eGov.BIDS:03
Version: 1.0
March, 2011

Iris Image Data Standard

For
e-Governance Applications in India

Government of India
Department of Information Technology
Ministry of Communications and Information Technology
New Delhi – 110 003

CONTENTS

1. Introduction

In the recent years, Iris recognition has emerged as an important and powerful Biometric characteristic. The Indian Government anticipates that, iris biometric would be deployed for identification and verification in e-Governance applications where identity management is a major issue.

In order to capture the Iris image, special devices are available in the market providing different formats for image acquisition and storage. Also many algorithms have been developed by vendors to extract the features of iris images to decide on a match during verification / identification stage. To ensure interoperability among the e-Governance applications requiring iris recognition, it is necessary to standardize iris specifications including the storage and transmission formats.

Thus, to allow the application developer maximum flexibility in usage of algorithms and devices from different vendors and to address interoperability requirements, the iris image must be captured and stored as per standard specifications included in this document

The Government of India would broadly adopt ISO 19794-6:2005(E) Iris Image Data Standard, by tailoring the standard specifications to meet specific needs of civilian e-Governance applications in Indian context and as per the GoI Policy on Open Standards.

1.1 Scope

This Standard specifies Iris image data specifications, acquisition, storage and transmission formats. It also includes best practices for implementation of the Standard specifications in different categories of e-Governance applications, based on the volume of data and verification/ accuracy requirements. This version of the Standard **does not** include features extraction & matching specifications.

This standard is structured as follows:

Sections 1 to 4 cover Scope, Objectives & a Brief description, Target audience, Type of Enforcement Category, Definitions and Acronyms. The Standard specifications are mentioned in Section 5. Section 6 includes Best practices for various categories of e-Governance applications.

1.2 Objective/Purpose

The purpose of this document is to standardize specifications of Iris image data, acquisition and storage formats and its transmission formats. This is to ensure interoperability during archival and exchange of Iris image data among various e-Governance applications and also to ensure interoperability among the various Iris image capturing devices.

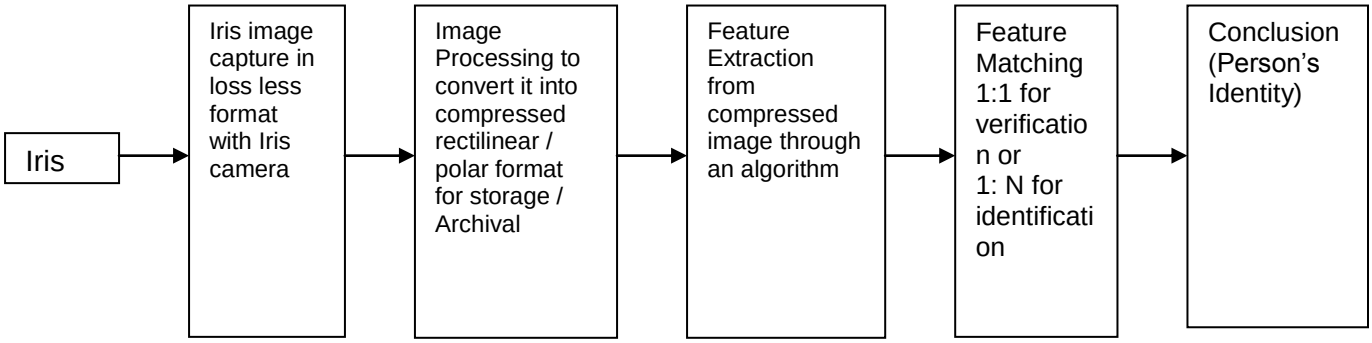
1.3 Applicability

This Standard would be applicable to all e-Governance applications in India as per the Government's Policy on Open Standards.

1.4 Description

There are two types of interchange formats to represent the Iris image data. The first is a rectilinear (rectangular or Cartesian) image storage format that specifies raw, uncompressed or compressed intensity values. The second format is based on polar image specification with specific pre processing and segmentation steps, producing a compact data structure containing only Iris information.

The Iris recognition concept and industry are still relatively new, so a need for continued research and testing remains. The Iris recognition requires following steps:



The Indian e-Governance applications will deal with Iris image data during multiple stages. Some of these stages are given below:

a. Image acquisition, its processing and its storage in the **Enrolment stage**

b. Image acquisition and storage for off line / on line **verification** of Iris image data in 1:1 matching stage

c. Image acquisition and storage for the purpose of **identification** in 1:N matching stage

d. **Transmission** of Iris image data to other e-Governance applications

e. **Extraction of features** of Iris images (enrolment or recognition stage), their storage, and matching (Not covered in the present version of the standard).

