Department of Electronics and Communication Engineering
Visvesvaraya National Institute of Technology

Assignment 4: Machine Learning with Python Laboratory; ECL 443. Odd Semester, 2023-2024

Due Date: 6th September 2023.

1. You have to upload your digital form of solutions to the Google classroom page created for this purpose. You should prepare the laboratory report in the given format as mentioned in the introductory class for this course i.e. the laboratory report should contain the Abstract, Introduction, Method/Procedure, Results, Discussions, Conclusions and Appendices [you should paste your code here]. Alongwith the laboratory report, you should also upload the python file in such a manner that it can be ready executed in Spyder and all the required graphs in the correct format are generated. Please make sure that in the laboratory report, the plots are presented in clear and discernible manner.

2. You should name your python file the following. Your complete rollnumber_linreg. For example, if your roll number is BT21ECE001, then your function should be named as BT20ECE001_linreg.

3. Include the answer of all the questions in the Results Section of your report SEQUENTIALLY. The answers will be checked sequentially, so if any question is not according to the sequence, that will not be checked.

4. DO NOT COPY FROM EACH OTHER. TRY EACH QUESTION ON YOUR OWN. WRITE THE LABORATORY REPORT USING YOUR OWN LANGUAGE. REMEBRE, THIS IS A BASIC COURSE AND THE CONCEPTS WILL BE REQUIRED THROUGHOUT YOUR DEGREE PROGRAM AND POSSIBLEY, FOR YOUR JOB/HIGHER STUDY. IF YOU COPY, YOU ARE HARMING YOURSELF.

<u>Supervised classification with Support Vector Machine.</u>

Download the dataset fisheriris_matlab.mat. Using the dataset, train a SVM classifier that can distinguish between the different types of iris. Clearly mention all the relevant details related to SVM. Divide your dataset into training, validation and testing dataset using the function you created in the previous lab exercise.

1. As mentioned in the class, you can borrow any standard SVM function from the internet. You have to perform a detail experimentation with at least 3 different kernel functions.
2. For each kernel function, perform a detail grid search to find out the best values of the hyperparameters for your particular problem. Show the error/accuracy vs. hyperparemeter values curves to justify your selection of the best values of the hyperparatemers.
3. For each kernel function, report the results [in the form of Accuracy, sensitivity, specificity, AUROC and ROC curve; both after training and after testing].
4. Compare the performance of SVM with that of an ANN using the codes you wrote in the previous assignments in terms of accuracy as well as training time.