Enhancement to Existing Standard

December 5, 2005

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Compression Methods, Codes, & Uses

METHOD	BIN CODE	ASCII CODE	NOTES*
Binary FP & Sign (UNC)	0	---	Image Packed 8 pix/byte Types: 5-6, 8
Binary FP & Sign (CMP)	1	---	ANSI/EIA-538 -1988 Facs >Lossless – Types 5-6,8
Gray & Color Img (CMP)	---	JPEGL	Lossless JPEG – Types: 10, 13-17**
Gray & Color Img (UNC)	0	NONE	Types: 3 & 4 Types: 10, 13-17

Compression Methods, Codes, & Uses(cont)

METHOD	BIN	ASCII	NOTES*
Gray Finger/Palm Prints (CMP)	1	WSQ20	Lossy *** WSQ Type: 4 Types: 14, 15 (500ppi)
Gray & Color Images (CMP)	2	JPEGB	Lossy JPEG Type: 4(500ppi) Types: 14-15 (500ppi) Types: 10, 16-17
Gray & Color Images (CMP)	---	JP2	Lossy JPEG 2000 Types 10, 14-17
Gray & Color Images (UNC)	---	JP2L	Lossless JPEG 2000 Types 10,14-17

Finger Minutiae Harmonization with M1

- Purpose: Facilitate the conversion of minutiae information between applications using both formats
- Optional use of M1 block of fields (vendor type)
- Minutiae placement to be in agreement with ANSI INCITS 378-2004 – tighter position than ANSI/NIST
- Cartesian coordinate system used
- Origin at upper left corner of image
- Minutiae position expressed in pixels rather than mm
- Angle reported in 2 degree increments
- Angle differs by 180 degrees from ANSI/NIST

Block of Minutiae Fields Required for M1 Harmonization

- Fields 9.001-9.004 required (Format = “U”)
- Field *9.121 - CBEFF* Information
  - Format Owner Assigned by IBIA “27” (0x1b)
  - Format Type “513” (0x0201) minutiae only
  - Owner of encoding equipment
- Field 9.122 – Capture Equipment ID / APPF Compliance
- Field 9.123 – Size of scanned image (x and y)
- Field 9.124 – Scan resolution (x and y)
- Field 9.125 – Finger View (“0” through “15”)

Block of Minutiae Fields (cont)

- Field 9.126 – Finger Position
- Field 9.127 – Finger Quality (“0” through “100”)
- Field 9.128 – Number of minutia
- Field 9.129 – Finger minutiae data
  - X Coordinate
  - Y Coordinate
  - Theta (0-179)
  - Minutiae Type (Other, ending, bifurcation)
  - Minutiae Quality (1 to 100)
- Multiple occurrences separated by <RS>

Finger Image Harmonization with M1

- *CBEFF requirements addressed later in proposal*
- Field 14.123 – Size of scanned image (x and y)
- Field 14.124 – Scan resolution (x and y)
- Field 14.125 – Finger View (“0” through “15”)

Fingerprint Image Quality Score

- Fingerprint matcher performance is directly affected by the quality of images used
- Poor quality fingerprint images cause the AFIS identification performance to be reduced
- Knowledge of fingerprint quality prior to matching can be used to improve matcher performance
- Require recapture of samples with insufficient quality
- Poor quality samples can be processed using different algorithms or thresholds

Image Quality Metric Field 14.022

- Mandatory ASCII field defined by the FBI EFTS 7.1.
- Consists of two information items separated by the <US> separator character
  - Finger number
  - Predictive quality score
- Subfield repeats for individual fingers of a slap image separated by the <RS> character
- 14.022:10^{US}5^{RS}9^{US}4^{RS}8^{US}3^{RS}7^{US}2^{GS}