This version of the standard is applicable for the stages a to d.

2. Target Audience

- All E-Governance projects of the Central and State Government or any other organization which need to comply with this Standard for the purpose of interoperability
- All those e-Governance projects where identity management is an important issue e.g., cyber security, defence, counter terrorism etc.
- Vendors of Iris image acquisition devices or software developers for conversion of images as per the Standardised format
- All Integrators/Service providers for Indian e-Governance applications.

3. Type of Standard Document:

Type: Standard Specification and Best Practices

Enforcement Category: Standard specifications: Mandatory

Best practices : Recommended

4. Definitions and Acronyms

Refer Annexure I

5. Specification of Iris Image Data Standard

Indian e-Governance Standard will adopt ISO-19794-6 Iris Image Data Standard as Indian Standard. However for this version of the Standard the prescriptive values, exceptions, deviations and additions, if any are listed in the following three sections as follows

a. Iris image Specifications

b. Storage and Transmission Specifications

c. Iris Record Format which includes CBEFF header.

5.1 Iris Image Specifications

5. 1.1 Iris Image Type

The interchange format type of the Iris images that is defined in this standard is for **rectilinear images** only.
If the image is collected by a camera that captures only one eye at a time and is stored using a rectilinear coordinate system no specific pre-processing is required.

Cameras that capture images of both eyes simultaneously may use the following processing steps to calculate the rotation angle of the Iris images**.**

5.1.1.1 Pre-processing to calculate rotation angle

Before compression, the Iris image will have to be pre-processed to calculate rotation angle.

Refer section 6.3.1 of ISO 19794-6:2005(E) for rotation angle calculation for rectilinear images.

5.1.1.2 Rectilinear Image Rotation Uncertainty

Refer section 6.3.1.3 of ISO 19794-6:2005(E).

5.1.2 Number of Eyes

For Enrolment - Two eyes

For Verification / Authentication: One / two eyes depending upon the sensitivity of application

5.1.3 Iris Diameter

As per ISO 19794-6:2005(E) medium and higher quality images are only acceptable,. Hence for this Standard, minimum acceptable Iris diameter will be150 pixels

5.1.4 Image Margin Segmentation

50% left and right of Iris diameter

25% top and bottom of Iris diameter

5.1.5 Colour and Pixel Depth

The iris images shall be captured and stored in grey scale with pixel depth 8bits/pixel.

5.1.6 Illumination

The eye should be illuminated using near-infrared light with wavelength between 700 and 900 nanometres' (nm) approximately.

5.1.7 Image Acquisition Format

Lossless format (Raw/PNG/Lossless JPEG 2000)

5.2 Storage Specifications

Since there is no Standard template available to store extracted Iris image data features, original Iris images would be stored in specified format from which features can be extracted and used for matching.

The data format specifications for storage / archival should adhere to the Policy on Open Standards to ensure interoperability, long-term availability, vendor independence and optimal utilization of storage space, without affecting the quality of image.

5.2.1 Format for Storage / Archival

Iris image storage and archival shall be done in PNG format.

Note: One additional value for bytes 22-23 to be used for Image format in Iris Record Header (refer table 2 of ISO/ IEC 19794-6:2005(E)) to incorporate PNG format with respect to this standard, which is as follows:

IMAGE_FORMAT_MONO_PNG=**18 (0X0012)**

5.2.2 Iris image Transmission Format

5.2.2.1 Normal Bandwidth

PNG

5.2.2.2 Restricted bandwidth

JPEG 2000 format with compression ratio up to 1:6

5.3 Iris Image Record Format

This is a format to store Biometric data within a Biometric data record to cater to interoperability requirements of the biometric data taken by various image acquisition devices. This format also stores specific information related to the Iris images.

CBEFF (Common Biometric Exchange Formats Framework) described in ISO 19794-6 will be adopted.

