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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

This consolidated reprint of ISO/IEC 19794-5:2005 was prepared by Joint Technical Committee ISO/IEC JTC1, *Information Technology*, Subcommittee SC 37, *Biometrics*.

This consolidated reprint of ISO/IEC 19794-5:2005 contains the original content of ISO/IEC 19794-5:2005 and incorporates the Amendments ISO/IEC 19794-5:2005/Amd 1:2007 and ISO/IEC 19794-5:2005/Amd 2:2009 and the Technical Corrigenda ISO/IEC 19794-5:2005/Cor 1:2008, ISO/IEC 19794-5:2005/Cor 2:2008, ISO/IEC 19794-5:2005/Cor 3:2013, ISO/IEC 19794-5:2005/Cor 4:2015, and the unpublished draft of ISO/IEC 19794-5:2005/Cor 5.

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Introduction

Face images, also commonly referred to as displayed portraits, have been used for many decades to verify identity of persons. In recent years, digital face images are used in many applications including human examination as well as computer automated face recognition. Although photographic formats have been standardized in some cases such as passport and driver license, it is also demanded to define a standard data format of digital face images to allow interoperability among vendors.

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

- Human examination of facial images with sufficient resolution to allow a human examiner to ascertain small features such as moles and scars that might be used to verify identity;
- Human verification of identify by comparison of persons against facial images;
- Computer automated face identification (one-to-many searching);
- Computer automated face verification (one-to-one matching).

To enable many applications on variety of devices, including devices that have the limited resources required for data storage, and to improve face recognition accuracy, this document specifies not only a data format, but also scene constraints (lighting, pose, expression, etc.), photographic properties (positioning, camera focus, etc.), digital image attributes (image resolution, image size, etc.).

Several image types are introduced to define categories that satisfy requirements of some applications. Each requirement is specified for each image type.

The record format specified in this document is designed to be embedded in a CBEFF-compliant structure specified in the multi-part Standard ISO/IEC 19785. The embedment in the CBEFF structure is described in ISO/IEC 19794-1:2006.

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Information technology – Biometric data interchange formats – Face image data

1 Scope

This document specifies

- A record format for storing, recording, and transmitting the information from one or more facial images within a CBEFF data structure,
- Scene constraints of the facial images,
- Photographic properties of the facial images,
- Digital image attributes of the facial images.

Each requirement is specified for the following *Face Image Types*, respectively.

- **Basic:** This is the fundamental *Face Image Type* that specifies a record format including header and image data. All *Face Image Types* adhere to the properties of this type. No mandatory scene, photographic and digital requirements are specified for this image type.
- **Frontal:** A *Basic Face Image Type* that adheres to additional requirements appropriate for frontal face recognition and/or human examination. Two types of *Frontal Face Image Types* are defined in this document, *Full Frontal* and *Token Frontal* (or simply Token).
- **Full Frontal:** A *Face Image Type* that specifies frontal images with sufficient resolution for human examination as well as reliable computer face recognition. This type of *Face Image Type* includes the full head with all hair in most cases, as well as neck and shoulders. This image type is suitable for permanent storage of the face information, and it is applicable to portraits for passport, driver license, and “mug shot” images.
- **Token Frontal:** A *Face Image Type* that specifies frontal images with a specific geometric size and eye positioning based on the width and height of the image. This image type is suitable for minimizing the storage requirements for computer face recognition tasks such as verification while still offering vendor independence and human verification (versus human examination which requires more detail) capabilities.

Table 1 shows the relationships between *Face Image Types* using the notion of inheritance. For example, *Frontal* inherits properties from *Basic*, which means that all normative Clauses that apply to *Basic* also apply to *Frontal*.

Table 1 – Inheritance of Face Image Types

Face Image Type	Inherits from	Normative Clauses	Informative Clauses
Basic	None	1, 2, 3, 4, 5, 6	A.1
Frontal	Basic	7	A.2
Full Frontal	Frontal	8	A.3
Token	Frontal	9	A.4

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Figure 1 gives a general overview of the scene, photographic, digitization, and format requirements for the face image types specified in this document. The *Basic Face Image Type* has no scene, photographic, or digital requirements.

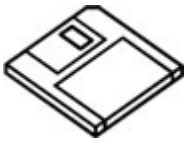
Requirements			
Scene	**Photographic**	**Digital**	**Format**
Lighting Image and Subject	Positioning Camera Attributes	Digital Camera Analogue to Digital Image Scanning	 Digital Specifications Record Format and Organization
Clauses: Basic Face None Frontal Face 7.2 Full Frontal Face 8.2	*Clauses:* Basic Face None Frontal Face 7.3 Full Frontal Face 8.3	*Clauses:* Basic Face None Frontal Face 7.4 Full Frontal Face 8.4 Token Face 9.2	*Clauses:* Basic Face 5 6.2 6.3 6.4 Frontal Face 7.5 Full Frontal Face 8.5 Token Face 9.3

Figure 1 – Types of imaging requirements specified in this document.

2 Compliance

Conformity with this document requires compliance with the record format specification defined in Clauses 5 and the *Basic Face Image Type* defined in Clause 6. In addition, this document defines additional *Face Image Types*. Compliance with the *Full Frontal Face Image Type* requires compliance with Clauses 5, 6, 7, and 8. Conformity with the *Token Frontal Image Type* requires additional compliance with Clause 5, 6, 7, and 9.

3 Normative references

The following referenced documents are indispensable for the application 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 19785 Information technology -- Common Biometric Exchange Formats Framework – Multi-part Standard
- ISO/IEC 19794-1:2006 Information technology — Biometric data interchange formats — Part 1: Framework

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- ISO/IEC 10918-1, Information technology — Digital compression and coding of continuous-tone still images: Requirements and guidelines
- ISO/IEC 15444-1, Information technology — JPEG 2000 image coding system: Core coding system
- C-Cube Microsystems, JPEG File Interchange Format (JFIF), Version 1.02
- PIMA 7667:2001, Photography – Electronic Still Picture Imaging – Extended sRGB Color Encoding – e-sRGB
- ICC.1:2001-12, File Format for Color Profiles
- ISO/IEC 14496-2:2004, Information technology - Coding of audio-visual objects - Part 2: Visual (MPEG4)
- ISO/IEC 15948:2004, Information technology — Computer graphics and image processing — Portable Network Graphics (PNG): Functional specification

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