Nile University
Communication and Information Technology Program
Spring 2017

CIT651 –Introduction to Machine Learning and Statistical Data Analysis

Machine Learning - Assignment #1

(Due on: April 22, 2017 at mid-night)

You are required to design a Fisher's linear discriminant classifier that can recognize scanned images of the 26 lower-case characters provided in the file "Assignment 1 Dataset.zip". The zip file contains two folders: "Train" and "Test". The "Train" folder contains 7 images for each lower-case character while the "Test" folder contains 2 images for each lower-case character. The images in the "Train" folder should be used to train a classifier for each character using the method given at the bottom of slide 9 in Lecture 2.pdf. After the classifiers are trained, test each classifier using the images given in the "Test" folder.

Deliverables:

- Your code.
- A plot of the number of images classified correctly for each character. The x-axis should show the character (a, b, …, z) while the y-axis should show the count. Name the plot "Accuracy.jpg".

Important Notes:

- **Do not use R built-in functions for mean, covariance or the Fisher's linear discriminant. You have to implement your own version of all needed functions**.
- This is an individual assignment. It is not a team assignment.
- To compute the bias term for Fisher's linear discriminant, you can use the following equation:

$$w_0 = -\mathbf{w}^T (m_1 + m_2)/2$$