As per ISO 19785-1, ISO 19794- 6, the Common Biometric Exchange Format Framework (CBEFF) is structured as follows:

- **SBH (Standard Biometric Header) as per ISO 19785-1**

- **BDB (Biometric Data Block) for rectilinear Iris Image** (Extracted from ISO 19794-6:2005(E))

Iris Record Header:

Iris Biometric Sub type Header(s)
(There can be either **one** sub type header for left **or** right eye or two sub type headers - for left **and** right eye)

- **Iris Image Header(s)**
(There can be multiple images of an eye, and each eye image will have a separate iris image header)

- Image Data corresponding to each Iris Image Header

Certain values in the Iris image record format would be static as per the Standard. Certain values will be dynamic in nature.

CBEFF Signature (This is optional as it is used for encrypting & digitally signing the data wherever required)

Refer section 6.2 for details and sample values of Iris Record Header, Iris Biometric Sub type Header and Iris Image Header.

6. Best Practices

The e-Governance Standards are intended for a variety of applications with varying degree of sensitivity and volume requirements. The specifications in Section 5 are broad in nature to cater to all types of e-Governance applications. This Section covers the best practices suitable for various categories of applications

6.1 Best Practices for Implementation of Iris Image Standard

6.1.1 Device Specifications	
	For the purpose of acquisition of Iris image at the time of enrolment, verification or identification, the Iris scanner / camera devices need to be used. There is a need to standardize device specifications to ensure interoperability of Iris images of the same person taken at different stages. Device specifications include scan resolution, pixel depth minimum exposure time, image sampling frequency etc. The specifications are tailored from the ISO 19794-6:2005(E) standard to meet the civilian e-Governance application requirements.
Device Type	Any of the following devices can be used 1. Stationary 2. Hand held 3. Hand held with alignment aid
Exposure time	<33 milliseconds
Auto features requirement	The device should have auto focus, auto capture features, horizontal / vertical positioning tolerance. The device should have automatic alert system, if the quality is in sufficient.
Illumination / Imaging wavelength	700 - 900 nano meters, depending upon application sensitivity requirement
Scan Type and Image evaluation rate.	Continuous scanning with image sampling rate of at least 5 frames per second
Signal to noise ratio	As per ISO 19794-6, it should not be less than 40 db

<table>
<tr><td>Focus quality</td><td>Images should have focus quality, adequate to preserve the specified spatial resolution (minimum 12.4 pixels per mm).</td></tr>
<tr><td>Spatial (Optical) Resolution</td><td>Minimum 3 Line Pair (lp)/mm at 60% or higher contrast for Medium image quality level (Ref. 6.1.2 below)</td></tr>
<tr><td>Pixel Resolution</td><td>Minimum 12.5 pixels per mm</td></tr>
<tr><td>Pixel Depth</td><td>8 bits per pixel for monochrome image intensity depth.</td></tr>
<tr><td>Pixel Aspect Ratio</td><td>Pixel aspect ratio would be 1:1.</td></tr>
<tr><td></td><td>Device with capability to capture both the eyes Iris image simultaneously to be preferred.

Operational Instruction:
Operator to adjust camera instead of enrollee positioning himself / herself at right distance / right posture</td></tr>
<tr><td colspan="2">6.1.2 Iris Image Specifications with respect to quality requirements</td></tr>
<tr><td>Refer Section 5.1 for Iris Image specifications</td><td>Image quality level 51 or above is recommended for e-Governance applications in India, as prescribed in Annexure – A, in ISO 19794-6.

Following table provides details about medium and high quality Iris image quality parameters.

<table>
<tr><th>Image Quality Level</th><th>Image Quality Value</th><th>Expected Iris Diameter, (Pixels)</th><th>Minimum Pixel Resolution (Pixel per mm)</th><th>Optical Resolution at 60% modulation (lp/mm)</th><th>Comment</th></tr>
<tr><td>Medium</td><td>51-75</td><td>150-199</td><td>12.5</td><td>3.0</td><td>Acceptable Quality</td></tr>
<tr><td>High</td><td>76-100</td><td>200 or more</td><td>16.7</td><td>4.0</td><td>Good Quality</td></tr>
</table>
For enrolment of the Iris image, high quality image is recommended however the choice of the medium or high quality of the image will be as per application’s accuracy requirement.

Blurry, out of focus and noisy iris images are not acceptable.

