PURVANG LAPSIWALA

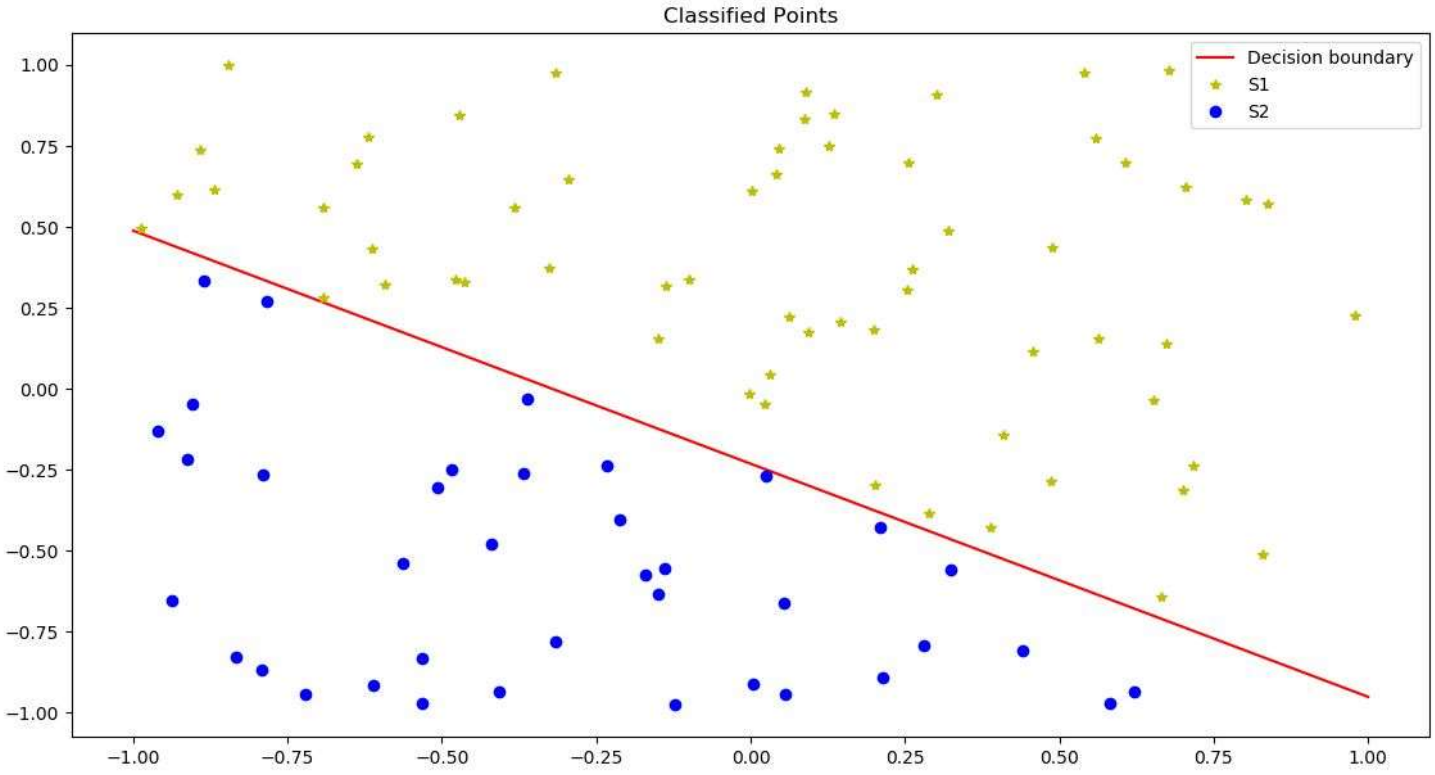
UIN = 662689378

Answer = 3

Uniformly generated random weights are as follows

[w0, w1, w1] = [0.26854 0.95845 -0.265895]

After picking 100 points independently and uniformly at random on [−1, 1], generated plot is below.



