EEE-6561 Fundamentals of Biometric Identification
Spring 2020 Homework #3

February 1, 2020

Due: February 21, 2020, 11:59 PM

This assignment should be completed individually by the student. Late submissions will not be accepted. Proper citation should be provided for any references used. Points will be awarded based upon the thoroughness of the answers you provide.

This assignment involves the implementation and evaluation of a correlation based facial recognition system. You are given two data files for this assignment *ProbeSet.rar* and *GallerySet.rar*. *ProbeSet.rar* contains 200 normalized face images from 100 individuals (two per subject). *GallerySet.rar* contains 100 images from the same 100 individuals.

Using a closed universe experiment protocol and the normalized correlation coefficient as your similarity measure, perform the following:

PART I Entire Face Performance [30 points]

(a) Plot the genuine and impostor score distributions.

(b) Plot the Cumulative Match Characteristic curves.

(c) Plot the Receiver Operating Curve (FAR vs. FRR).

PART II Partial Face Performance [50 points]

Different parts of the face contain varying amounts of discriminating power. Repeat (a), (b), and (c) using only the top half, bottom half, left half, and right half of the facial images.

Are any of the performance numbers of the partial face experiments close to those obtained when using the entire face image? Which of the partial face regions perform the best? Are the performance numbers obtained using the partial face expected?(Why or why not?) Providing sufficient detail, how could the performance numbers of the entire face based system be improved using those obtained from partial face experiments?

Extra Credit: PCA Based Facial Recognition [20 points] [NO PARTIAL CREDIT]

Repeat the tasks from Parts I and II using PCA coefficients for the feature representation and Euclidean distance as the distance measure. Do the results obtained agree with those obtained using correlation based facial recognition? (Why or why not?)

Any programming language is acceptable, but it is recommended that MATLAB be used for the assignment. You should provide your graphs, plots, and question responses in a formatted report. Aside from the correctness of your responses, your plots and graphs will be graded based upon their appearance as well as their correctness. You should use the graphs/plots depicted in the text as a reference.