



**International  
Standard**

**ISO/IEC 29794-5**

**Information technology —  
Biometric sample quality —**

**Part 5:  
Face image data**

*Technologies de l'information — Qualité d'échantillon  
biométrique —*

*Partie 5: Données d'image de face*

**First edition  
2025-04**

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

ISO/IEC 29794-5:2025

<https://standards.iteh.ai/catalog/standards/iso/7b8c92cc-f70a-4273-832e-a2a8a95cfdc7/iso-iec-29794-5-2025>

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

ISO/IEC 29794-5:2025

<https://standards.iteh.ai/catalog/standards/iso/7b8c92cc-f70a-4273-832e-a2a8a95cfdc7/iso-iec-29794-5-2025>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO/IEC 2025

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

Page

<b>Foreword</b>	<b>v</b>
<b>Introduction</b>	<b>vi</b>
<b>1 Scope</b>	<b>1</b>
<b>2 Normative references</b>	<b>1</b>
<b>3 Terms and definitions</b>	<b>2</b>
<b>4 Abbreviated terms</b>	<b>4</b>
<b>5 Conformance</b>	<b>4</b>
<b>6 Common computations</b>	<b>6</b>
6.1 Overview	6
6.2 Conversion of 16 bits per channel images to 8 bits per channel images	7
6.3 Conversion of high bit-depth images to 8 bit greyscale or 24 bit colour images	7
6.4 Face detection	7
6.5 Face landmark estimation	8
6.6 Landmarked region segmentation	10
6.7 Face alignment	11
6.8 Face parsing	12
6.9 Face occlusion segmentation	13
6.10 Computing eye centres and inter-eye distance	14
6.11 Head pose estimation	15
6.12 Conversion of 8-bits-per-channel colour images to luminance	16
6.13 Conversion of 8-bits-per-channel colour images to CIELAB space	17
6.14 Handling of greyscale images	18
6.15 Luminance histogram	18
6.16 Entropy	18
6.17 Expressing binary quantities as continuous values	18
6.18 Representation and arithmetic of real and integer numbers	18
6.19 Normalization of image colour values	19
<b>7 Quality measures</b>	<b>19</b>
7.1 General	19
7.2 Quality score (unified)	20
7.2.1 Description	20
7.2.2 Computation of the native quality measure	20
7.2.3 Mapping the computation result to the target range of the quality component	21
7.3 Capture-related quality components	21
7.3.1 General	21
7.3.2 Background uniformity	21
7.3.3 Illumination uniformity	22
7.3.4 Moments of the luminance distribution	23
7.3.5 Under-exposure prevention	25
7.3.6 Over-exposure prevention	25
7.3.7 Dynamic range	26
7.3.8 Sharpness	27
7.3.9 No compression artefacts	28
7.3.10 Natural colour	29
7.4 Subject-related quality components	30
7.4.1 General	30
7.4.2 Single face present	30
7.4.3 Eyes open	31
7.4.4 Mouth closed	32
7.4.5 Eyes visible	32
7.4.6 Mouth occlusion prevention	33
7.4.7 Face occlusion prevention	34

## ISO/IEC 29794-5:2025(en)

7.4.8	Inter-eye distance.....	34
7.4.9	Head size.....	35
7.4.10	Crop of the face image .....	36
7.4.11	Head pose.....	38
7.4.12	Expression neutrality .....	39
7.4.13	No head covering.....	40
<b>8</b>	<b>Face image quality block.....</b>	<b>41</b>
8.1	Binary encoding .....	41
8.2	XML encoding .....	41
8.3	Organization identifiers.....	41
8.4	Algorithm identifiers .....	41
<b>Annex A (normative) Conformance test assertions .....</b>		<b>44</b>
<b>Annex B (informative) Quantitative goal for face image QAAs .....</b>		<b>50</b>
<b>Annex C (informative) Applications of quality measures .....</b>		<b>53</b>
<b>Annex D (informative) Quality requirements with no quality measure .....</b>		<b>56</b>
<b>Annex E (informative) OFIQ testing reports .....</b>		<b>58</b>
<b>Annex F (informative) Guidance for sequential use of ISO/IEC 29794-5 quality components.....</b>		<b>59</b>
<b>Bibliography.....</b>		<b>60</b>

# iTeh Standards (<https://standards.iteh.ai>) Document Preview

[ISO/IEC 29794-5:2025](https://standards.iteh.ai/catalog/standards/iso/7b8c92cc-f70a-4273-832e-a2a8a95cfdc7/iso-iec-29794-5-2025)

<https://standards.iteh.ai/catalog/standards/iso/7b8c92cc-f70a-4273-832e-a2a8a95cfdc7/iso-iec-29794-5-2025>

## 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.

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](http://www.iso.org/directives) or [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs)).

ISO and IEC draw attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO and IEC take no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO and IEC had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents) and <https://patents.iec.ch>. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html). In the IEC, see [www.iec.ch/understanding-standards](http://www.iec.ch/understanding-standards).

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

This first edition cancels and replaces the first edition of ISO/IEC TR 29794-5:2010 which has been technically revised.

