SLOVENSKI STANDARD
SIST-TS CEN/TS 17051:2017

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Fotografija celega telesa

Full body photography

Ganzkörperfotografie

Photographie du corps entier

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35.240.15	Identifikacijske kartice. Čipne kartice. Biometrija	Identification cards. Chip cards. Biometrics

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TECHNICAL SPECIFICATION
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ICS 35.240.15

English Version

Full body photography

Photographie du corps entier

Ganzköperfotografie

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (CEN/TS 17051:2017) has been prepared by Technical Committee CEN/TC 224 “Personal identification, electronic signature and cards and their related systems and operations”, the secretariat of which is held by AFNOR.

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Introduction

Most countries around the world are provided with identification systems for law enforcement and border control. Many of these systems are not limited to face recognition purposes. To be consistent in such deployments and processes, technical documents, guidelines and best practice recommendations are being developed by different groups. However, these documents are primarily focused on travel document systems and the technical and operational issues to be considered when planning and deploying such systems in Europe. Full body recognition is the biometric mode used as a secondary mode in addition to face recognition or for forensic purposes. Face recognition is the biometric mode suited to the practicalities of travel documents.

There is little guidance covering the full body imaging for cross-border interoperability or law enforcement services. There is a need for guidance for the use of high quality digital cameras and video surveillance devices for full body photography. This Technical Specification is not restricted to body image data. For example, it may be possible to extract iris images in some scenarios where high resolution cameras are used or body silhouette data for gait recognition when low resolution cameras are in use.

1 Scope

This Technical Specification is intended to provide a Full Body Image Format for pattern recognition services and applications requiring the exchange of full body image data. Its typical applications include:

a) human examination of high resolution full body images;

b) human verification of identity based on full body images;

c) computer automated full body identification;

d) computer automated full body verification.

To enable applications on a wide variety of devices, including devices that have limited data storage, and to improve image recognition accuracy, ISO/IEC 19794 standards are followed regarding not only 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.).

A specific biometric profile for cross-border interoperability is required for full body photographs. Full body photography standardization is required to get good quality database images for identification and verification using video surveillance and other similar system generated images. At the moment, border guards take full body photographs using local practices for enrolment, verification, identification and watch list identification.

ISO 22311:2012 [10] specifies a common output file format that can be extracted from the video-surveillance contents collection systems to perform necessary processing. ISO/IEC 30137 [8] specifies data formats for storing, recording and transmitting biometric information acquired via a video surveillance system. The EN 62676 series [11] defines video surveillance systems for use in security applications.

The purpose of this Technical Specification is to provide expert guidance (i.e. best practices) for the photography of full body, especially when the resulting images are to be used for purposes of identification and verification, either by automated recognition systems or by human viewers.

2 Normative reference

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.

EN 61966-8, *Multimedia systems and equipment - Colour measurement and management - Part 8: Multimedia colour scanners*

ISO 12233, *Photography — Electronic still picture imaging — Resolution and spatial frequency responses*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
biometric verification
process of confirming a biometric claim through biometric comparison

[SOURCE: ISO/IEC 2382-37]

3.2
biometric identification
process of searching against a biometric enrolment database to find and return the biometric reference identifier(s) attributable to a single individual

[SOURCE: ISO/IEC 2382-37]

3.3
CCTV
closed-circuit television
video surveillance
system that sends television signals to a limited number of screens or other receivers, and is often used in shops and public places to prevent crime

3.4
4K
originally described digital cinema (4096 × 2160 px)

Note 1 to entry: Digital Cinema resolution is not often used in television, the term “4K” or “4K Ultra HD” (3840 × 2160 px) was invented to achieve a 16 × 9 aspect ratio.

4 Abbreviated terms

ASN.1	Abstract Syntax Notation number One
CCTV	closed-circuit television
CEN	European Committee for Standardization
CIE	International Commission on Illumination (Commission Internationale de l'Eclairage)
DCI	Digital Cinema Initiatives consortium
DSLR	Digital single-lens reflex camera
EU	European Union
ICAO	International Civil Aviation Organization
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
JTC	Joint Technical Committee
MP4	digital multimedia file format used to store video and audio
NIST	National Institute of Standards and Technology
RGB	Red Green Blue colour representation
SD	Standard-definition television
WG	Working Group

5 Conformance

Conformity with this document requires compliance with the record format specification defined in Clause 6.