Weights for Perceptron Training Algorithm: [w0', w1', w2'] = [-0.2823095, 1.86523062, -0.96085163]

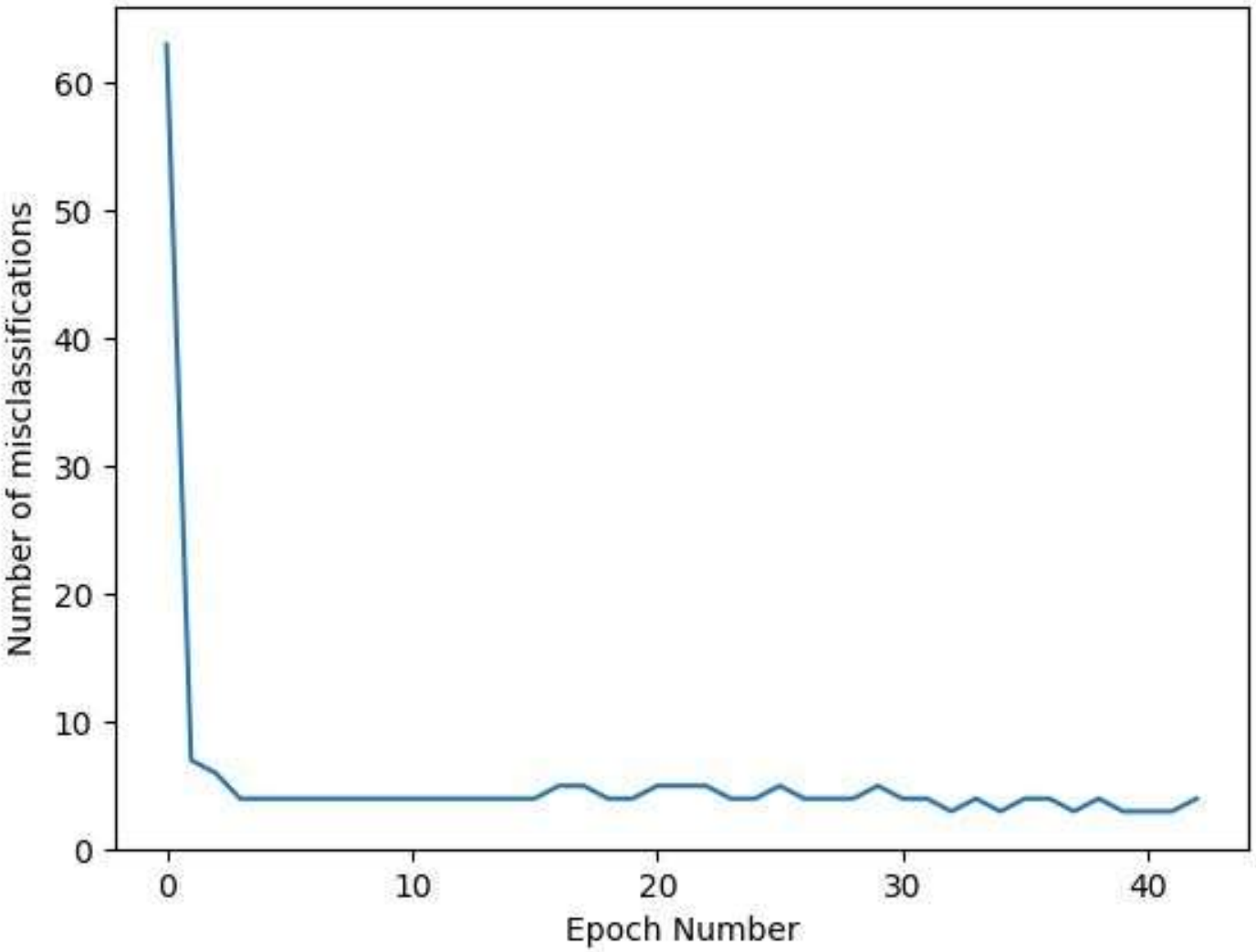
Final weights obtained after convergence with choosing learning rate equal to 1:

[-1.10695451 6.15524602 -4.01788606]. When we compare these weights to the optimal

Weights, it can be seen that there is huge difference between weights as they almost altered in sign.

