E1213 : PRNN - Assignment-3

Submitted by: P.Abhishek, M.tech. C.D.S. Dept. ,SR.No. 14594

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1. **Solution :**
   Problem/Task : The problem was to find the separating hyperplane using different algorithms.

   (a) Accuracies for Perceptron, LMS, and generalized inverse 1a:

Perceptron(initialized with all ones)	*LMS(learning rate* 0.08)	*generalized inverse*
96	87	94

Perceptron(initialized with all random weights)	*LMS(learning rate* 0.05)	*generalized inverse*
96.54	88	94

   (b) Accuracies for 1b are:

Perceptron(initialized with all ones)	*LMS(learning rate* 0.05)	*generalized inverse*
93	79	91

Perceptron(initialized with all random weights)	*LMS(learning rate* 0.08)	*generalized inverse*
95.12	78	91

   Conclusion:
   As the learning rate decreases, the LMS algorithm performances better but also takes time to converge. Whereas the Perceptron has better convergence rate than all the algorithms. Generalized also performs better. LMS if given higher rate of learning the sequence diverges.

2. **Solution :**

   Problem/Task : This problem we are given 2D data generated from a class conditional density and asked to classify.

   Accuracies for LMS, Logistic Regression and Fisher Linear Discriminant:

LogisticRegression	*LMS(learning rate* 0.01)	*Fisher Linear Discriminant*
93	91	93

3. **Solution :**
   Problem/Task : This problem we are given 10D data generated from a class conditional density and asked to classify.

   Accuracies for LMS, Logistic Regression and Fisher Linear Discriminant:

LogisticRegression	*LMS(learning rate* 0.001)	*Fisher Linear Discriminant*
79	77	80

Conclusions for Problem 2 & 3 :
LMS doesn't converge to particular value as the learning rate decreases but accuracy increases. It oscillates between a certain range.

Logistic Regression consistently performs better than all the algorithms.

Fisher Linear Discriminant also performs well compared to LMS.