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Overview of Quality Features for NFIQ 2.0

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Developing Quality Features for NFIQ2.0

- Requirements for selection as a feature candidate
  - Based on publically documented algorithms
  - Available as Open Source
  - Standardized Interfaces to Plug-and-Play feature algorithms
- Outcome
  - Quality feature for NFIQ2.0
  - Project timeline and scope

General Approach

- Review of the discussion and findings from the IBPC 2010 sample quality workshop
- Process inNFIQ2.0
  1. Literature investigation
  2. Prototype implementation in Matlab
  3. Refinement of algorithm and parameters
  4. Performance assessment
  5. Implementation in C/C++

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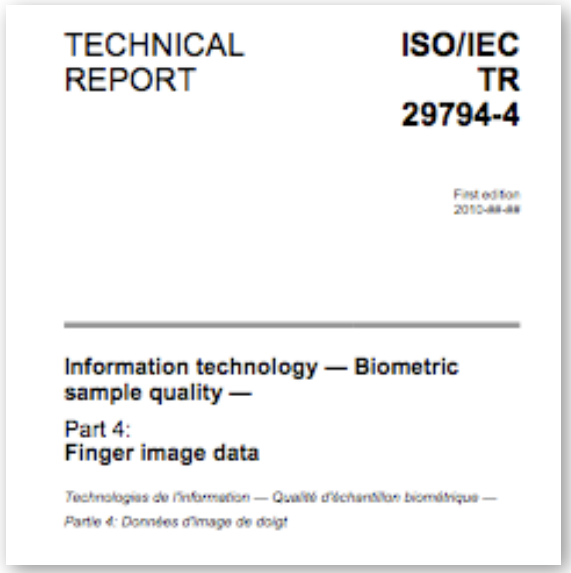
Context - I

- Based on ISO/IEC IS 29794-1:2009
  "Information technology - Biometrics sample quality Part 1: Framework"
- Definitions
  - **quality**: *"the degree to which a biometric sample fulfils specified requirements for a targeted application*"
  - **quality score**: "*a quantitative expression of quality*"
  - **utility:** "*the observed performance of a biometric sample or set of samples in one or more biometric systems*"
- Biometric data quality blocks
- Quality score
  - 0: lowest quality
  - 100: highest quality
  - 255: failed attempt to assign a quality score

description		size	valid values	notes
Number of Quality Blocks		1 byte	[0,255]	This field is followed by the number of 5-byte Quality Blocks reflected by its value A value of zero (0) means that no attempt was made to assign a quality score. In this case, no Quality Blocks are present.
Quality Block	Quality Score	1 byte	[0,100] 255	0: lowest 100: highest 255: failed attempt to assign a quality score
	Quality Algorithm Vendor ID	2 bytes	[1,65535]	Quality Algorithm Vendor ID shall be registered with IBIA as a CBEFF biometric organization. Refer to CBEFF vendor ID registry procedures in ISO/IEC 19785-2.
	Quality Algorithm ID	2 bytes	[1,65535]	Quality Algorithm ID may be optionally registered with IBIA as a CBEFF Product Code. Refer to CBEFF product registry

Context - II

- Linked to ISO/IEC TR 29794-4:2010
  "Information technology - Biometrics sample quality
  Part 4: Finger image data"
- Quality feature classes
  - Global features
  - Local features (blockwise)
- Expected return of research investment
  - Intended revision of ISO/IEC IS 29794-4:201x
  - Upgrade to an IS (International Standard)


TECHNICAL REPORT

ISO/IEC TR 29794-4

First edition

Information technology — Biometric sample quality —

Part 4:
Finger image data

Technologies de l'information — Qualité d'échantillon biométrique —
Partie 4: Données d'image de doigt

Abstract Feature Overview

- Input is always the fingerprint image

- A segmentation mask is optional
- Analyze image in a global or local manner to produce raw quality scores
- For a local metric a suitable aggregation function is chosen to produce a *single* quality score

Current Quality Feature Groups - Status of available Features

- Group 1: NFIQ1.0
  - Quality Zone 3+4, Foreground
- Group 2: Implemented from ISO/IEC TR 29794-4
  - Frequency Domain Analysis
  - Local Clarity Score
  - Orientation Certainty Level
  - Orientation Flow
  - Radial Power Spectrum
  - Ridge Valley Uniformity
- Group 3: New Features
  - Gabor (Olsen, 2012), Gabor (Shen et al., 2001)
  - Minutiae count, mean pixel intensity (input image, block wise), sigma of intensity
- Group 4: Open Source Contribution
  - Digital Persona JetFX Minutia Extractor ”Derivate” (e.g. total # of minutiae)
  - **Your** contribution ?

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