Image Quality Score
Field 14.024

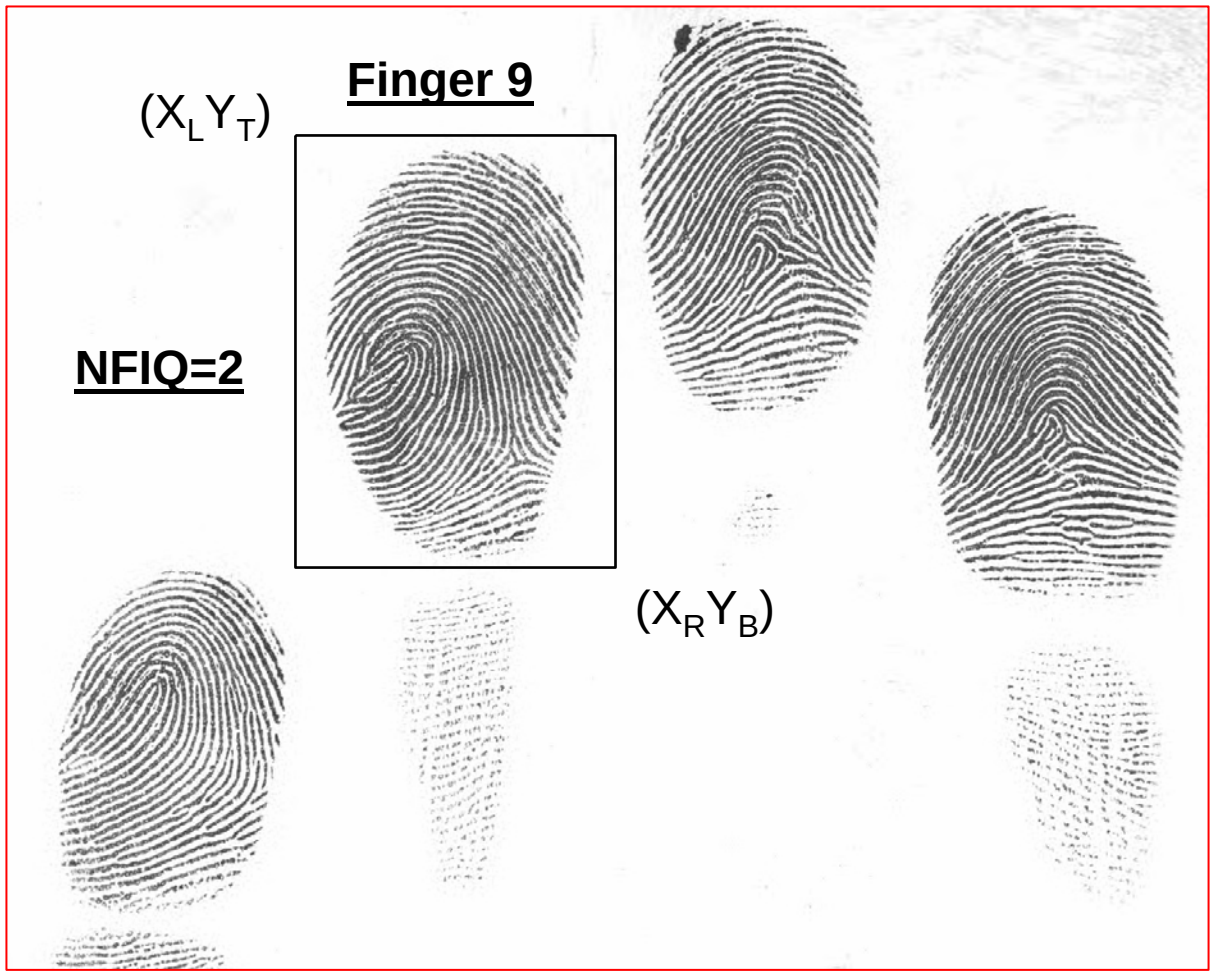
- Field similar to EFTS 7.1 Field 14.022
- Field consists of five information items
  - Finger number
  - Predictive quality score (-1 to 100)
  - Vendor identification (ASCII)
  - Vendor assigned code for algorithm
  - Version and revision of algorithm
- Provision for additional quality scores
- 14.024:$2^{US}100^{US}NIST^{US}64530^{US}001.123^{RS}$
  $2^{US}80^{US}ABCD^{US}5432^{US}02.004^{GS}$

Image Quality Score
Slap Example

- Provision for segmented slap image by multiple algorithms

14.024:2^{US}100^{US}NIST^{US}64530^{US}001.123^{RS}
3^{US}100^{US} NIST^{US}64530^{US}001.123^{RS}
4^{US}80^{US}NIST^{US}64530^{US}001.123^{RS}
5^{US}60^{US}NIST^{US}65430^{US}001.123^{RS}
2^{US}090^{US}ABCD^{US}5432^{US}02.004^{RS}
3^{US}80^{US}ABCD^{US}5432^{US}02.004^{RS}
……

