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Master's Thesis: Continuous Mobile Face Authentication

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*Mobile Authentication,
Biometrics, and Machine
Learning*

Softwarepark 11
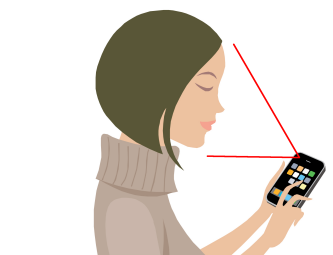A-4232 Hagenberg/Austria

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Motivation

Face recognition [1] is a well researched form of biometric recognition [2] that distinguishes people by their faces [3-6]. With increasing computational power and sensor capabilities on mobile devices, face recognition becomes more interesting on those as well. Most such mobile face authentication approaches are explicit, i.e. users have to explicitly look into the cam to be authenticated. As this demands user time and attention, usability and user experience is negatively affected by explicit face authentication.

We are interested in unobtrusive, continuous, frontal mobile face authentication - that continuously monitors and identifies mobile users' faces while they are interacting with their devices. Monitoring could e.g. be done while the device screen is turned on. The approach should be implemented on Android and tested using a small, self recorded, continuous mobile face authentication test database. We are further interested if liveness detection (e.g. eye blinking) and shoulder surfing detection (e.g. multiple faces detected that look at device screen) can be embedded.

Goals

- A suitable continuous face recognition approach should be selected, prototypically implemented and demonstrated to work on existing face data (e.g. publicly available face database).
- A continuous mobile face sample database should be recorded, using an Android App (the face unlock module of the Android authentication framework can be used as basis here [7]). The DB should contain video records of users interacting with their phones. It should be used to evaluate and fine tune the already implemented continuous face recognition approach for continuous mobile face data.
- The final, evaluated continuous face authentication approach should be implemented as Android App (e.g. by extending the previously implemented continuous face data recording App).

Research questions

- Which face recognition approaches are suitable for continuous mobile face authentication, eventually featuring liveness detection? How can shoulder surfing be detected and addressed in this approach?
- Using the implemented approach, which recognition performance can realistically be expected in a continuous mobile face authentication scenario - in contrast to publicly available, non-mobile face data?
- How much data per user is required to be able to distinguish between users? How much data is required to be able to detect malicious users interacting with the device?
- How can draining the mobile device battery be prevented when using continuous face authentication?

Literature

[1] Facial recognition system, http://en.wikipedia.org/wiki/Facial_recognition_system
[2] Biometrics, http://en.wikipedia.org/wiki/Biometrics
[3] Face Recognition Homepage, http://www.face-rec.org/general-info/
[4] Stan Z. Li, Anil K. Jain, 2005. Handbook of Face Recognition. 395p, Springer Science & Business Media, Springer. Online: http://www.springer.com/br/book/9780857299314
[5] W. Zhao, R. Chellappa, P. J. Phillips, A. Rosenfeld, 2003. Face recognition: A literature survey. In ACM Computing Surveys (CSUR), 35(4), 399-458. Online: http://dl.acm.org/citation.cfm?id=954342
[6] Riddhi Patel, Shruti B. Yagnik, 2013. A Literature Survey on Face Recognition Techniques. In International Journal of Computer Trends and Technology (IJCTT), 5(4). Online: http://ijcttjournal.org/Volume5/number-4/IJCTT-V5N4P136.pdf
[7] Face module for the mobilesec Android authentication framework. Online: https://github.com/mobilesec/authentication-framework-module-face