The main changes are as follows:

- the document has been completely revised to become an International Standard;
- information on the role of quality measures has been added;
- requirements on quality software have been added.

A list of all parts in the ISO/IEC 29794 series can be found on the ISO and IEC websites.

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](http://www.iso.org/members.html) and [www.iec.ch/national-committees](http://www.iec.ch/national-committees).

## Introduction

Adoption of deep learning techniques has caused error rates associated with automated face recognition tasks to be reduced. However, errors still occur and are often related to imaging, human factors, the level of biometric capture subject cooperation, the comparison algorithm, and its associated threshold and decision logic. Without significant modernisation of capture procedures, recognition errors will become more prevalent as volumes increase. This document is aimed at reducing errors due to image quality, through the use of quality assessment algorithms. Quality assessment algorithms have several roles (see [Annex C](#)), primarily those related to sample capture. Drivers for improved capture are as follows.

- Need for improved usability — The general improvement of biometric systems has highlighted that improved usability for both biometric capture subjects and human operators can reduce errors through the improvement of capture. Without a careful consideration of both biometric capture subjects and system operators, system designers risk seeing the limitations inherent in using technology alone.
- Increasing volumes — Vast numbers of face images are being collected in many commercial, civil identity management and law enforcement applications. These photographs are used as reference enrolment samples, or as recognition probes that, in turn, sometimes later serve as references.
- New programs — Future large-scale programs will employ face recognition: For example, in China the railway transportation system uses face recognition for identity verification and to improve passenger check-in efficiency. The European Union uses face recognition for biometric exit confirmation. The United States currently uses face recognition for biometric exit confirmation and vessel boarding. In India, the Aadhaar program allows face recognition for authentication.
- Face-blind cameras — Historically, many face images were collected using cameras that were not face-aware. In contrast, in some situations concerning fingerprint and iris biometrics, capture devices run in an auto-capture quality-assessment loop, with explicit awareness of the kind of image intended for collection.
- Reliance on imaging design specifications — Faces collected for ID credentials and authoritative databases are largely collected using cameras set up according to published documentary standards, most recently ISO/IEC 39794-5, regulating geometry and photography. In the best case, face images from such collections are then checked with image compliance tools. When photographs are collected by a human photographer, this can be without any automated quality assessment, relying only on the photographer to check conformance.
- Behaviour not intended by the relevant capture standard — Some recognition failures arise from biometric capture subjects effecting differences in presentation in reference and probe images. Standards define a canonical presentation to be centred and frontal with neutral expression, eyes-open and without occlusions. Facial recognition systems are expected to operate accurately across a wide range of individuals who vary in age, body size, ethnicity, language, culture, literacy and familiarity with technology. Careful human factors design is vital to the acquisition of canonical images and improved face image capture.
- Quality assessment is separated from the capture process — In many cases, a photograph is captured and later submitted to a backend server while ensuring no image tampering occurs, where it is assessed for quality. If poor quality is detected (by human or automated means), re-capture is initiated hours or days later, when possible, with another encounter and attendant expense.

Regarding image quality, [Table 1](#) lists characteristics of face image quality relating to the biometric capture subject and characteristics relating to the capture process, demonstrating that issues due to mis-presentation (often associated with human factors design) and issues related to imaging are in many cases separable. For example, photographs can be systematically de-focused even when the biometric capture subjects present perfectly.

Table 1 — Characterization of face image quality

	Biometric capture subject characteristics	Capture process
Static properties	Biological characteristics; — injuries and scars, — dermatological conditions, — etc.	Capture process and capture device properties: — image resolution, — optical distortions, — sub-optimal camera angle, — field of view, — etc.
	Other static characteristics: — thick or dark glasses, — permanent jewellery, — makeup and cosmetics, — etc.	Static properties of the background: — (textured) wallpaper.
		Affordance: — properties of a data capture subsystem that intuitively imply its functionality and use to biometric capture subjects, — human-centric system physical and process design.
Dynamic properties	Behaviour: — exaggerated expression, — hair across the eye, — facial hair, — etc.	Scenery: — background moving objects, — variation in lightning.
		Capture device variation: — de-focus, — camera vibration, — sub-optimal camera angle, — poor exposure, — etc.

By defining image quality measurements, this document is intended to improve the accuracy of automated face recognition systems. Quality can be tied to recognition accuracy (see [Annex B](#)). Improved quality can also improve human review of images. The quality measures included in this document were selected because guidance on how to control them has already been included in ISO/IEC 39794-5. The implementations of some quality measures were evaluated for performance.<sup>[62]</sup> The reference implementation defines quality measures that use external algorithms with licence conditions.<sup>[58]</sup>

This document recognizes the Open Face Image Quality (OFIQ)<sup>[60]</sup> software as the reference implementation of the requirements of the document. It is open-source.<sup>[59]</sup> Other quality algorithm implementations can conform to this document as described in [Clause 5](#).

Some of the computations of this document can be effective on images captured with illumination at non-visible wavelengths.

Encoding of quality data is defined in ISO/IEC 29794-1. The methodology for performance evaluation of quality assessment algorithms is also defined in ISO/IEC 29794-1.

NOTE Use of this document can be subject to local regulations.