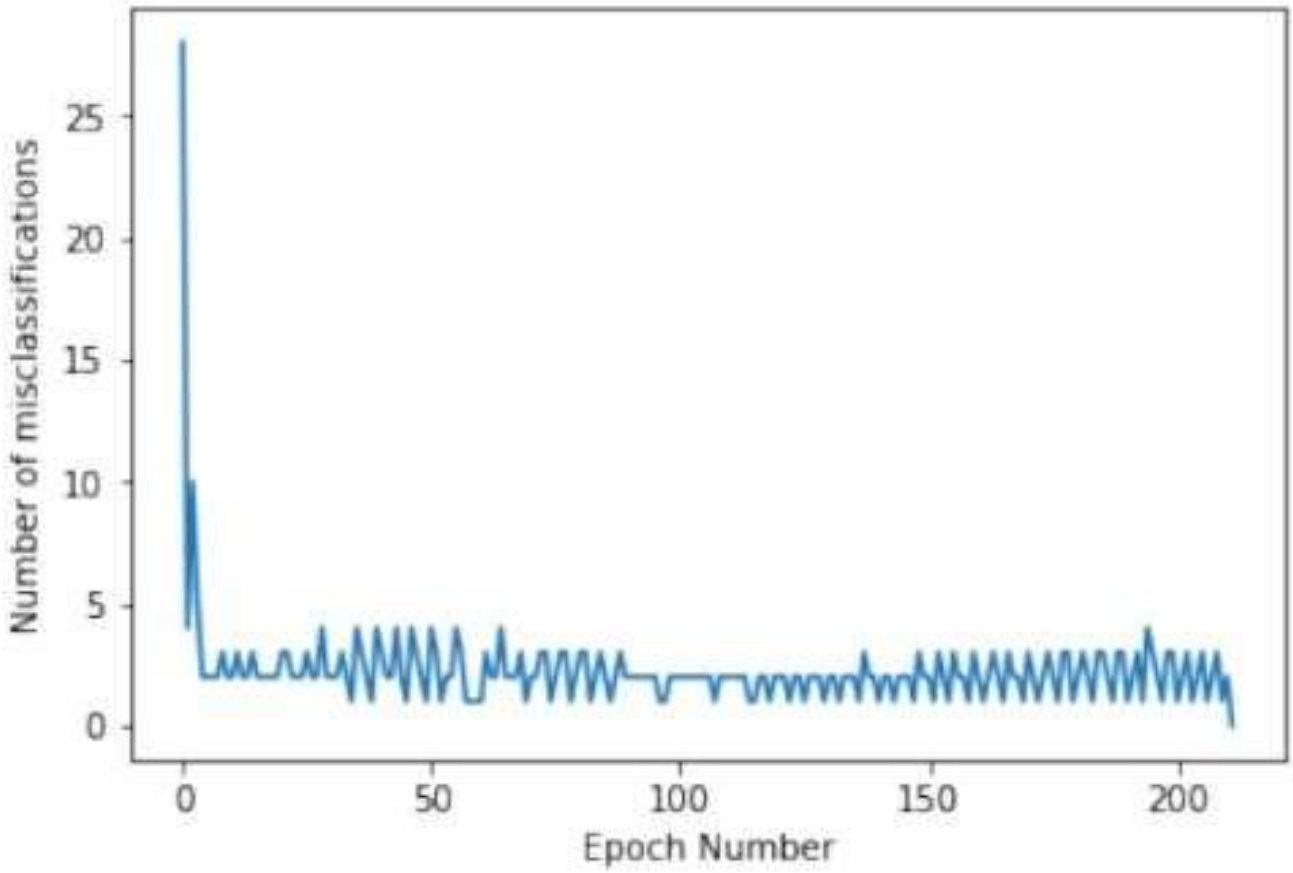
Number of epochs needed to converge with learning rate of 1 is 36.

