SS ISO/IEC 19794-5.2:2021

ISO/IEC 19794-5:2011+A1:2014+A2:2015+C1:2016, IDT

(ICS 35.040)

SINGAPORE STANDARD

Information technology — Biometric data interchange formats

– Part 5 : Face image data

Singapore Standards Council

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Published by Enterprise Singapore

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ISBN 978-981-5024-36-4

National Foreword

This Singapore Standard was prepared by the Technical Committee on Identification Technology under the purview of Information Technology Standards Committee.

This standard is an identical adoption of ISO/IEC 19794-5:2011, “Information technology — Biometric data interchange formats — Part 5 : Face image data”, including its Amendments 1 & 2 and Technical Corrigendum 1, published by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC).

Both ISO/IEC 19794-5:2005 and ISO/IEC 19794-5:2011 (confirmed in 2017) have been adopted as Singapore Standards, as the later and current version of the standard is not backward compatible with the previous version. Both versions are being used by industry. ISO has specified that the previous edition of the standard (i.e. the 2005 version) ‘exceptionally remains valid until 2033’.

NOTE 1 – Reference to International/Overseas Standards are replaced by applicable Singapore Standards or Technical References.

NOTE 2 – Where numerical values are expressed as decimals, the comma is read as a full point.

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NOTE

1. *Singapore Standards (SSs) and Technical References (TRs) are reviewed periodically to keep abreast of technical changes, technological developments and industry practices. The changes are documented through the issue of either amendments or revisions. Where SSs are deemed to be stable, i.e. no foreseeable changes in them, they will be classified as “Mature Standards”. Mature Standards will not be subject to further review, unless there are requests to review such standards.*

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INTERNATIONAL STANDARD

ISO/IEC 19794-5

Second edition
2011-11-01

Information technology — Biometric data interchange formats —

Part 5: Face image data

Technologies de l'information — Formats d'échange de données biométriques —

Partie 5: Données d'image de la face

Reference number
ISO/IEC 19794-5:2011(E)

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Web www.iso.org

Published in Switzerland

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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 national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national 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 shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 19794-5 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 37, *Biometrics*.

This second edition constitutes a technical revision of the first edition (ISO/IEC 19794-5:2005), which is provisionally retained. It also 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 and ISO/IEC 19794-5:2005/Cor.2:2008. This edition reflects the harmonization across the second generation of ISO/IEC 19794. Clause 5 contains descriptions of the harmonized general and representation headers; and Clauses 5 to 13 have been technically revised. Annexes C, D, and E have been added.

ISO/IEC 19794 consists of the following parts, under the general title *Information technology — Biometric data interchange formats*:

— *Part 1: Framework*

— *Part 2: Finger minutiae data*

— *Part 3: Finger pattern spectral data*

— *Part 4: Finger image data*

— *Part 5: Face image data*

— *Part 6: Iris image data*

— *Part 7: Signature/sign time series data*

— *Part 8: Finger pattern skeletal data*

— *Part 9: Vascular image data*

— *Part 10: Hand geometry silhouette data*

— *Part 11: Signature/sign processed dynamic data*

— *Part 13: Voice data*

— *Part 14: DNA data*

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Introduction

Face images, also commonly referred to as displayed portraits, have been used for many decades to verify the 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 for passports and driver licenses, there is a need to define a standard data format of digital face images to allow interoperability among vendors.

This part of ISO/IEC 19794 is intended to provide a face image format for face recognition applications requiring exchange of face image data. The typical applications are

1) 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,

2) human verification of identity by comparison of persons against facial images,

3) computer automated face biometric identification (one-to-many searching), and

4) computer automated face biometric verification (one-to-one comparison).

To enable many applications on a variety of devices, including devices that have limited resources available for data storage, and to improve face recognition accuracy, this part of ISO/IEC 19794 specifies not only a data format, but also scene constraints (lighting, pose, expression, etc.), photographic properties (positioning, camera focus, etc.) and digital image attributes (image resolution, image size, etc.).

