

# CS 5011: Assignment 2 report

Due on Thursday, October 16, 2014

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CS12B028

## Question 1.

The parameters are chosen based on the accuracy scores.

**Linear** : 61% accuracy

**polynomial:**

maximum accuracy - 68% for degree=2 and gamma=2.

**guassian(rbf):**

maximum accuracy - 66% for gamma = 2 and C = 1 .

**sigmoid:**

maximum accuracy - 54% for gamma=1 and coef0=0 .

## Question 2.

Updated rules for the new error function :

$$\beta_{km}^{(r+1)} = \beta_{km}^{(r)} - \gamma_r \sum_{i=1}^N \left( \frac{\partial R}{\partial \beta_{km}^{(r)}} + 2\gamma \beta_{km}^{(r)} \right)$$

$$\alpha_{ml}^{(r+1)} = \alpha_{ml}^{(r)} - \gamma_r \sum_{i=1}^N \left( \frac{\partial R}{\partial \alpha_{ml}^{(r)}} + 2\gamma \alpha_{ml}^{(r)} \right)$$

The new error function is similar to adding ridge in ridge regression. The advantage of this error function is numerical values of weights will be low as compared to previous weights which were derived from original back propagation algorithm.

## Question 3.

For L2 logistic regression, the performance measures are

Accuracy - 0.95

Precision for forest class - 1.0

Precision for mountain class - 0.909090909091

Recall for forest class - 0.9

Recall for mountain class - 1.0  
F-measure for forest class - 0.947368421053  
F-measure for mountain class - 0.952380952381

For L1 logistic regression using scikit-learn ,the performance measures are :  
Accuracy - 0.975  
Precision for forest class - 1.0  
Precision for mountain class - 0.952380952381  
Recall for forest class - 0.95  
Recall for mountain class - 1.0  
F-measure for forest class - 0.974358974359  
F-measure for mountain class - 0.975609756098

For L1 logistic regression using Boyd's code ,the performance measures are :  
Accuracy - 1  
Precision for forest class - 1  
Precision for mountain class - 1  
Recall for forest class - 1  
Recall for mountain class - 1  
F-measure for forest class - 1  
F-measure for mountain class - 1

## Question 4.

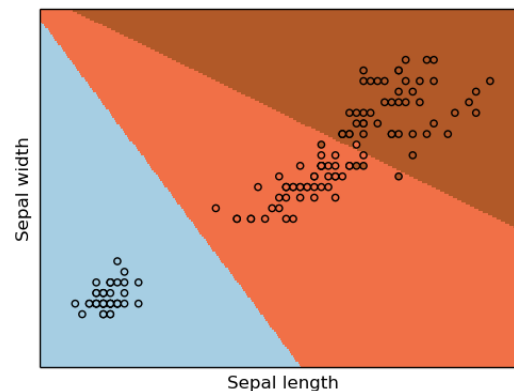


Figure 1: LDA

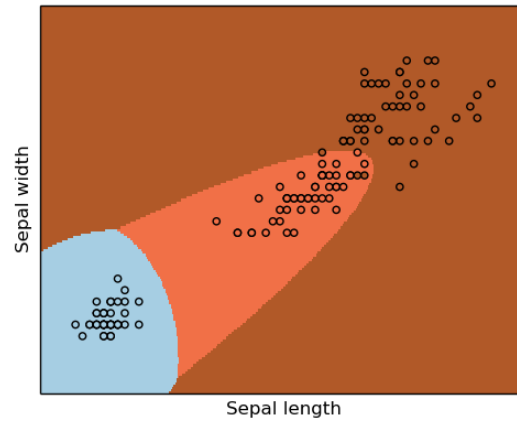


Figure 2: QDA

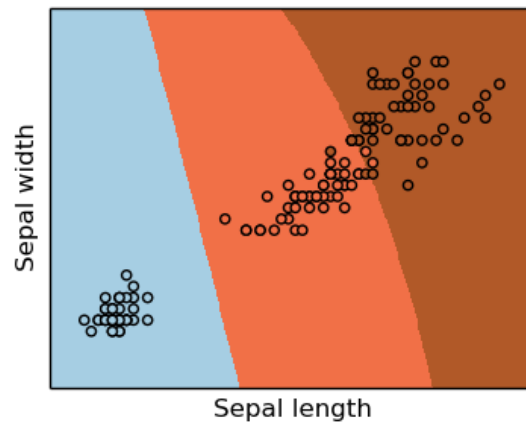


Figure 3: RDA with regparam as 0.3