6 Data structures

6.1 Body Tree concept

A full body photography system produces photographs for human examination and for automated full body verification and identification.

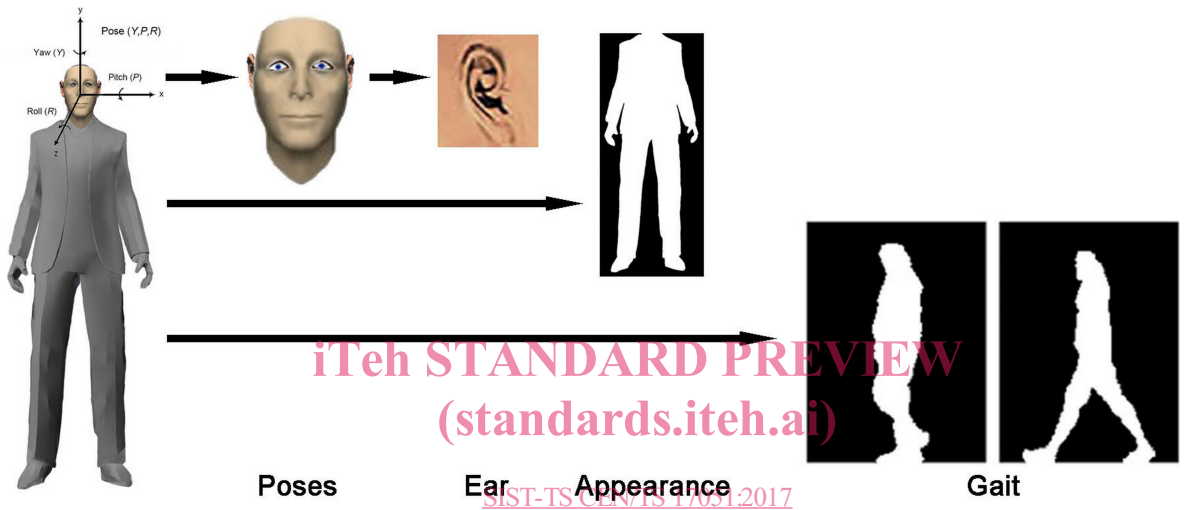

Figure 1 — Example of biometric features for various processes provided by full body images and videos

Standard poses help the parsing of the body tree. Parsing can be done using methods utilizing algorithms which process the human body as an assembly of parts. Segmentation can be used as a pre-processing step.

6.2 Camera images

It is recommended to take pictures using vertical camera orientation. The original camera image is saved whenever possible without any additional cropping, rotation or other image processing. The full body pose shall be between 60 % and 90 % of the vertical length of the image. The whole body width shall be visible. The margin area around the human figure shall be at least 5 % of the image height.

To satisfy the requirements for minimum image size, the normative practice shall be to fill any undefined set of pixels with sRGB middle grey (128, 128, 128). This process does not refer to the filling of the background along the body contour line, which shall be avoided in full body images. The middle grey is a tone that is perceptually about halfway between black and white on a lightness scale. The use of grey is based on the assumption that human viewer is less distracted by the image fringe area when grey is used if compared to white or black borders. In the sRGB colour space used widely in monitors and photography, CIELAB middle grey is equivalent to 46,6 % brightness. Middle grey is typically defined as 18 % reflectance in visible light.

For a level-51 image capture profile, the minimum number of pixels in the digital image shall be 2400 pixels in the horizontal direction by 3200 pixels in the vertical direction. Off-the-shelf 8 megapixel

digital cameras satisfy this requirement. Most robust mobile phones are capable of taking level 51 or higher level images.

Level 50 image size is compatible with 4K video format as shown in Table 1. 4K is typically a landscape format when both level-50 and level-51/52 has been defined as portrait formats.

Image orientation is generally not a problem as JPEG Exif (Exchangeable image file format) metadata shows the camera orientation. MPEG-4 AVC/H.264 (ISO/IEC 14496-10 MPEG-4 Part 10, Advanced Video Coding) implementations for video coding allow frame extraction for biometric sample comparison processing to take place. MPEG-4 Part 14 or MP4 is a digital multimedia format most commonly used to store video and audio. MPEG-4 Part 14 (formally ISO/IEC 14496-14:2003) is a standard specified as a part of MPEG-4. MP4 is the related file format.

