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Information technology — Biometric sample quality —

Part 6: Iris image data

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/IEC JTC 1, *Information technology*, SC 37, *Biometrics*.

ISO/IEC 29794 consists of the following parts, under the general title *Information technology — Biometric sample quality*:

— *Part 1: Framework*

— *Part 4: Finger image data*

— *Part 5: Face image data* (Technical Report)

— *Part 6: Iris image data*

ISO/IEC 29794 will be prepared to accommodate new, additional parts that address other modalities specified by ISO/IEC 19794, with part numbers and titles aligning appropriately.

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Introduction

The assessment of biometric sample quality through the calculation of quality metrics can be used to predict the resulting identification accuracy in the framework of a given biometric system. With proper use, quality metrics can enhance the functionality of a biometric system. For example they can provide feedback regarding the integrity of collected biometric data during the enrolment or identification process.

The purpose of this part of ISO/IEC 29794 is to define terms and quantitative methodologies relevant to characterizing the quality of iris images and to assess their potential for high confidence biometric match decisions.

ISO/IEC 19784-1 and ISO/IEC 19785-1 standards allocate a quality field and specify a quality score range applicable to iris images with a qualitative foundation. ISO/IEC 19794-6 includes an informative annex covering the subject of iris image capture and provides image quality guidelines. However, these International Standards do not contain specific content to guide the quantitative formation of iris image quality metrics or the interpretations of such metrics. This part of ISO/IEC 29794 establishes required ranges of covariate values where definitive empirical data exists to justify such ranges. In other cases, ranges of covariate values are specified as non-normative recommendations.

This part of ISO/IEC 29794 is structured as follows. The first five Clauses state Scope, Conformance, Normative references, Terms and definitions, and Acronyms. Clause 6 specifies a set of quality metrics for assessing the quality of iris images. Some of the metrics are declared as normative, as their impacts on recognition rates have been quantified, while others are only informative, allowing their use as they may provide valuable information for further stages in the biometric system. Some of the metrics in Clause 6 are applicable to the analysis of single images, while others are applicable to assessing the utility of a given pair of images for mutual comparison.

Clause 7 is dedicated to provide guidance to acquisition device manufacturers by defining quality parameters that shall be considered for generating conformant iris images.

Clause 8 establishes encoding of the iris image quality data record.

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Information technology — Biometric sample quality —

Part 6:
Iris image data

1 Scope

This part of ISO/IEC 29794 establishes

— methods used to quantify the quality of iris images,

— normative requirements on software and hardware producing iris images,

— normative requirements on software and hardware measuring the utility of iris images,

— terms and definitions for quantifying iris image quality, and

— standardized encoding of iris image quality.

Outside the scope is

— performance evaluation of specific iris quality assessment algorithms.

2 Conformance

An iris image shall be of sufficient utility if the measurements required by 6.2.X.3 satisfy the valid range/thresholds specified in 6.2.X.4.

A pair of images of an iris shall be of sufficient utility if the pair conforms to the requirements of 6.4. Specifically, they shall satisfy valid range/thresholds specified in 6.4.X.4 using computation method specified in 6.4.X.3.

An iris image quality record shall conform to this part of ISO/IEC 29794 if its structure and data values conform to the formatting requirements of Clause 8 (Iris image quality data record) and its quality values are computed using the methods specified in 6.2.X.3. Conformance to the normative requirements of Clause 8 fulfils Level 1 and Level 2 conformance as specified in ISO/IEC 19794-1:2011, Annex A. Conformance to the normative requirements of Clause 6.2.X.3 is Level 3 conformance as specified in ISO/IEC 19794-1:2011, Annex A.

An iris acquisition device shall conform to this part of ISO/IEC 29794 if it conforms to the normative requirements of Clause 7.

Computation of the utility of an iris image shall conform to the requirements of 6.2, specifically the computation methods described in 6.2.X.3. Computation of the utility of the pair of images shall be assessed per normative requirements of 6.4, specifically the computation methods described in 6.4.X.3.

If an implementation of the metrics in this part of ISO/IEC 29794 reports an unacceptable (low) quality value for one or more quality metrics, another image of the subject should be re-captured. This should be repeated until

— a fully conformant image has been acquired, or

— it is determined that repeated acquisitions will not yield a sufficient quality (e.g., correct enrolment) within the application time constraint. In this case, one unacceptable image is chosen and retained as the best possible candidate.

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3 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 19794-1:2011, *Information technology — Biometric data interchange formats — Part 1: Framework*

ISO/IEC 19794-6:2011, *Information technology — Biometric data interchange formats — Part 6: Iris image data*

ISO/IEC 29794-1, *Information technology — Biometric sample quality–Part 1: Framework*

4 Terms and definitions

For the purpose of this document, the terms in ISO/IEC 19794-6:2011, ISO/IEC 29794-1, and the following apply.

4.1
covariate
variable or parameter that either directly, or when interacting with other covariates, affects iris recognition accuracy

Note 1 to entry: Synonyms are variable, explanatory variable, and quality parameter.

Note 2 to entry: Accuracy might be stated in terms of false negative identification rate, false positive identification rate, false non-match rate, false match rate, failure-to-enrol rate, or failure-to-acquire rate.

4.2
defocus
image impairment due to the position of the iris along the optical axis of the camera away from the plane or surface of best focus, generally resulting in reduced sharpness (blur) and reduced contrast

4.3
depth of field
a distance range relative to the entrance aperture of a capture device over which the iris image has greater than a specified quality with respect to focus

4.4
iris centre
centre of a circle approximating the boundary between the iris and the sclera

4.5
iris radius
radius of a circle approximating the boundary between the iris and the sclera

4.6
metric
quantification of a covariate using a prescribed method

4.7
modulation
waveform with maximum and minimum values, max and min, 100(max-min)/(max+min)%

4.8
modulation transfer function
ratio of the image modulation to the object modulation at specified spatial frequencies

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