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Traceable and comparable evaluation methodology for biometric systems usability

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Summary

- Motivation and Goals
- Methodology
- Experiments
- Results
- Conclusion



Motivation and Goals

- Reviewing the State of the Art on the User Interaction in Biometrics.
- Proposing a formal methodology to evaluate the accessibility of biometric systems and how user's accessibility concerns influence usability and the outcome of the recognition process.
- Validating this novel methodology by examining the data collected during two experiments.



Novel Methodology

STEP 0

Planning a user interaction evaluation according to the design specification of ISO/IEC 21472:

Design a user biometric system interaction assessment recreating different scenarios (REC and TEC) changing the interaction factors (e.g., ergonomics of the systems, test subject sectors, guidance).

STEP 1

Evaluate the accessibility of the Scenario:

- *Number of users who have access to the scenario evaluation*
- *Number of users who are real customers of the product in real life*

STEP 2

Evaluate the accessibility of the Biometric Capture Device:

- *Report the number of users who can not start the interaction with the system and specify the reason*
- *Report the number of users who can not complete the task required in a specific scenario and specify the reason*

STEP 3

Evaluate how users accessibility concerns affect:

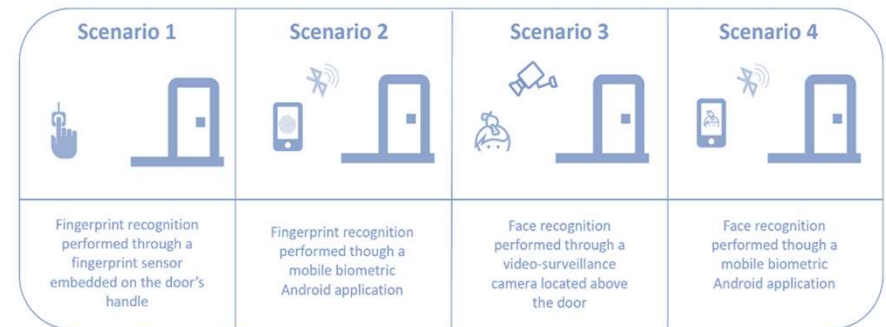
- *The performance*
- *The usability*
- *The biometric sample quality*



Experiments

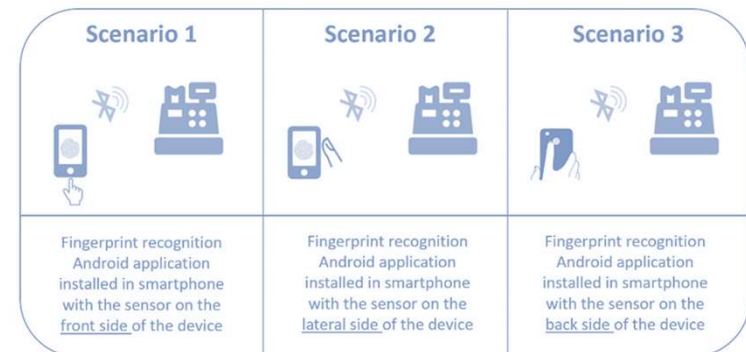
Access Control System through Biometric Recognition

- Users were required to interact with the biometric system in 4 different scenarios testing different biometric sensors (mobile and not mobile based).
- 1 enrolment and 2 verification visits in 2 different weeks.
- 48 users recruited, split in different groups according to their ages (later adolescence, early, middle, and later adulthood) and la and health status (learning, developmental and motor issues).



Mobile Fingerprint Authentication System for Retail Payments

- Users were required to interact with an Android app to complete a retail payment. 3 scenarios proposed to test the application using 3 different smartphones.
- Experiment divided in 2 sessions, 1 week apart.
- 21 users recruited, split in different groups according to their ages (later adolescence, early, middle, and later adulthood) and la and health status (learning, developmental and motor issues).



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Results

- Having access to a scenario or to a biometric system is strictly tied to the experience, and health status of the users.
- The lack of experience and the low dexterity of elderly users cause several interaction problems concerning the accessibility to the scenario and the biometric system.
- Accessibility issues and aging affect the outcome of the recognition system under different aspects: performance, usability, and sample quality.
- The behaviour of the user, while performing a biometric authentication, changes depending on his group sectors.



Conclusions

- When enrolling accessibility groups, it is a good practice to specify the motor or the cognitive problems affecting the users' capabilities and possibilities.
- Justifying the reasons of no interactions (if it depends on the user, on the system, or the scenario) is recommendable to understand which specific factors prevent user from interacting with biometric recognition devices.
- Elderly users must be included while evaluating the accessibility of biometric systems. As demonstrated by our studies, there is a strong correlation between the user's age and the accessibility to the biometric process.
- Carrying out long term-evaluations (considering more than 2 sessions) is recommended to study the degree with which users improve their experience and interaction with biometric applications.
- A more careful study of users' behaviour while testing biometric applications. Besides the subjects' emotions and expressions, it could be helpful to establish if even the gesture of approaching biometric sensors depends on the user's characteristics (both age and health status). When users interact with mobile biometrics apps, it could be interesting to establish if people, belonging to the same user sector, approach the biometric sensor, or hold the smartphone in the same way.
- Implementing biometric solutions to support the user in daily tasks and testing them through accessibility evaluations is necessary to promote biometrics among more and more categories of users and, besides, to instruct users about a more conscious use of biometrics in everyday scenarios.





Thank you!



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