

# Assignment 2

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## 1 Local Logistic Regression

### 1.1 Accuracy with constant learning rates

- Training Time() : **2112 s**
- Testing Time() : **1.02 s**
- Training Accuracy : **71.26**
- Testing Accuracy : **69.03**

### 1.2 Accuracy with decreasing learning rates

- Training Time() : **2213 s**
- Testing Time() : **1.01 s**
- Training Accuracy : **73.08**
- Testing Accuracy : **70.09**

### 1.3 Accuracy with increasing learning rates

- Training Time() : **2003 s**
- Testing Time() : **59 s**
- Training Accuracy : **66.52**
- Testing Accuracy : **63.41**

### 1.4 Parameters

- Batch Size : **100**
- Constant Learning Rate : **0.001 s**

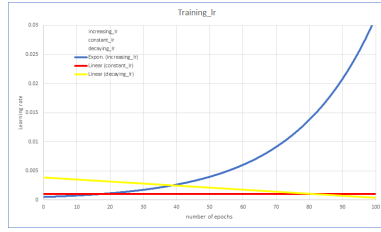


Figure 1: variation of learning rate with number of epochs

## 2 Parallelized Logistic Regression

### 2.1 Parameters

- Batch Size : **100**
- Constant Learning Rate : **0.001 s**
- Parameter Server : **2**
- Worker Node : **3**

### 2.2 Bulk Synchronous Parallel

- Training Time() : **2801 s**
- Testing Time() : **.98 s**
- Training Accuracy : **72.22**
- Testing Accuracy : **71.97**

### 2.3 Asynchronous

- Training Time() : **1838 s**
- Testing Time() : **.93 s**
- Training Accuracy : **71.58**
- Testing Accuracy : **70.41**

### 2.4 Stale Synchronous

- Staleness : **3**
- Training Time() : **1931 s**
- Testing Time() : **1.01 s**

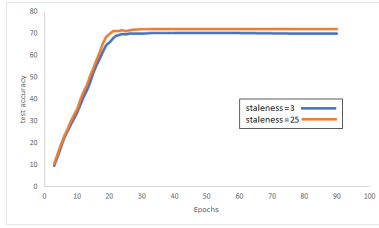


Figure 2: test accuracy for different staleness in SSP

- Training Accuracy : **70.32**
- Testing Accuracy : **69.91**
- Staleness : **25**
- Training Time() : **2001 s**
- Testing Time() : **.99 s**
- Training Accuracy : **71.45**
- Testing Accuracy : **70.09**

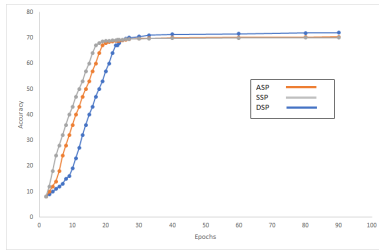


Figure 3: accuracy with number of epochs

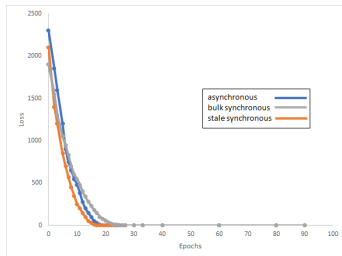


Figure 4: loss with number of epochs

### 3 Assumptions

- (i) Stop words are removed.
- (ii) As the size of Dictionary is very large in full data set so selection of word is made if the word is present more than a threshold value.

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### 4 Conclusion

We can see in local and distributed system accuracy decreases. Time required to train a model decreases a lot in Distributed System. With increasing staleness in SSP accuracy increases. BSP is giving better result than ASP and SSP but training time required by ASP and SSP is lower than BSP.