Plot of Epoch number vs Number of misclassifications for the above experiment is shown below:



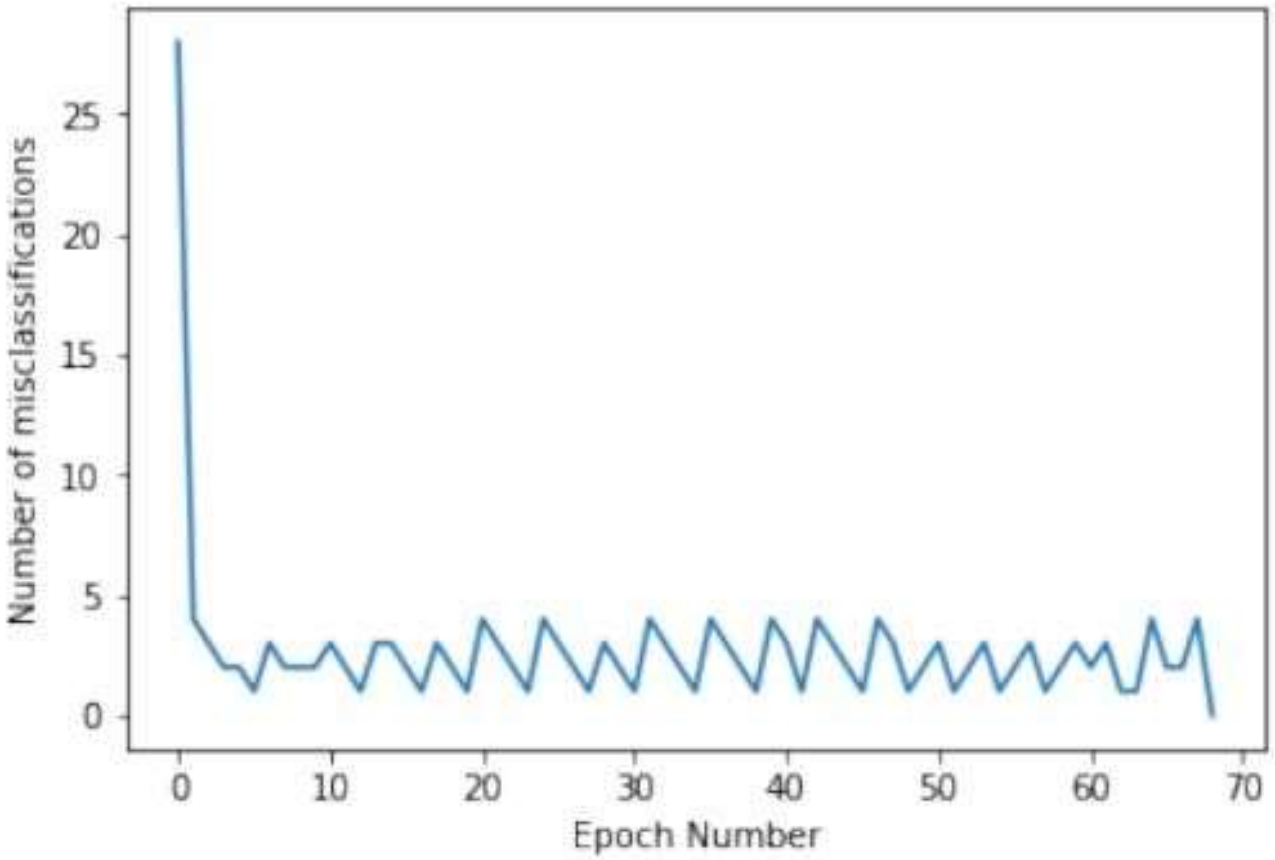
Plot of Epoch number vs Number of misclassifications for learning rate of 10 is shown below:

final weights are [-34.94566905 -45.88645 -94.08706799]



