Federal Office
for Information Security

Open Source Facial Image Quality (OFIQ)
An Overview

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Outline

The Open Source Facial Image Quality (OFIQ) Framework

Motivation for OFIQ

Project OFIQ at BSI

The Open Source Facial Image Quality (OFIQ) Framework

- Facial images are widely used
  in public sector applications such as EES and VIS.
- Quality assessment of facial images is important
  to ensure system performance.
- Quality components affect recognition performance
  but can also be relevant to control compliance
  with existing regulations
  (e.g. the EES implementing decision 2019/329).
- A common approach to quality assessment is essential.

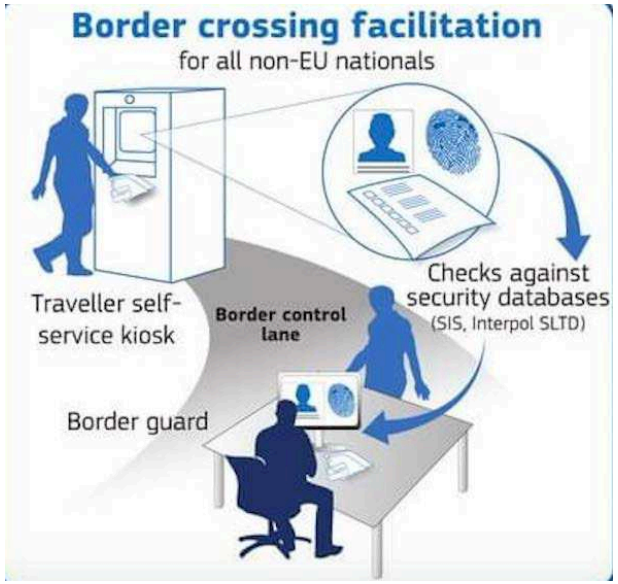
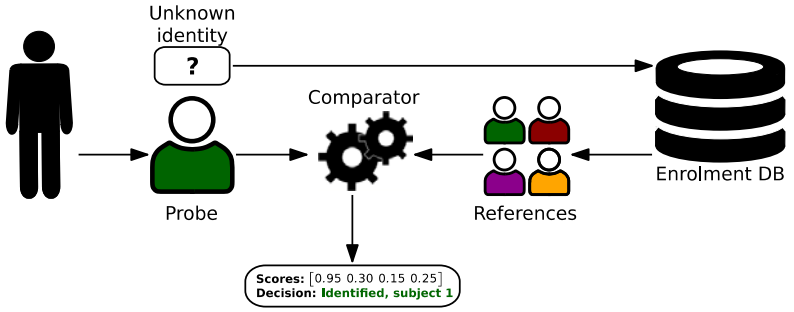


Image source: https://www.schengenvisainfo.com/wp-content/uploads/2018/11/Entry-Exit-System-EES.jpg

- Assessment of fingerprint images by NFIQ2.2 is standard procedure.
  But currently we have no equivalent open source solution for facial images.
- We need „NFIQ for Face“ → why?

Motivation for OFIQ: Quality equals Performance

- The quality of facial images has an impact on the recognition performance.
- In large scale databases, such as EES, quality requirements are therefore immensely high.



- Good data quality is essential for overall system performance.
- But: What does “good” mean?
- The necessary quality level depends on the specific application scenario which can be quite diverse.

Image source: http://solutions.ait.ac.th/garbage-in-garbage-out/

Motivation for OFIQ: Quality in diverse scenarios

- The scenarios in which facial images are used are very different (border control only being one of them).
  - All scenarios come with different requirements and needs.
  - There are many different vendors and solutions.
  - Even within one application scenario (e.g. border control), different solutions may be used (e.g. self-service system followed by manual border control).

- Biometric samples might be fed into different backend systems (EES, VIS, …). It is important to ensure interoperability and harmonize requirements.
- At enrolment stage, recognition algorithms might be unknown (and black box).
- A standardized quality assessment is important when the application landscape is diverse.

Motivation for OFIQ: Quality versus Transaction Time

- Remember
  - Quality requirements depend on the system in question (e.g. border control vs. pass issuance).
  - The aim is to reach the desired quality level in the minimum of time not to achieve the maximum quality. Quality is not an end in itself.
  - It is advantageous to know the required quality level of the target system and to align to it.

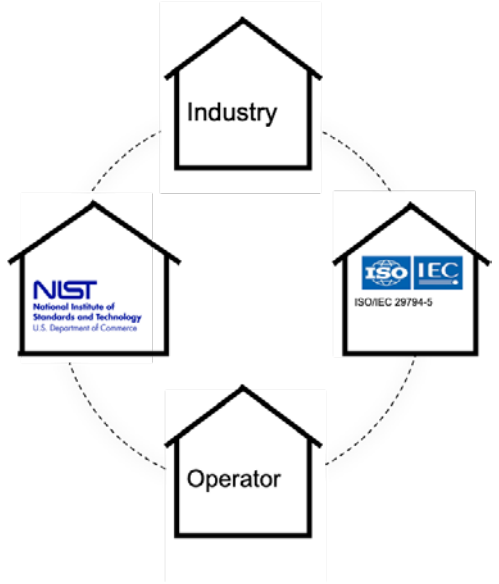
- Producing "good" quality is "expensive" (in the sense of “time-consuming”), especially in distributed systems.
- To keep the transaction time low, it is important to have a common understanding of facial image quality so we can align to the desired quality level as early as possible.

Image source: https://www.flaticon.com.jpg

Motivation for OFIQ: Harmonization and Interoperability

- Interoperability will connect EES, VIS, etc.

- Biometric data will be shared and transported to other systems.
- A common understanding of facial image quality is therefore essential (semantic interoperability).



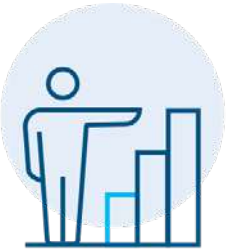
- For fingerprints: NFIQ
- For facial images: OFIQ
  - ISO standard 29794-5
  - Open source reference implementation QFIQ

Motivation for OFIQ: Summary

- Quality matters, especially in large-scale databases and with diverse application scenarios.
- Garbage in, garbage out! Good data quality is essential but what does “good” mean?
- Quality requirements depend on application context. A common approach is important.
- Quality is often a question of time. Specific components contribute differently to overall quality.
- Standardization and harmonization is essential for (semantic) interoperability.

- Reference implementation OFIQ (open source)
- Project by German Federal Office for Information Security (BSI)

Project OFIQ at BSI: Overview



- January 2022 – Mid 2024
- Open source implementation
- Public documentation and state of the art reports (see arXiv.org)

- Current state: Prototyping and evaluation of quality components, NIST benchmarking

- Different other projects to align to, e.g.
  - Entry-Exit-System
  - Interoperability

Thank you for your attention!

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Open Source Facial Image Quality (OFIQ): Key messages and takeaways

- Biometric data quality is essential for system performance, especially in large-scale databases.
- A common approach is important, especially for (semantic) interoperability.
- Garbage in, garbage out! But what does “good” mean regarding facial images?
- We need a common understanding of facial image quality → OFIQ