

Biometrics (CSE 40537/60537)

University of Notre Dame, Fall 2014

Assignment 4: Presentation attack detection (PAD) in fingerprint recognition

Interim report: by the end of Sunday, November 23, 2014

Full report: by the end of Monday, December 1, 2014

1 Description

In this assignment you will build your own method detecting presentation attacks in fingerprint biometrics. Your method should differentiate all authentic fingerprints and impressions of silicone/glue artifacts.

In this assignment **do not** calculate FNMR/FMR as these metrics relate to biometric recognition accuracy and not to the presentation attack detection. It is also not necessary to calculate EER and attach the EER graph to your answer sheet. Please use the following error metrics when evaluating the PAD accuracy:

APCER: Attack Presentation Classification Error Rate – proportion of attack presentations that were incorrectly classified as authentic presentations.

NPCER: Normal Presentation Classification Error Rate – proportion of authentic presentations incorrectly classified as attacks.

Your software package contains three folders:

- **mfiles:** MATLAB scripts prepared by the instructor,
- **data-raw/silicone:** impressions of silicone fingers prepared by you,
- **data-raw/glue:** impressions of glue fingers prepared by the instructor.

2 Tasks to be solved

1. Use MATLAB programs prepared by the instructor and build the algorithm detecting sweat pores as presented during class on slide #63 (lecture 8 on security of biometrics). `BIO_PAD_FG_HOWTO.m` will guide how to use all the scripts in **mfiles** folder.
2. Adapt the parameters marked as 'TODO' in `BIO_PAD_FG_CANDIDATES.m`, namely: **FILTERSIZE** and **SIGMA** responsible for image filtering, as well as **THRESHOLD** responsible for image binarization. Use all 36 samples (12 images of your authentic fingers acquired for the first assignment, 12 impressions of silicone fingers and 12 impressions of glue fingers). If you cannot obtain 100% of accuracy, develop the method that presents NPCER=0 and try to obtain as small APCER as possible.

3. Analyze the results and provide your comments. Propose a few improvements to the method implemented in the step 2. Feel free to propose any improvements to every stage of the method.
4. Select one improvement proposed in the step 3, implement it and repeat step 2 with your improved method. Compare resulting (new) value of APCER with this obtained in the step 2.