Successive multiple captured Iris images, should be compared with each other by using appropriate matching algorithm for ensuring good quality Iris image.”</td></tr>
</table>

6.2 Rectilinear Data Record Format

In the following tables, values in shaded rows are variable in nature and need to be entered on case to case basis. Values in other rows are static in nature as per the Standard specifications, and should not to be altered.

a. Values in **shaded rows** are variable in nature and need to be entered on a case - to case basis.

b. Values in other rows are fixed in nature as per ISO 19794-6:2005(E) specifications and should not to be altered

6.2.1 Sample of Rectilinear Iris Image Data record - Single Eye and its Single Image

Example is for Single Left eye and its Single Image

Table 1 – Rectilinear Iris Image Biometric data block - image (Extracted from table B.1 of ISO 19794-6:2005(E))

Bytes	Value	Description
Iris Record Header		
1-4	49 49 52 00	Format ID “IIR”
5-8	XX XX XX 00	Format version
9-12	00 00 2E 91	Length of entire record, 11921 bytes
13-14	XX XX	Capture device id
15	01	No. of Iris biometric sub types=1
16-17	00 2D	Record header length – 0x2D = 45 bytes
18-19	00 16	Image property bitfield =0x16 Horizontal orientation = Orientation_FLIPPED Vertical orientation=ORIENTATION_BASE Scan type = SCAN_TYPE_PROGRESSIVE Iris occlusions=IROCC_UNDEF Occlusions filling = IROCC_ZEROFILL Boundary extraction = IRBNDY_UNDEF
20-21	00 BE	Expected Iris diameter = 190 pixels
22-23	00 12	Image format = 0x0012 = IMAGEFORMAT_MONO-PNG
24-25	00 00	Image width = 00 = WIDTH_UNDEF
26-27	00 00	Image height= 00 = HEIGHT_UNDEF
28	08	Image intensity depth = 0x08 =8 bits
29	00	Transformation to polar image = TRANS_UNDEF
30-45	4D 30 30 63 30 34 66 31	Device unique identifier (DUID), 16 bytes, “M00c04f1b7ecf”

	62 37 65 63 66 00 00 00	
Iris Biometric Sub type Header (for Left eye)		
46	02	Biometric subtype identifier = 0x02 = EYE_LEFT
47-48	00 01	Number of iris images =1
Iris Image Header (for Left Eye)		
49-50	00 01	Image sequence number = 1
51	40	Image quality medium = 0x40 = 64 decimal
52-53	FF FF	Rotation angle = ROT_ANGLE_UNDEF=0xFFFF
54-55	FF FF	Rotation uncertainty = ROT_UNCERTAIN_UNDEF=0XFFFF
56-59	00 00 2E 56	Size of image data, bytes = 11, 862 bytes = 0x00002E56
Iris Image data (for Left eye)		
60-11921	Xx xx xx xx Xx xx xx xx Xx xx xx xx Xx xx xx xx …… ……	Left eye Image data, 11 862 bytes

Table 2 – CBEFF header for sample Rectilinear Image data record -Single Eye (left), and its Single Image

(Extracted from Table B.2 of ISO 19794-6:2005(E))

CBEFF Field	Type	Content	Description
CBEFF_BDB_quality	Unsigned short	Iris Image quality	Image quality value = 0x40 = 64 decimal (medium quality)
CBEFF_BDB_format_owner	Unsigned short	Format owner	0x0101
CBEFF_BDB_format_type	Unsigned short	Format type	Type = 0x0009 (rectilinear)
CBEFF_BDB_biometric_type	Various	Biometric type code	(0x10) Iris type code specified in patron format
CBEFF_BDB_biometric_subtype 0x0 – eye not specified 0x1 for left eye 0x2 for right eye	Unsigned short	Right or left eye	Biometric subtype = 0x1 for left eye

6.2.2 Sample of Rectilinear Iris Image Data record - Multiple Eyes, Multiple Images

Example is for Multiple Eyes (Right and Left) and their Multiple Images (2 images of each)

Table 3: Rectilinear image biometric data block

(Extracted from table – B.3 of ISO 19794-6:2005(E))

