Department of Electronics and Communication Engineering
Visvesvaraya National Institute of Technology

Assignment 2: Machine Learning with Python Laboratory; ECL 443. Odd Semester, 2022-2023

Due Date: 16th August 2022.

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 BT20ECE001, 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.

Implementation of Linear regression.

Download the accidents dataset [dataset provided by Mathworks] file Matlab_accidents.mat. Formulate a regression problem which can be solved using any regression algorithm. Clearly write down the problem statement at the end of the Introduction statement of your report. Divide your dataset into training and testing dataset using the function you created in the previous lab exercise.

1. Solve the problem using linear regression analytical method i.e. by calculating the pseudo inverse. Clearly write down the dependent and independent variables, the relation between the dependent and independent variable, the dimension of weight vector etc. Find the weight values using training set and then evaluate its accuracy on the testing set.
2. Solve the same problem with the same linear regression algorithm, but now change the method. Instead of computing the pseudo inverse, use gradient descent algorithms to find out the optimum weight vector. You can write your own function of gradient descent algorithm or you can use some available functions. Find the weight values using training set and then evaluate its accuracy on the testing set. Compare the performance of 1 and 2 in terms of accuracy and computation time.
3. Use another relationship between the input and output variables and perform linear regression.