in number of feature vectors.

### 1.3 Increasing Learning Rate

Initial Learning Rate = 0.1
Regularization = 0.01
Feature Vector Size - 5000

- Increasing Factor : 1.05
- Train Time : 484.40 secs
- Test Time : 1.34 secs
- Train Accuracy : 40.1 %

- Test Accuracy : 38.4 %




# 2 Part b

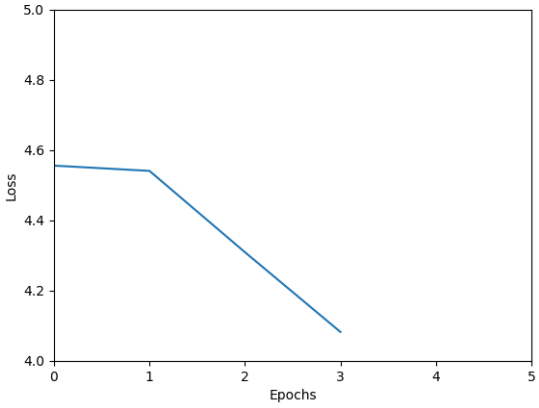
## 2.1 Parameter Server choice

I used JBosen parameter server framework. Hadoop does not support parameter server framework and parameter server integrated with Spark is not stable.

## 2.2 SSP Settings

Initial Learning Rate = 0.1
Regularization = 0.01
staleness-parameter = 5
Number of workers = 6 ( 3 host and 2 threads per client )
Epochs = 4 per worker

- Decreasing Factor : 0.95
- Test Time : 1.4 secs
- Train Accuracy : 47.34 %
- Test Accuracy : 42.69 %



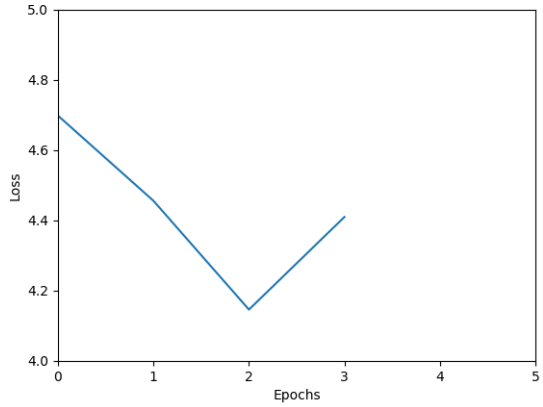

### 2.3 BSP Setting

The program failed to terminate when staleness was set to 0. I was not able to find the root cause of why PSTableGroup.globalBarrier() failed to terminate.

### 2.4 Asynchronous Settings

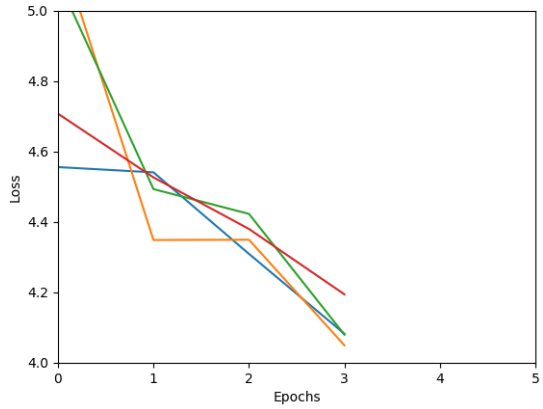
Initial Learning Rate = 0.1
Regularization = 0.01
staleness-parameter = 10000
Number of workers = 6 ( 3 host and 2 threads per client )
Epochs = 4 per worker

- Decreasing Factor : 0.95
- Test Time : 1.4 secs
- Train Accuracy : 39.56 %
- Test Accuracy : 34.27 %



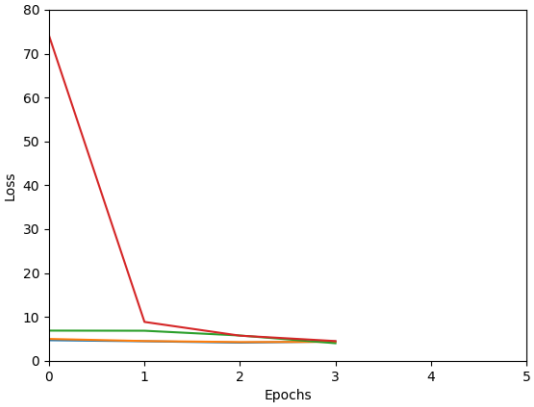

### 2.5 Plot SSP for different delay parameters

Blue - Staleness = 4
Orange - Staleness = 10
Green - Staleness = 15
Red - Staleness = 20




### 2.6 Plot Asynchronous for different worker parameters

Blue - Workers = 6
Orange - Workers = 9
Green - Workers = 12
Red - Workers = 15


80
70
60
50
40
30
20
10
0
Loss
0
1
2
3
4
5
Epochs