Bytes	Value	Description
Iris Record Header		
1-4	49 49 52 00	Format ID “IIR”
5-8	XX XX XX 00	Format version
9-12	00 00 CB F4	Length of entire record=0x0000CC04 = 52212 bytes
13-14	XX XX	Capture device id
15	01	No. of Iris biometric sub types=2
16-17	00 2D	Record header length – 0x2D = 45 bytes
18-19	00 16	Image property bitfield =0x16 Horizontal orientation = Orientation_FLIPPED Vertical orientation=ORIENTATION_BASE Scan type = SCAN_TYPE_PROGRESSIVE Iris occlusions=IROCC_UNDEF Occlusions filling = IROCC_ZEROFILL Boundary extraction = IRBNDY_UNDEF
20-21	00 BE	Expected Iris diameter = 150 pixels
22-23	00 12	IMAGEFORMAT_MONO-PNG -18(0x0012)
24-25	00 00	Image width = 00 = WIDTH_UNDEF
26-27	00 00	Image height= 00 = HEIGHT_UNDEF
28	08	Image intensity depth = 0x08 =8 bits
29	00	Transformation to polar image = TRANS_UNDEF
30-45	4D 30 30 63 30 34 66 31 62 37 65 63 66 00 00 00	Device unique identifier (DUID), 16 bytes, “M00c04f1b7ecf”
Iris Biometric Sub type Header for Right eye		
46	01	Biometric subtype identifier = 0x01 = EYE_RIGHT
47-48	00 02	Number of iris images, this biometric type=2
Iris Image Header (for 1st image of Right eye)		
49-50	00 01	Image sequence number = 1
51	40	Image quality medium = 0x40 = 64 decimal

52-53	FF FF	Rotation angle = ROT_ANGLE_UNDEF=0xFFFF
54-55	FF FF	Rotation uncertainty = ROT_UNCERTAIN_UNDEF=0XFFFF
56-59	00 00 2E 56	Size of image data, bytes = 11, 862 bytes = 0x00002E56
Iris Image Data (for 1st image of Right eye)		
60-11921	Xx xx xx xx Xx xx xx xx Xx xx xx xx Xx xx xx xx …… ……	Ist Image data of right eye , 11 862 bytes
Iris Image Header (for 2nd image of Right eye)		
11,922-11923	00 02	Image sequence number=2
11924	40	Image quality medium = 0x40=64 decimal
11925-11926	FF FF	Rotation angle = ROT_ANGLE_UNDEF = 0xFFFF
11927-11928	FF FF	Rotation uncertainty=ROT_UNCERTAIN_UNDEF=oxFFFF
11929-11932	00 00 37 21	Size of image data, bytes= 14113 bytes= 0x00003721
Iris Image Data (for 2nd image of Right eye)		
11933-26045	Xx xx xx xx Xx xx xx xx Xx xx xx xx Xx xx xx xx …… ……	2nd Image Data of right eye-14113 bytes
Iris Biometric Subtype Header for Left eye		
26046	02	Biometric subtype identifier = 0x02 = EYE_LEFT
26047-26048	00 02	Number of iris images, this biometric type=2
Iris Image Header (for 1st image of Left eye)		
26049-26050	00 01	Image sequence number = 1
26051	40	Image quality medium = 0x40 = 64 decimal
26052-26053	FF FF	Rotation angle = ROT_ANGLE_UNDEF=0xFFFF
26054-26055	FF FF	Rotation uncertainty = ROT_UNCERTAIN_UNDEF=0XFFFF
26056-26059	00 00 33 CE	Size of image data, bytes = 13, 262 bytes = 0x000033CE
Iris Image Data (for 1st image of Left eye)		
26060-39321	Xx xx xx xx Xx xx xx xx Xx xx xx xx Xx xx xx xx ……	1st Image data of left eye, 13262 bytes

	……	
Iris Image Header (for 2nd image of Left eye)		
39322-39323	00 02	Image sequence number=2
39324	4B	Image quality medium = 0x4B=75 decimal
39325-39326	FF FF	Rotation angle = ROT_ANGLE_UNDEF = 0xFFFF
39327-39328	FF FF	Rotation uncertainty=ROT_UNCERTAIN_UNDEF=oxFFFF
39329-39332	00 00 32 50	Size of image data, bytes= 12880 bytes= 0x00003250
Iris Image Data (for 2nd image of Left eye)		
39333-52212	Xx xx xx xx Xx xx xx xx Xx xx xx xx Xx xx xx xx …… ……	2nd Image Data of left eye- 12880 bytes

Table 4: CBEFF Header for Rectilinear Image Data Record - Multiple Eyes (Right & Left) , Multiple Images (2 images each)

Extracted from table – B.4 of ISO 19794-6:2005(E)

CBEFF Field	Type	Content	Description
CBEFF_BDB_quality	Unsigned short	Iris Image quality	Image quality value = 0x40 = 64 decimal (medium quality)
CBEFF_BDB_format_owner	Unsigned short	Format owner	0x0101
CBEFF_BDB_format_type	Unsigned short	Format type	Type = 0x0009 (rectilinear)
CBEFF_BDB_biometric_type	Various	Biometric type code	0x10(Iris type code specified in patron format)
CBEFF_BDB_biometric_subtype 0x0 – eye not specified 0x1 for left eye 0x2 for right eye 0x3 for Right and left eye	Unsigned short	Right or left eye	Biometric subtype = 0x3 (Left and Right both)

7. Annexure

Annexure –1 Definition and Acronyms

Acquisition

Process of accepting a Biometric sample(s) in accordance with the defined policy that is deemed suitable for creating a biometric reference or a biometric probe.