Plot of Epoch number vs Number of misclassifications for learning rate of 0.1 is shown below:

final weights are [2.526905 12.5658309 -3.87473937]



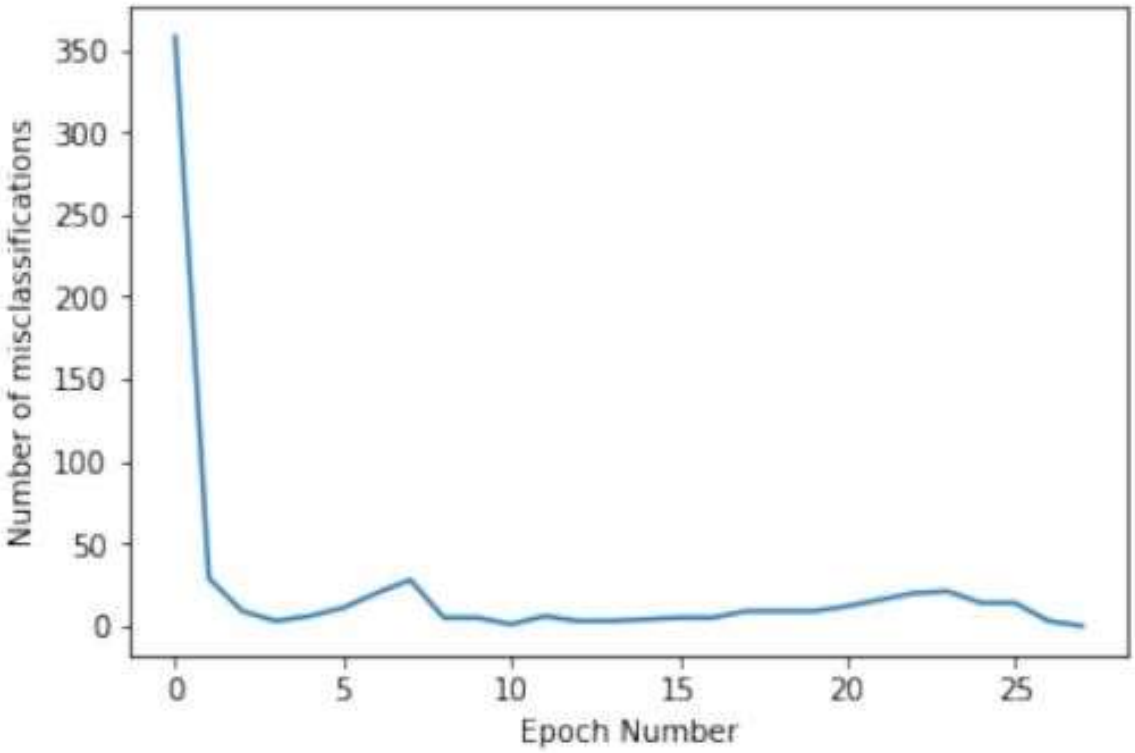
It is noted that when we put learning rate too low such as 0.1, time taken by algorithm to converge is considerably high as it takes too many and small steps so increment in weights are also too small. It took 67 steps to converge to optimal values of weights. On the other hand, when we increase the learning rate, instead of decreasing epoch to converge graph, it is actually increased due to the fact that there is so high fluctuation after each step.

