Odd Semester 2020-2021
Programming Assignment 1
CS401-Introduction to Machine Learning

Date: 27/10/2020

Note: Each group should take the data assigned to the group only

Classification Tasks:

Dataset: 2-dimensional data of 2, 3 or 4 classes:

(a) Linearly separable data set
(b) Nonlinearly separable data set
(c) Overlapping data set

Classifier to be built: Bayes classifier

a. Covariance matrix for all the classes is the same and is $\sigma^2 I$
   You can obtain the same Covariance matrix for all the classes by taking the average of Covariance matrices of all the classes. You can obtain same variance by averaging all the variances.
b. Full Covariance matrix for all the classes and is same for all the classes
   i. You can obtain the same Covariance matrix for all the classes by taking average of Covariance matrices of all the classes
   ii. You can obtain the same covariance matrix for all the classes by taking training data of all the classes combined.
c. Covariance matrix is diagonal and is different for each class
d. Full covariance matrix for each class is different

Report should include the results of studies presented in the following each dataset:

1. Plot of training data with mean displayed in different color
2. Classification accuracy, precision for every class, mean precision, recall for every class, mean recall, F-measure for every class and mean F-measure on test data
3. Confusion matrix based on the performance for test data. The entries in confusion matrix must be made in percentage.
3. Decision region plot for every pair of classes with the respective training data superimposed
4. Decision region plot for all the classes together with the training data superposed
5. Decision region plot for all the classes together with the testing data superimposed

Report should also include your observations about the performance and the nature of decision surface for each classifier, and for each dataset.

The report should be submitted in PDF form only. The code and report should be uploaded in Google classroom within the deadline. Name the zip file as Group<num>_Assignment1_IML.zip. Eg. Group01_Assignment1_IML.zip

Deadline for submission of report: 11:55 PM, Tuesday 03rd November 2020