Segment & Assign NFIQ



Finger Segment Position Field 14.021

- Purpose: Defines offsets to the locations of bounding boxes of the individual fingers within the plain image.
- Offsets are relative to the origin, (0,0), which is in the upper left corner of the image.
- A finger segment is defined by five information items:
  - Finger number
  - X coordinates (LEFT, RIGHT) and
  - Y coordinates (TOP, BOTTOM), of its bounding box. s
  - Information items separated by <US> character
  - Subfields for fingers separated by <RS> character

Segmented Finger Quality Field 14.023

- Indication of the quality of the segmentation process
- Used with Field 14.021
- Field consists of five information items
  - Finger number
  - Predictive quality score (-1 to 100)
  - Vendor identification (ASCII)
  - Vendor assigned code for algorithm
  - Version and revision of algorithm
- Provision for additional segmentation scores

Segmented Finger Example
Fields 14.021 & 14.023

14.021:10^US3^US352^US725^US1265^RS
9^US375^US750^US175^US765^RS
8^US800^US1150^US5^US581^RS
7^US1200^US1598^US274^US801^GS

14.023:10^US80^USNIST^US6430^US001.123^RS
9^US80^US NIST^US6430^US001.123^RS
8^US80^USNIST^US6430^US001.123^RS
7^US100^USNIST^US6530^US001.123^RS

Table Updates

- Table 6 – Finger position code & maximum size
  - Image area column removed in favor of dimensions
  - Maximum size for the plain right and left four fingers increased
  - Additional code 15 for the combination of right and left thumbs
- Table 19 – Additional Entries

Finger Position Code & Maximum Size - Table 6

Finger Position	Finger Code	Width		Length	
		(mm)	(in)	(mm)	(in)
Unknown	0	40.6	1.6	38.1	1.5
Right thumb	1	40.6	1.6	38.1	1.5
Right index finger	2	40.6	1.6	38.1	1.5
Right middle finger	3	40.6	1.6	38.1	1.5
Right ring finger	4	40.6	1.6	38.1	1.5
Right little finger	5	40.6	1.6	38.1	1.5
Left thumb	6	40.6	1.6	38.1	1.5
Left index finger	7	40.6	1.6	38.1	1.5
Left middle finger	8	40.6	1.6	38.1	1.5

Table 6 (cont)

Finger Position	Finger Code	Width		Length	
		(mm)	(in)	(mm)	(in)
Left ring finger	9	40.6	1.6	38.1	1.5
Left little finger	10	40.6	1.6	38.1	1.5
Plain right thumb	11	25.4	1.0	50.8	2.0
Plain left thumb	12	25.4	1.0	50.8	2.0
Plain right four fingers	13	81.3	3.2	76.2	3.0
Plain left four fingers	14	81.3	3.2	76.2	3.0
Left and Right thumbs	15	81.3	3.2	76.2	3.0

ADDITIONAL PALM CODES (Table 19)

Palm Position	Palm Code	Width (in)	Length (in)
Right Interdigital	31	5.5	3.0
Right Thenar	32	3.0	4.0
Right Hyperthenar	33	3.0	5.5
Left Interdigital	34	5.5	3.0
Left Thenar	35	3.0	4.0
Left Hyperthenar	36	3.0	5.5

SOURCE AGENCY FIELD SIZE

- ***Interpol requirements:***
- ***10.003:CC/agency{$^{G}_{S}$} where***
  - **CC is 2 alpha-numeric characters**
  - **Agency is up to 32 characters**
- ***Proposal: Increase size of source agency /ORI to a maximum of 43 characters for all records Types 10 and above***
- ***Field 1.007 (DAI) & 1.008 (ORI) user defined***

Attended Operation
Fields 10.030, 14.030 - 17.030

- Records if the capture of fingerprints, palmprints, facial image, and iris was in an attended or unattended mode.
- This field consists of two information items separated by the <US> character.
- First item contains “Unattended” if the device is in an unattended kiosk environment and “Attended” if an operator is in attendence.
- Second item contains “NA” if unattended or the operator identification if in an attended mode.

IRIS Proposal

Iris Logical Record

- Add Type-17 Iris Record
  - Can exchange data contained in M1 standard (INCITS 379-2004) Iris Image Interchange Format
    - Rectilinear and Polar
  - Can exchange iris image data using only Type-16 like format with addition of
    - Identity of which eye
    - Make/Model/Serial Number