**ELEN 4720: Machine Learning for Signals, Information and Data**

Homework #3

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**Problem-1 (Boosting Coding)**

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

Chart, line chart

Description automatically generated

1. The stem plotfor 999 weights is shown below-

Chart

Description automatically generated

1. The Plots for alpha and epsilon are shown below respectively-

Chart

Description automatically generated

Chart, line chart

Description automatically generated

**Problem-2-(K-Means)**

1. We have shown how objective function varies for various values of K for 20 iterations-

Chart, line chart

Description automatically generated

1. The cluster assignment for K=3 and K=5 is shown respectively in the below figures-

Chart, scatter chart

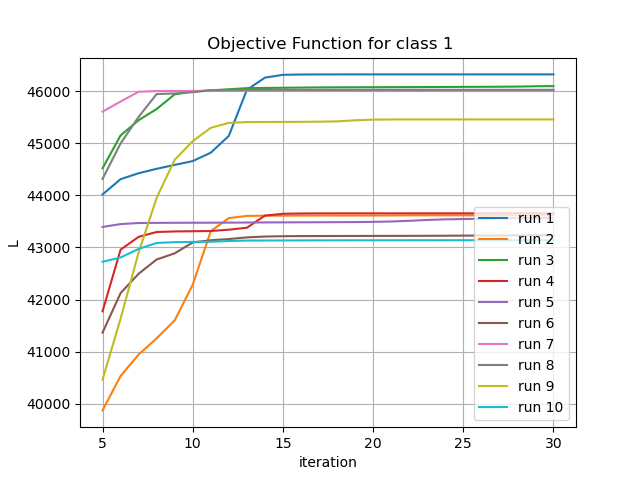
Description automatically generated

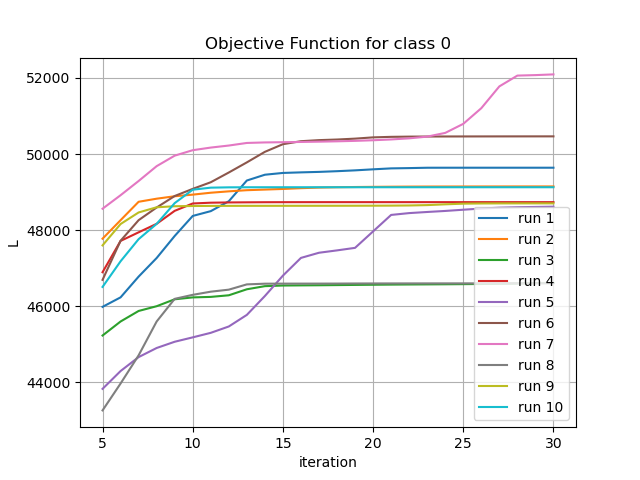
Chart, scatter chart

Description automatically generated

**Problem-3(Bayes Classifier Revisited)**

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





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

|  |  |  |  |
| --- | --- | --- | --- |
| K=1 | Predict | | |
| Actual |  | y\_pred=0 | y\_pred=1 |
| y=0 | 180 | 98 |
| y=1 | 6 | 175 |
| Accuracy=77% | | | |

Table 1-Bayes classifier for K=1

|  |  |  |  |
| --- | --- | --- | --- |
| K=2 | Predict | | |
| Actual |  | y\_pred=0 | y\_pred=1 |
| 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 | | |
| Actual |  | y\_pred=0 | y\_pred=1 |
| y=0 | 234 | 44 |
| y=1 | 13 | 168 |
| Accuracy=88% | | | |

Table 4-Bayes classifier for K=4