Results for 1000 Samples

Learning rate = 1

Weights after convergence: [15.36505 -8.350427 -35.265599]

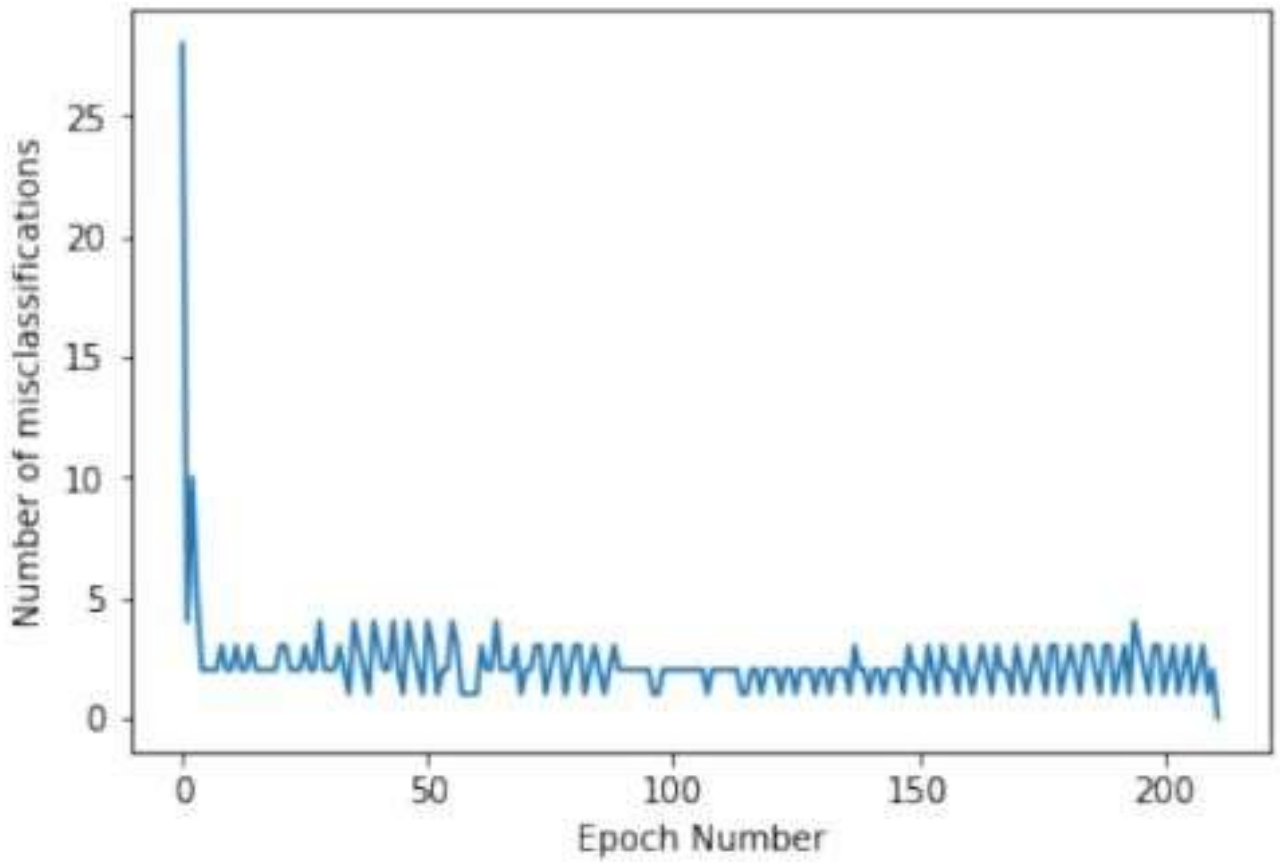
Number of epoch = 27



Learning rate = 10

Final weights obtained: [41.8566905 -13.2563 -95.3569]