Note: In addition to capture, acquisition may include segmentation, biometrics feature extraction, quality control and other pre-processing steps.

Biometrics
[Automated] recognition of [living] persons based on observation of behavioural and biological (anatomical and physiological) characteristics.

Biometric system

An automated system capable of:
1. Capturing a biometric sample from an end user;
2. Extracting biometric data from that sample;
3. Comparing the biometric data with that contained in one or more reference templates;
4. Deciding how well they match; and
5. Indicating whether or not an identification or verification of identity has been achieved.

Biometric data

The data representing a Biometric characteristic
Example: sensor data, image data, behavioural data, feature data

NOTE For the purpose of this document, biometric data refers to Iris Image data.

Biometric Data Block (BDB)

Block of data with a defined format that contains one or more biometric samples or biometric templates

Biometric Information Record (BIR)

Data structure containing one or more BDBs together with information identifying the BDB formats, and possibly further information such as whether the BDB is encrypted.

Biometric sample

Biometric Image Data obtained from a biometric device, either directly or after processing.

Biometric Template

Biometric sample or combination of biometric samples that is suitable for storage as a reference for future comparison

Capture

Capture is the process of taking a biometric sample from an end user.

Capture device type ID

The capture device type ID shall be a unique identifier for the type of capture device deployed to acquire a biometric sample. The capture device type ID shall be recorded in two bytes. A value of all zeros indicates that the capture device type ID is unreported. The value "unreported" may not be allowable in some applications. The value field is determined by the vendor possibly depending on requirements for the respective application

Enrolment

In enrolment, a transaction by a subject is processed by the system in order to generate and store an enrolment template for that individual.

Enrolment typically involves:

- Sample acquisition;
- Segmentation and feature extraction;
- Quality checks, (which may reject the sample/features as being unsuitable for creating a template, and require acquisition of further samples);
- Template creation (which may require features from multiple samples), possible conversion into a biometric
- Data interchange format and storage;
- Test verification or identification attempts to ensure that the resulting enrolment is usable;
- Should the initial enrolment be deemed unsatisfactory, repeated enrolment attempts may be allowed (dependent on the enrolment policy).

NOTE: A accept or reject decision is then based on whether this score exceeds the given threshold.

Grey scale

Continuous-tone image that has one component, which is luminance

Identification

In identification, a transaction by a subject is processed by the system in order to find an identifier of the subject's enrolment. Identification provides a candidate list of identifiers that may be empty or contain only one identifier. Identification is considered correct when the subject is enrolled, and an identifier for their enrolments in the candidate list. The identification is considered to be erroneous if either an enrolled subject's identifier is not in the resulting candidate list (false-negative identification error), or if a transaction by a non-enrolled subject produces a non-empty candidate list (false-positive identification error).

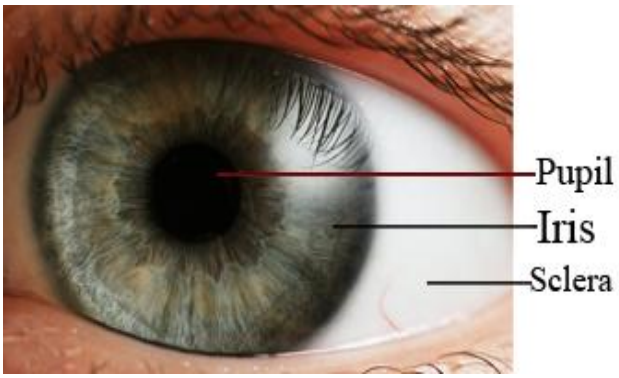
Identification typically involves:

- Sample acquisition;
- Segmentation and feature extraction;
- Quality checks (which may reject the sample/features as being unsuitable for comparison, and require acquisition of further samples);
- comparison against some or all templates in the enrolment database, producing a similarity score for each comparison
- Judgment on whether each matched template is a potential candidate identifier for the user, based on whether the similarity score exceeds a threshold and/or is among the highest scores returned, producing a candidate list;
- An identification decision based on the candidate lists from one or more attempts, as dictated by the decision policy.

