EEE-6561 Fundamentals of Biometric Identification
Spring 2018 Homework #6

March 31, 2018

Due: April 14, 2018, 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 will use implementations and results from previous homework assignments #3 and #5.

PART I Multi-Sample Biometric System [20 points]

Using the two probe face images from homework #3 run an matching experiment that simulates a multi-sample biometric system. Perform the following:

(a) Plot the genuine and impostor score distributions.

(b) Plot the Cumulative Match Characteristic curves.

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

To receive full credit you should answer the following questions in detail:

(d) Describe how your experiment simulates a multi-sample biometric system.

(e) What level of fusion did you use? Was score noramization used? If so, which one? Which fusion rule was used? (This will depend on the level of fusion)

PART II Multi-Algorithm Biometric System [20 points]

Using only the first probe face image from homework #3 run an matching experiment that simulates a multi-algorithm biometric system.You are free to use any 2-3 facial recognition algorithms (Correlation, PCA, LDA, LBP, etc.) Perform the following:

(a) Plot the genuine and impostor score distributions.

(b) Plot the Cumulative Match Characteristic curves.

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

|noindent To receive full credit you should answer the following questions in detail:

(d) Describe how your experiment simulates a multi-algorithm biometric system.

(e) What level of fusion did you use? Was score noramization used? If so, which one? Which fusion rule was used? (This will depend on the level of fusion)

PART III Multi-modal Biometric System [30 points]

Using the first probe face images from homework #3 and the iris probe image from homework #5, run an matching experiment that simulates a multi-modal biometric system. Perform the following:

(a) Plot the genuine and impostor score distributions.

(b) Plot the Cumulative Match Characteristic curves.

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

To receive full credit you should answer the following questions in detail:

(d) Describe how your experiment simulates a multi-modal biometric system.

(e) What level of fusion did you use? Was score noramization used? If so, which one? Which fusion rule was used? (This will depend on the level of fusion)

Extra Credit: Non-Ideal Samples [Exam #1 +10 Points] [NO PARTIAL CREDIT]

Prior to extracting features from the iris probe image, smooth the images using a 5x5 mean filter. Use only the bottom half of the first face probe image for feature extraction. Repeat (a)-(c) and (e). Answer the following:

How does this system performance compare to the previous systems? What would you conclude regarding the importance of sample quality vs. multiple modalities in a multi-modal biometric system? Explain your reasoning.