# EEE-6561 Fundamentals of Biometric Identification
# Spring 2020 Homework #5

March 12, 2020

## Due: March 26, 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 analysis of iris recognition using a well-known implementation of a Daugman-like algorithm.

**Task I: Setup Environment and Download Code**

1. A working MATLAB environment is needed to complete the assignment.
2. Download and unarchive Libor Masek's open source iris matching code from the HW#5 directory.
3. A detailed description of the implementation is provided in Masek's thesis which is provided in the HW#5 directory as well. The two key functions you will need to call are **createiris-template.m** and **gethammingdistance.m**.

**Task II: Download and Enroll Iris Images**

4. Download and unarchive the iris images files located in homework 6 directory as **iris-img.rar**. The archive contains two sets of 100 iris images captured from 100 individuals.
5. Write a script to enroll all the images in the data set. Enrollment will also produce diagnostic messages that show the results of segmentation, noise masking, and iris coding.
6. Run your script to generate .mat files that can be loaded rapidly on subsequent calls to **createiristemplate.m**.

**TIP #1:** Depending on your version of MATLAB, re-arrangement of the file layout to correct broken function call dependencies may be required.

**Task III: Matching**

7. Write a script to generate matching scores when comparing each of the irises in the probe set to each of the iris stored in the gallery set.

**TIP #2:** The last argument to **gethammingdistance.m** is the number of filters used to encode the templates. If you have not changed any of the encoding parameters hardcoded in **createiristemplate.m**, this argument will be "1".

**Task IV: Analysis**

8. Display in your report the results of the segmentation, noise masking, and iris coding for the first three images in the probe set.
9. Calculate the mean and standard deviation for the genuine and imposter distributions from question 7. By how much do they differ?
10. Using MATLAB, plot two Gaussian distributions defined the parameters you calculated in question 9. Put both distributions on the same graph so you can compare them.
11. Examining the overlap of the distributions, would you consider this an easy or difficult set to match?
12. Find and display the lowest scoring genuine pair of images. Why do you think this pair matched well?
13. Find and display the highest scoring genuine pair of images. Why do you think this pair matched poorly?
14. Find and display the lowest scoring imposter pair of images. Why do you think this incorrect pairing matched well?
15. Find and display the highest scoring imposter pair of images. Why do you think this incorrect pairing showed good separation?

**EXTRA CREDIT: +10 POINTS TO EXAM #1**

Prior to extracting features from the probe images, smooth the images using a 5x5 mean filter. Repeat steps 5-15. Was there a significant drop in matching performance when using the blurred version of the probe images? Were the higher performing and lowest performing pairs using the blurred version of the images different than when using the non-blurred versions? Why might this be? What if anything can be done when using the blurred version of the images to improve matching performance?