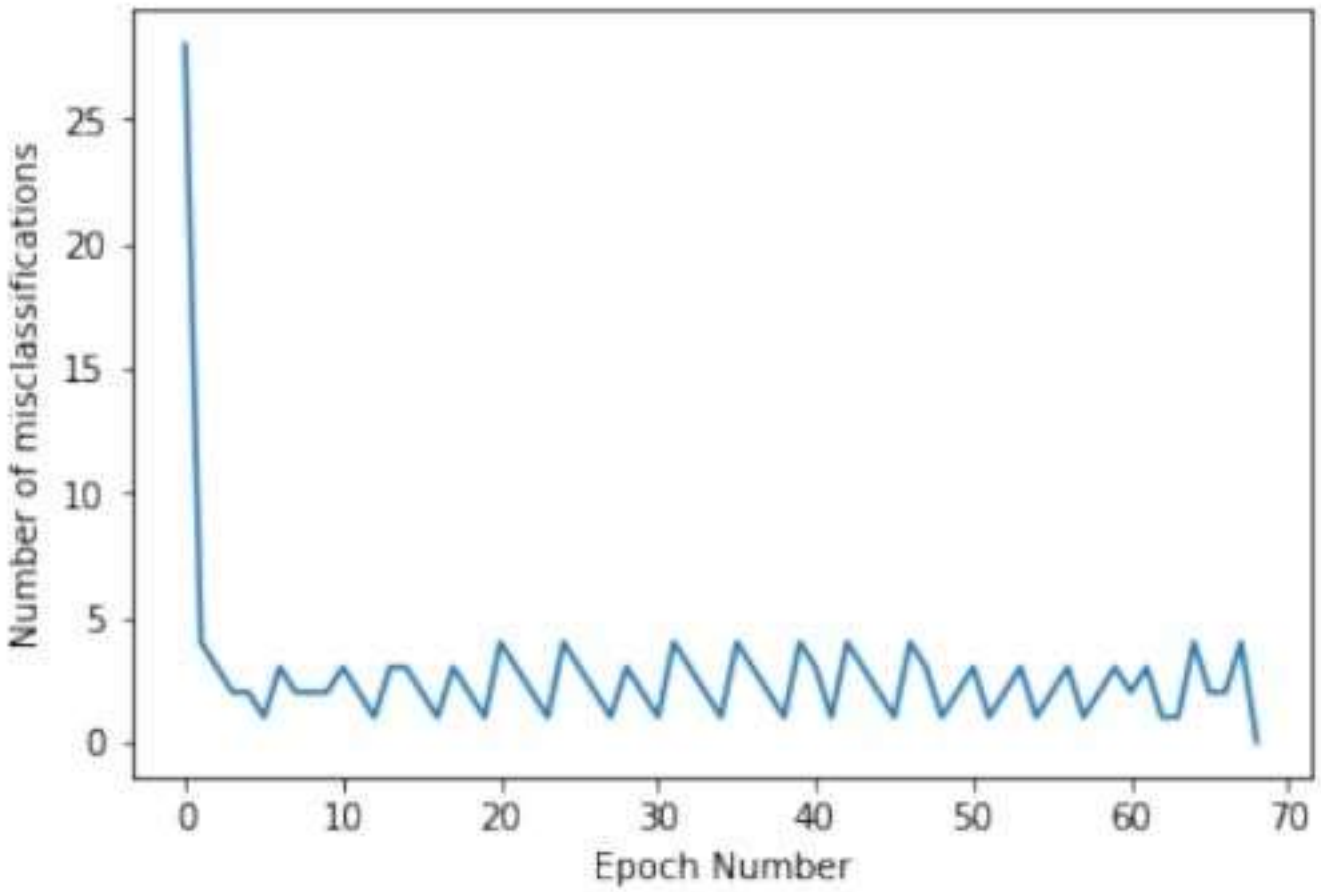
Number of epoch = 218



Learning rate = 0.1

Final weights: [8.6566905 -9.31209599 -1.2890223

Number of epoch = 68



CONCLUSION:

After doing this example, It can be observed that not only learning parameter have effect on convergence but number of samples that taken in to consideration also plays crucial part in convergence of diagram.