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Information technology — Extensible biometric data interchange formats —

Part 5: Face image data

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Foreword

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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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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 37, *Biometrics*.

A list of all parts in the ISO/IEC 39794 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Face images have been used for many decades to verify the identity of individuals. In recent years, digital face images have been used in many applications including human examination as well as computer-automated face recognition. Photographic formats are standardized, e.g., for passports and driver licences. There is also a need for a standard data format for digital face images to enable interoperability. A prominent case where such interoperability is essential is the electronic passport system, where face images are stored for several purposes including Automated Border Control.

Biometric data interchange formats enable the interoperability of different biometric systems. The first generation of biometric data interchange formats was published between 2005 and 2007 in the first edition of the ISO/IEC 19794 series. From 2011 onwards, the second generation of biometric data interchange formats was published in the second edition of the established parts and the first edition of some new parts of the ISO/IEC 19794 series. In the second generation of biometric data interchange formats, new useful data elements such as data elements related to biometric sample quality were added, the header data structures were harmonized across all parts of the ISO/IEC 19794 series, and XML encoding was been added in addition to the binary encoding.

In anticipation of the need for additional data elements, and in order to avoid future compatibility issues, the ISO/IEC 39794 series provides standard biometric data interchange formats capable of being extended in a defined way. Extensible specifications in ASN.1 (Abstract Syntax Notation One) and the distinguished encoding rules (DER) of ASN.1 form the basis for encoding biometric data in binary tag-length-value formats. XSDs (XML schema definitions) form the basis for encoding biometric data in XML (eXtensible Markup Language).

This third generation of face image data interchange formats complements ISO/IEC 19794-5:2005 and ISO/IEC 19794-5:2011. The first generation of biometric data interchange formats, which has been adopted, e.g., by ICAO for the biometric data stored in Machine Readable Travel Documents, is expected to be retained in the standards catalogue as long as needed.

This document is intended to provide a generic face image data format for face recognition applications requiring exchange of face image data. Typical applications are:

— automated face biometric verification (one-to-one comparison) and identification (one-to-many comparison), and

— human verification of a biometric claim by comparison of data subjects against face images, including examination of face images with sufficient detail.

In addition to the data format, this document specifies application specific profiles including scene constraints, photographic properties and digital image attributes like image spatial sampling rate, image size, etc. These application profiles are contained in Annex D.

The structure of the data format in this document is not compatible with the previous generations. However, this new revision addresses, for the first time, a mechanism to maintain future extensions in a backwards- and forwards-compatible manner. This will mean that a parser is able to read data records and understand data items that are formatted according to versions of the standard that are older, the same or newer than the parser is developed to. All newer data items will not disrupt the parsing process and can be ignored. Newer versions of this document will at least include the mandatory data items of the previous standards.

The 3D encoding types 3D point map and range image are not supported by this edition of this document.

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Information technology — Extensible biometric data interchange formats —

Part 5:
Face image data

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1 Scope

This document specifies:

— generic extensible data interchange formats for the representation of face image data: A tagged binary data format based on an extensible specification in ASN.1 and a textual data format based on an XML schema definition that are both capable of holding the same information;

— examples of data record contents;

— application specific requirements, recommendations, and best practices in data acquisition; and

— conformance test assertions and conformance test procedures applicable to this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 2382-37, *Information technology — Vocabulary — Part 37: Biometrics*

ISO/IEC 8824-1, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation — Part 1*

ISO/IEC 8825-1, *Information technology — ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER) — Part 1*

ITU-T Rec. T.81 | ISO/IEC 10918-1, *Information technology — Digital compression and coding of continuous-tone still images — Part 1: Requirements and guidelines*

ISO 11664-2:2007, *Colorimetry — Part 2: CIE standard illuminants*

ISO/IEC 14496-2:2004, *Information technology — Coding of audio-visual objects — Part 2: Visual*

ITU-T Rec. T.800 | ISO/IEC 15444-1, *Information technology — JPEG 2000 image coding system— Part 1: Core coding system*

ISO/IEC 15948, *Information technology — Computer graphics and image processing — Portable Network Graphics (PNG): Functional specification*

ISO/IEC 39794-1, *Information technology — Extensible biometric data interchange formats — Part 1: Framework*

Doc ICAO 9303: *Machine Readable Travel Documents*

W3C Recommendation, *XML Schema Part 1: Structures* (Second Edition), 28 October 2004, http://www.w3.org/TR/xmlschema-1/

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W3C Recommendation, *XML Schema Part 2: Datatypes* (Second Edition), 28 October 2004, http://www.w3.org/TR/xmlschema-2/

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 39794-1, ISO/IEC 2382-37 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
1:1 application case
biometric verification

Note 1 to entry: Biometric verification is defined in ISO/IEC 2382-37 as a process of confirming a biometric claim through biometric comparison.

3.2
1:N application case
biometric identification

Note 1 to entry: Biometric identification is defined in ISO/IEC 2382-37 as a process of searching against a biometric enrolment database to find and return the biometric reference identifier(s) attributable to a single individual.

3.3
2D face image
two-dimensional face representation that encodes the luminance and/or colour texture of the face of a capture subject in a given lighting environment

3.4
3D face image
three-dimensional face representation that encodes a surface in a 3D space

3.5
3D vertex
representation using 3D vertices and triangles between these points for coding of a 3D surface

3.6
RGB
colour space designed to encompass most of the colours achievable on CMYK colour printers, but by using red, green and blue primary colours on a device such as a computer display

3.7
anthropometric landmark
landmark on the face used for identification and classification of humans

3.8
landmark code
<anthropometric> two-part code that uniquely defines an anthropometric landmark

3.9
camera to subject distance
CSD
distance between the eyes plane of a capture subject and the and the sensor/image plane of the camera

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