Several face image types are introduced to define categories that satisfy requirements of some applications:

- **Basic:** This is the fundamental Face Image Type that specifies a record format including header and representation 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 part of ISO/IEC 19794, 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 “mugshot” 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.
- **Post-processed Frontal:** Applying digital post-processing to a captured image can modify this image in a way that it is more suitable for automatic face recognition. The Post-processed Frontal Face Image Type is thought of as the interchange format for these kinds of facial images.
- **Basic 3D:** The Basic 3D Image Type is the base Image Type of all 3D Face Image Types. All 3D Face Image Types obey normative requirements of this image type.
- **Full Frontal 3D:** The Full Frontal 3D Image Type combines a Full Frontal 2D image with additional 3D information.
- **Token Frontal 3D:** The Token Frontal 3D Image Type combines a Token Frontal 2D image with additional 3D information.

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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 annexes
Basic	None	1, 2, 3, 4, 5, 6	B.1
Frontal	Basic	7	B.2
Full Frontal	Frontal	8	B.3
Token Frontal	Frontal	9	B.4
Post-processed Frontal	Frontal	10	

Figure 1 gives a general overview of the scene, photographic, digitization, and format requirements for the face image types specified in this part of ISO/IEC 19794.

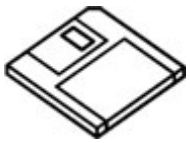
Requirements			
Scene	**Photographic**	**Digital**	**Format**
Lighting Image and Subject	Positioning Camera Attributes	Digital Camera Analogue to Digital Image Scanning	 Digital Specifications Record Format and Organization
Clauses: Basic Face None Frontal Face 7.2 Full Frontal Face 8.2	*Clauses:* Basic 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 Post-processed Frontal Face 10.3

Figure 1 — The types of imaging requirements specified in this part of ISO/IEC 19794. The Basic Face Image Type has no scene, photographic, or digital requirements

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This is a revision of ISO/IEC 19794-5:2005. The structure of the data format is not compatible with the previous version.

NOTE This part of ISO/IEC 19794 relies on other ISO International Standards.

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INTERNATIONAL STANDARD **ISO/IEC 19794-5:2011(E)**

Information technology — Biometric data interchange formats —

Part 5: Face image data

1 Scope

This part of ISO/IEC 19794

— specifies a record format for storing, recording, and transmitting the information from one or more facial images or a short video stream of facial images,

— specifies scene constraints of the facial images,

— specifies photographic properties of the facial images,

— specifies digital image attributes of the facial images,

— provides best practices for the photography of faces.

2 Conformance

A biometric data record conforms to this part of ISO/IEC 19794 if it satisfies all of the normative requirements related to:

A) Its data structure, data values and the relationships between its data elements, as specified in Clauses 5, 6, 7, 8 for the Full Frontal Face Image Type, Clauses 5, 6, 7, 9 for the Token Frontal Image Type, and Clauses 5, 6, 7, 10 for the Post-processed Frontal Image Type of this part of ISO/IEC 19794, respectively.

B) The relationship between its data values and the input biometric data from which the biometric data record was generated, as specified in Clauses 5, 6, 7, 8 for the Full Frontal Face Image Type, Clauses 5, 6, 7, 9 for the Token Frontal Image Type, and Clauses 5, 6, 7, 10 for the Post-processed Frontal Image Type of this part of ISO/IEC 19794, respectively.

A system that produces biometric data records is conformant to this part of ISO/IEC 19794 if all biometric data records that it outputs conform to this part of ISO/IEC 19794 (as defined above) as claimed in the Implementation Conformance Statement associated with that system. A system does not need to be capable of producing biometric data records that cover all possible aspects of this part of ISO/IEC 19794, but only those that are claimed to be supported by the system in the Implementation Conformance Statement.

A system that uses biometric data records is conformant to this part of ISO/IEC 19794 if it can read, and use for the purpose intended by that system, all biometric data records that conform to this part of ISO/IEC 19794 (as defined above) as claimed in the Implementation Conformance Statement associated with that system. A system does not need to be capable of using biometric data records that cover all possible aspects of this part of ISO/IEC 19794, but only those that are claimed to be supported by the system in an Implementation Conformance Statement.

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