ELEN 4720: Machine Learning for Signals, Information and Data

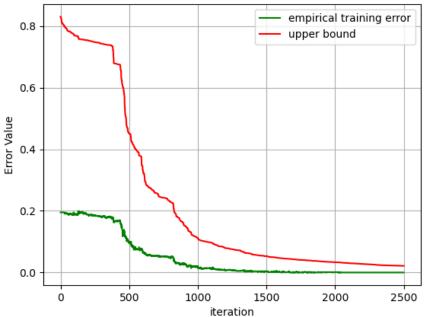
Homework #3

Rakshith Kamath (rk3165) November 21, 2021

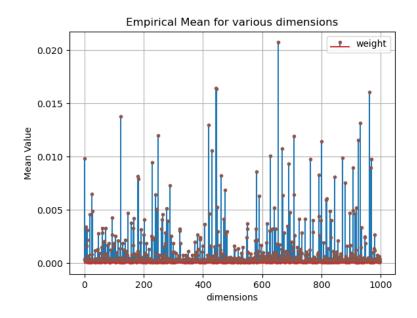
Problem-1 (Boosting Coding)

(a) The upper bound and the training error is plotted as shown after 2500 iterations of the AdaBoosting algorithm.

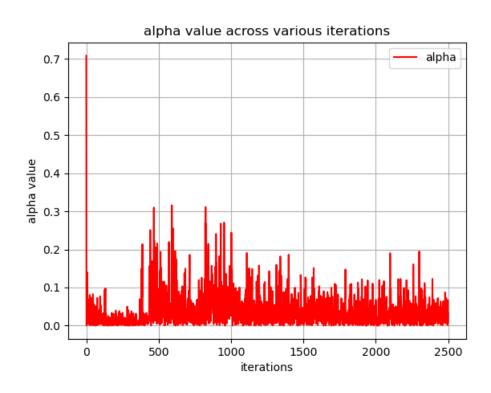


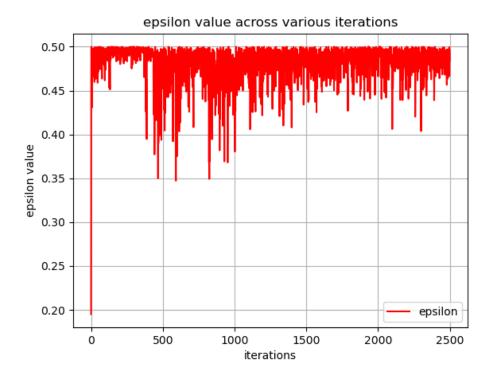


(b) The stem plotfor 999 weights is shown below-



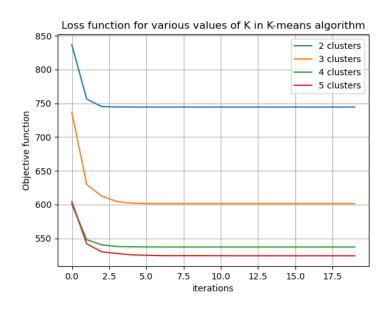
(c) The Plots for alpha and epsilon are shown below respectively-



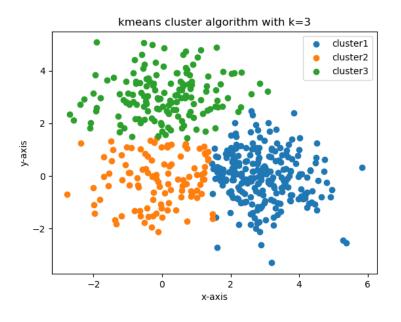


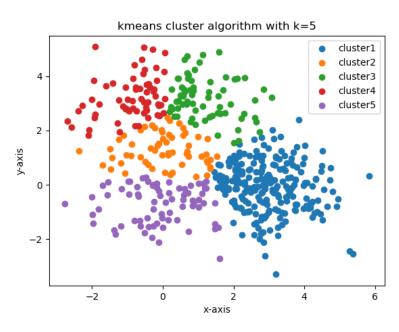
Problem-2-(K-Means)

(a) We have shown how objective function varies for various values of K for 20 iterations-



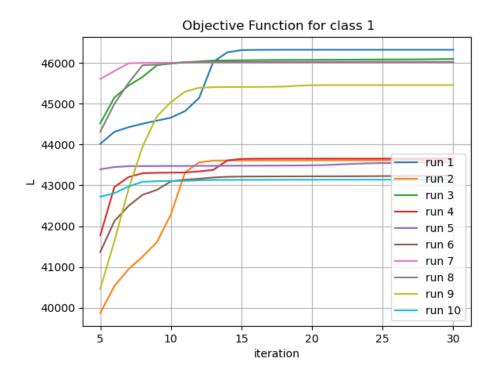
(b) The cluster assignment for K=3 and K=5 is shown respectively in the below figures-

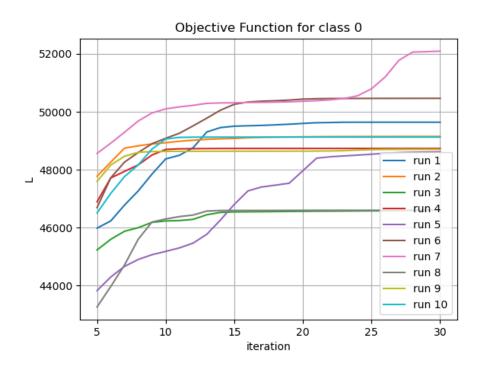




Problem-3(Bayes Classifier Revisited)

(a) The log marginal objective function for class 0 and class 1 are shown below respectively for 10 different runs which are 30 iterations each.





(b) Confusion matrix and their accuracy for K=1,2,3,4 is shown respectively-

K=1	Predict			
		y_pred=0	y_pred=1	
Actual	y=0	180	98	
	y=1	6	175	
Accuracy=77%				

Table 1-Bayes classifier for K=1

K=2	Predict			
		y_pred=0	y_pred=1	
Actual	y=0	195	83	
	y=1	9	172	
Accuracy=80%				

Table 2-Bayes classifier for K=2

K=3	Predict			
Actual		y_pred=0	y_pred=1	
	y=0	202	76	
	y=1	8	173	
Accuracy=82%				

Table 3-Bayes classifier for K=3

K=4	Predict			
		y_pred=0	y_pred=1	
Actual	y=0	234	44	
	y=1	13	168	
Accuracy=88%				

Table 4-Bayes classifier for K=4