Federal Office
for Information Security

Open Source Face Image Quality (OFIQ)
An Overview

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Outline

The Open Source Face Image Quality (OFIQ) implementation

Motivation for OFIQ

Project OFIQ

The Open Source Face Image Quality (OFIQ) implementation

- Facial images are widely used in public sector applications

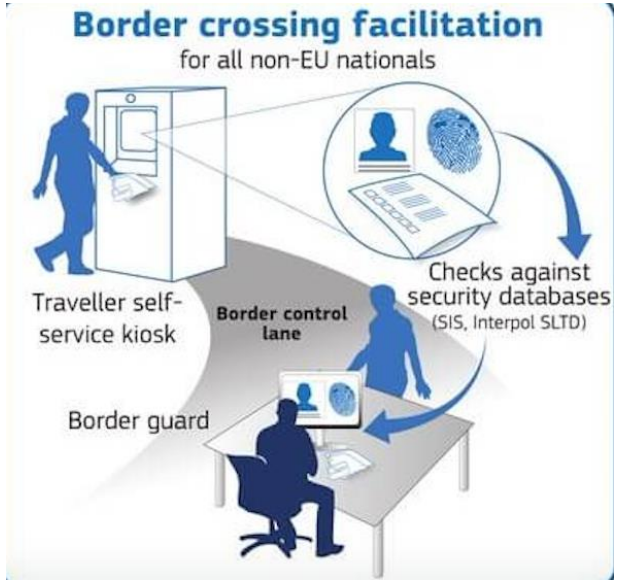


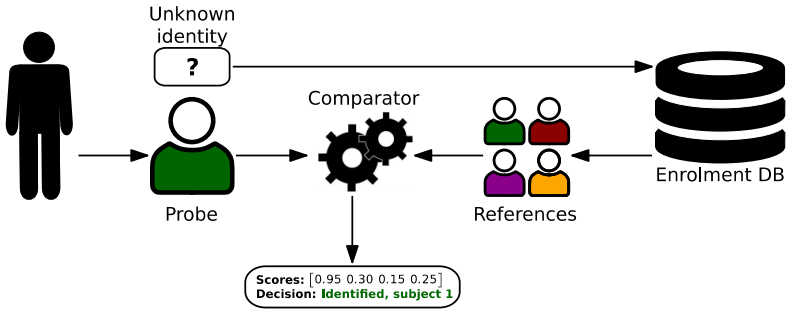
Image source: https://www.schengenvisainfo.com/wp-content/uploads/2018/11/Entry-Exit-System-EES.jpg

- Quality assessment of facial images is important to ensure system performance
- Quality components affect recognition performance but can also arise from regulations
- A common approach to quality assessment is essential

- 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, quality requirements are therefore immensely high.



- Good data quality is essential for overall system performance.
- But: What does “good” mean?

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

- The necessary quality level depends on the specific application scenario which can be quite diverse.

Motivation for OFIQ: Quality in diverse scenarios

- The scenarios in which facial images are used are very different.
  - All scenarios come with different requirements and needs.
  - There are many different vendors and solutions.
  - Even within one application scenario, different solutions may be used.
  - Biometric samples might be fed into different backend systems.
  - 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

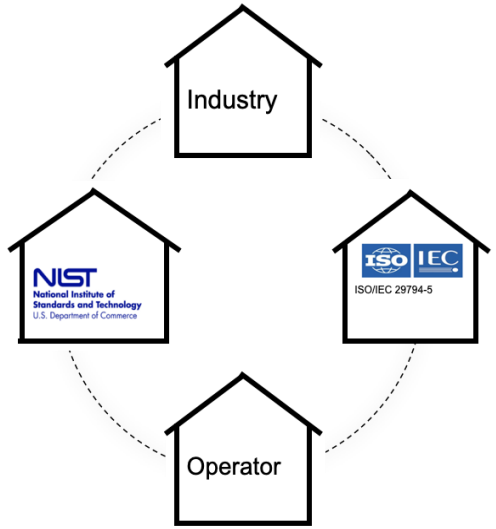
- Remember
  - Quality requirements depend on the system in question.
  - Aim: Reach the desired quality level in the minimum of time.
  - No aim: Achieve the maximum quality. Quality is not an end in itself.
  - It is advantageous to know the required quality level of the target system and to align to it.

- Producing "good" quality is "expensive" (time-consuming), especially in distributed systems.
- Different components may affect the quality of a facial image.
- OFIQ will focus on the essential quality components and one unified quality score

Motivation for OFIQ: Harmonization

- Facial image quality is not standardized yet.
  - Standardization and harmonization is key,
    especially in the view of (semantic) interoperability.
  - ISO/IEC 29794-5 will give us a common understanding of measuring facial image quality in a specific application scenario.

- Example (European) Border Control
  - Interoperability will connect EES, VIS, etc.
  - Biometric data will be shared and transported to other systems.
  - A common understanding of facial image quality
    is essential (semantic interoperability).



Motivation for OFIQ: Open Source

- We need a reference implementation of the ISO/IEC 29794-5 -> OFIQ
  - OFIQ will allow for alignment of all stakeholders (researchers, vendors, system architects, etc.)
  - Flexible software framework (usable for ABC gates and for Smartphones)
  - Contribution to ISO 29794-5
  - Open Source solution, which can be integrated in commercial systems (i.e. products)

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: Status

- Current project running January 2022 – Autumn 2024, for further information see:
  https://bsi.bund.de/EN/Themen/Unternehmen-und-Organisationen/Informationen-und-Empfehlungen/Freie-Software/OFIQ/OFIQ_node.html
- Open source implementation with public and transparent documentation:
  https://github.com/BSI-OFIQ/OFIQ-Project
- Incorporating public state of the art
  - see report: https://arxiv.org/abs/2211.08030
  - algorithms are selected and integrated, when fulfilling the criteria:
    a) detection accuracy as provided by the NIST FATE SIDD
    b) computational complexity
    c) appropriate license conditions
- Prototyping of quality measures: completed
  - Internal and NIST FATE SIDD benchmarking running

Project OFIQ: Outlook 2024 and beyond

- Establish procedures for OFIQ maintenance and support
  - gcc-compilers-updates, new (mobile) operating systems
  - error handling
- Deployment of OFIQ 1.0 with operational use cases in 2024/2025:
  - Entry-Exit-System (EES) enrolment at German airports
  - Passport Live Enrolment at passport agencies (starting in May 2025 in Germany)
- Launch of OFIQ 2.0 project (pending management approval) to address:
  - Further innovation of face image quality measures
  - Lightweight solutions – reducing transaction times
  - Investigate fairness of quality measures

Thank you for your attention!

Contact

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