Table 1 — Comparison of image formats

Image format name (details)	resolution	aspect ratio	pixels
Level-51/52 (profile) *	2400 × 3200	1:1.33 (3:4)	7,680,000
Level-50 (profile) *	3300 × 4400	1:1.33 (3:4)	14,520,000
DCI 4K (native resolution)	4096 × 2160	1,90:1 (19:10)	8,847,360

*ANSI/NIST has defined best practices for mugshots. These definitions are used as a baseline also for full body images. For an ANSI/NIST level-50 [4] image capture profile, the minimum number of pixels in the digital image shall be 3300 pixels in the horizontal direction by 4400 pixels in the vertical direction. Off-the-shelf 15 (or more) megapixel digital cameras satisfy this requirement.

6.3 Metadata

6.3.1 General

It is required to include the pose angle as descriptive metadata. Pose angles are defined relative to the frontal pose of the subject. See Figure 2 for the definition of the pose angle.

6.3.2 Pose Angle – Yaw

The yaw angle Y is the rotation in degrees about the y-axis (vertical axis) shown in Figure 2. Frontal poses have a yaw angle of 0 degrees. Positive angles represent faces looking to their left (a counter-clockwise rotation around the y-axis).

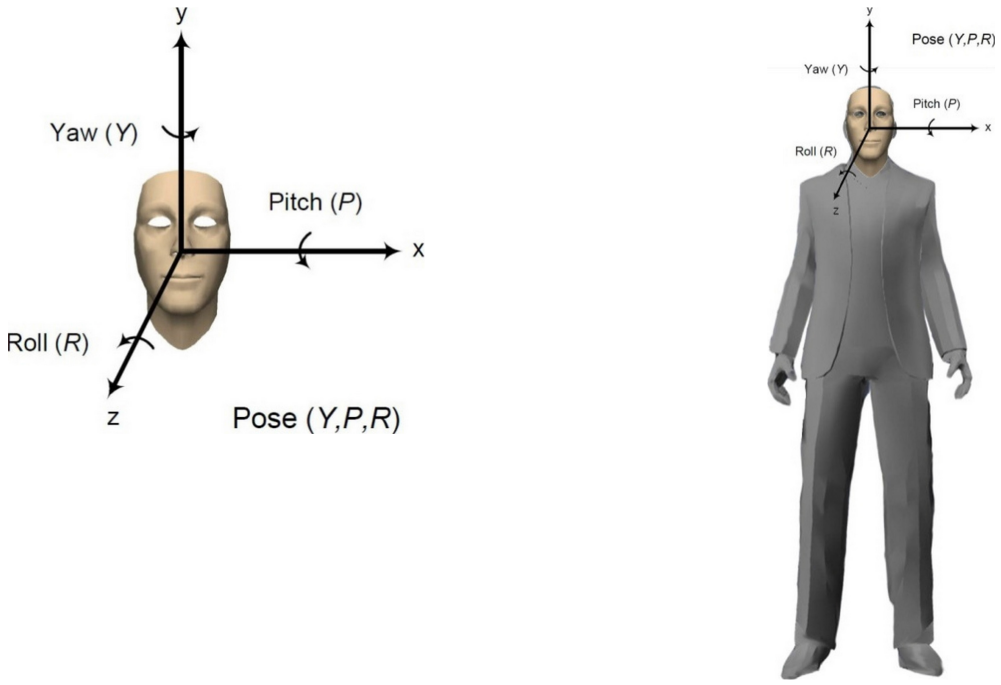

Figure 2 —Definition of the yaw body pose angle. Pitch and Roll are not in use for the body

(0,0,0) (+45,0,0) (+90,0,0) (+135,0,0) (+180,0,0) (−135,0,0) (−90,0,0) (−45,0,0)

Figure 3 — Examples of pose angles applied for full body images in the same way as for facial images

6.3.3 Pose angle encoding

Information exchange file in XML or ASN.1 format should contain proper pose angle data. Following XML definition is similar to the Figure 3 facial image (−45,0,0) pose angle, image on the right:

```
< BodyInformation >
    < PoseAngle >
        < Yaw Uncertainty = ”0” > −45 < /Yaw >
    < /PoseAngle >
< /BodyInformation >
```

Binary encoding enables the XML or ASN.1 usage in bandwidth or storage constrained environments.