Biometrics (CSE 40537/60537)

University of Notre Dame, Fall 2014

Assignment 2: Build your own iris recognition method
(Deadline: by the end of the day Monday, October 13, 2014)

1 Description

In this assignment you will program your own iris recognition method using Laplacian of Gaussian filtering. Your software package contains two folders:

- `mfiles`: MATLAB scripts prepared by the instructor,
- `data-raw`: your iris images collected during the class + additional images of unknown person.

`BIO_IRIS_Example.m` gives you the guidelines how to use different MATLAB functions and expressions when programming your own iris recognition method. In particular, this example DOES NOT show how to correct the eyeball rotation. It also DOES NOT make a full set of genuine and impostor comparisons. Programming these functions is part of your assignment.

`BIO_IRIS_EER.m` should be used to plot your FMR and FNMR curves.

In `data-raw` folder you will find:

- original iris images (ISO VGA format): `NetID_Ia_XN.bmp`, where `X = L` (left eye) or `R` (right eye), and `N` is the number of iris image,
- segmentation preview: `NetID_Ia_XN_l.bmp`,
- iris image in polar coordinates: `NetID_Ia_XN_p.bmp`, and
- occlusion mask in polar coordinates: `NetID_Ia_XN_pm.bmp`.

To solve all tasks you will need only polar images and the occlusion masks.

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2 Tasks to be solved

1. Find optimal parameters for filtering process to correctly recognize **your iris images in polar coordinates**. Make all possible genuine and impostor comparisons using your iris images to calculate normalized Hamming distances. Remember to use occlusion masks in your calculations. When finding optimal parameters for filtering try to obtain minimum Hamming distances when comparing the same eyes, and about 0.5 when comparing different eyes. **Do not implement correction of the eyeball rotation in this part**.

2. **Implement the compensation for eye rotation in your programs**. Make all possible genuine and impostor comparisons for your two eyes. What changed when compared to the results in part 1?

3. Check your method for a **greater dataset**. Add test images found in `data-raw` folder and make all possible genuine and impostor comparisons. Does your system still perform well?

Attach the resulting FNMR/FMR graphs generated by `BIO_IRIS_EER.m` for all three tasks. Please attach also your MATLAB programs when sending the answers.