

# DESCRIPTION OF ATVS-FFp DB

Two datasets of real and fake fingerprint images in .bmp format:

- DATASET 1: DS\_WithCooperation

The gummy fingers from which the fake fingerprint images were taken, were generated with the cooperation of the user according to the methodology described in [TS2010].

It contains fingerprint samples of the index and middle fingers of both hands of 17 users ( $17 \times 4 = 68$  different fingers).

Four samples of each fingerprint (fake and real) were captured in one acquisition session with:

1. The flat optical sensor Biometrika Fx2000 (512 dpi)
2. The sweeping thermal sensor by Yubee with Atmel's Fingerchip (500 dpi)
3. The flat capacitive sensor by Precise Biometrics model Precise 100 SC (500 dpi).

This way the dataset comprises  $68 \text{ fingers} \times 4 \text{ samples} \times 3 \text{ sensors} = 816$  real image samples and as many fake images.

- DATASET 2: DS\_WithoutCooperation

The gummy fingers from which the fake fingerprint images were taken, were generated without the cooperation of the user according to the methodology described in [TS2010].

It contains fingerprint samples of the index and middle fingers of both hands of 16 users ( $16 \times 4 = 64$  different fingers).

Beware that user 14 is missing.

Four samples of each fingerprint (fake and real) were captured in one acquisition session with:

1. The flat optical sensor Biometrika Fx2000 (512 dpi)
2. The sweeping thermal sensor by Yubee with Atmel's Fingerchip (500 dpi)
3. The flat capacitive sensor by Precise Biometrics model Precise 100 SC (500 dpi).

This way the dataset comprises  $64 \text{ fingers} \times 4 \text{ samples} \times 3 \text{ sensors} = 768$  real image samples and as many fake images.

- NOMENCLATURE

The nomenclature followed in both datasets to name the image files is as follows: uXX\_A\_BB\_CD\_YY

XX: is the number of the user [01 02 03 ... 17]

A: it can take the values "o" or "f" for "original" or "fake"

BB: it can take the values "fc", "fo", or "ft", for "capacitive", "optical", or "thermal" depending on the sensor used to capture the image

C: it can take the values "r" or "l", for "right" or "left" hand

D: it can take the values "m" or "i", for "middle" or "index" finger

YY: is the number of the sample [01 02 03 04]

- CORRESPONDENCE BETWEEN DATASETS

Users number [03 04 05 09 13 15 16 17] are the same in both datasets.

## REFERENCES

For further information on the database and on different applications where it has been used, including vulnerability assessment of fingerprint verification systems to direct attacks, and performance evaluation of fingerprint liveness detection methods, we refer the reader to (all these articles are publicly available at <http://atvs.ii.uam.es/listpublications.do>):

- [FGCS2012] J. Galbally, F. Alonso-Fernandez, J. Fierrez and J. Ortega-Garcia, "A High Performance Fingerprint Liveness Detection Method Based on Quality Related Features", *Future Generation Computer Systems*, Vol. 28, pp. 311-321, 2012.
- [TS2011] J. Galbally, J. Fierrez, F. Alonso-Fernandez and M. Martinez-Diaz, "Evaluation of Direct Attacks to Fingerprint Verification Systems", *Telecommunication Systems, Special Issue on Biometrics*, Vol. 47, n. 3, pp. 243-254, 2011.
- [ICCST2006] J. Galbally-Herrero, J. Fierrez-Aguilar, J. D. Rodriguez-Gonzalez, F. Alonso-Fernandez, J. Ortega-Garcia and M. Tapiador, "On the vulnerability of fingerprint verification systems to fake fingerprint attacks", in Proc. IEEE Intl. Carnahan Conf. on Security Technology, ICCST, pp. 130-136, Lexington, USA, October 2006.

Please remember to reference article [FGCS2011] on any work made public, whatever the form, based directly or indirectly on any part of the ATVS-FFp DB.