Intermediate biometric sample
Biometric sample obtained by processing an acquired biometric sample, intended for further processing

Iris

The Iris is a muscle within the eye that regulates the size of the pupil, controlling the amount of light that enters the eye. "Eye colour" is the colour of the Iris, which can be green, blue, or brown. In some cases it can be hazel (light brown) or grey. It is the area between sclera and pupil. The texture, and patterns of each person's Iris are as unique as a fingerprint



Limbus

Outer boundary of the Iris where it is joined to the sclera.

Live Capture

The process of capturing a biometric sample by an interaction between an end user and a biometric system.

Line-pair (lp)

The measure of spatial feature content, which when associated with a fixed distance measurement provides an estimate of spatial frequency

Matching

The process of comparing biometric data with a previously stored biometric template and scoring the level of similarity.

Policy

Course or principle of action adopted or proposed by an organization or individual

Pupil

The pupil is opening in the centre of the eye that serves as a variable light aperture and defines the inner boundary of the Iris (as defined in the figure 1 above).

Rectilinear

Photography (of a wide-angle lens) corrected as much as possible, so that straight lines in the subject appear straight in the image

Resolution

Number of pixels per unit length
NOTE: Pixels per centimetre (ppcm) or pixels per inch (ppi) will be used in this part of Biometrics Indian e-Governance standard as the units of resolution.

Sclera

The sclera is the white, tough wall of the eye. It along with internal fluid pressure keeps the eye shape and protects its delicate internal parts.

Segmentation

Segmentation refers to the process of partitioning a digital image into multiple segments (sets of pixels). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easy to analyze

Standard Biometric Header

Provides encodings for abstract values of CBEFF data elements and enables an application to obtain knowledge about the format and other properties (such as creation date) of the BDBs that are contained in the BIR without having to process the BDBs themselves

NOTE: BDBs are not required to be (and generally are not) self-identifying. Identification of BDB formats is provided in CBEFF data elements.

Verify

Make sure or demonstrate that something is true, accurate or justified.

Verification

In verification, a transaction by a subject is processed by the system in order to verify a positive specific claim about the subject's enrolment (e.g. "I am enrolled as subject X"). Verification will either accept or reject the claim. The verification decision outcome is considered to be

erroneous if either a false claim is accepted (false accept) or a true claim is rejected (false reject). Note that some biometric systems will allow a single end-user to enrol more than one instance of a biometric characteristic (for example, an Iris system may allow end-users to enrol both Iris images, while a Iris system may have end-users enrol one or two eyes image as backup for future reference).

Verification typically involves:

- sample acquisition,
- segmentation and feature extraction,
- quality checks (which may reject the sample/features as being unsuitable for comparison, and require acquisition of further samples),
- comparison of the sample features against the template for the claimed identity producing a similarity score,
- Judgment on whether the sample features match the template based on whether the similarity score exceeds a threshold,
- A verification decision based on the match result of one or more attempts as dictated by the decision policy.

EXAMPLE: In a verification system allowing up to three attempts to be matched to an enrolled template, a false rejection will result with any combination of failures-to-acquire and false non-matches over three attempts. A false acceptance will result if a sample is acquired and falsely matched to the enrolled template for the claimed identity on any of three attempts.

Abbreviated Terms

API	Application Programming Interface
BDB	Biometric Data Block
BIR	Biometric Information Record
CBEFF	Common Biometric Exchange Formats Framework
PPCM	pixels per centimetre
PPI	pixels per inch
SBH	Standard Biometric Header
SB	Security Block
PNG	Portable Network Graphics

8. References

Normative References:

[1] ISO 19794-6 **:2005(E)** Information Technology – Biometric data interchange formats – Part 6 Iris image data.

[2] ISO/IEC 19785-1, Information technology – Common biometric exchange formats framework – Part 1: Data element Specification.

[3] ISO/IEC 19785-3, Information Technology - Patron format specifications

[4] MTR 04B0000022 (Mitre Technical Report), Margaret Lepley, Profile for 1000 Iris compression, Version 1.1, April 2004 Available at http://www.mitre.org/work/tech_papers/tech_papers_04/lepley_iris/lepley_iris.pdf

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