INTERNATIONAL STANDARD

ISO/IEC 39794-4

First edition
2019-12

AMENDMENT 1
2023-08

Information technology — Extensible biometric data interchange formats —

Part 4: Finger image data

AMENDMENT 1: Extension towards improved interoperability with ANSI/NIST-ITL

Reference number
ISO/IEC 39794-4:2019/Amd. 1:2023(E)

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Published in Switzerland

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7.3

Replace:

"The year shall be the year of the publication of this document."

with:

"The year shall be the year of the publication of the standard or amendment or corrigendum that specifies the used version of the format."

8.2

Add:

"The encoding example in Clause B.2 is available at https://standards.iso.org/iso-iec/39794/-4/ed-1/en. The XSD in Clause A.4 extends the XSD in Clause A.2 by allowing the use of the same palm position codes and impression codes as ANSI/NIST ITL 1.[3] The XSD in Clause A.4 and the encoding example in Clause B.3 are available at https://standards.iso.org/iso-iec/39794/-4/ed-1/en/amd/1."

Annex A

Insert the following text as Clause A.3.

A.3 ANSI-NIST ITL Harmonized ASN.1 module for tagged binary encoding

```
ISO-IEC-39794-4-ed-1-v2 {iso(1) standard(0) iso-iec-39794(39794) part-4(4) ed-1(1) v2(2)
iso-iec-39794-4(0)}

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```

```
-- USE OR OTHER DEALINGS IN THE ASN.1 MODULE.

DEFINITIONS IMPLICIT TAGS ::= BEGIN

   IMPORTS
      QualityBlocks,
      ScoreOrError,
      RegistryIdBlock,
      CertificationIdBlocks,
      CaptureDateTimeBlock,
      PADDataBlock,
      VersionBlock,
      CoordinateCartesian2DUnsignedShortBlock,
      ExtendedDataBlock
   FROM ISO-IEC-39794-1-ed-1-v1;

   PositionCode ::= ENUMERATED {
      unknownPosition(0),
      rightThumbFinger(1),
      rightIndexFinger(2),
      rightMiddleFinger(3),
      rightRingFinger(4),
      rightLittleFinger(5),
      leftThumbFinger(6),
      leftIndexFinger(7),
      leftMiddleFinger(8),
      leftRingFinger(9),
      leftLittleFinger(10),
      rightFourFingers(13),
      leftFourFingers(14),
      bothThumbFingers(15),
      rightExtraDigitFinger(16),
      leftExtraDigitFinger(17),
      unknownFrictionRidge(18),
      entireJointImage(19),
      unknownPalm(20),
      rightFullPalm(21),
      rightWritersPalm(22),
      rightLowerPalm(23),
      rightUpperPalm(24),
      rightOtherPalm(25),
      rightInterdigital(26),
      rightThenar(27),
      rightHypothenar(28),
      leftFullPalm(29),
      leftWritersPalm(30),
      leftLowerPalm(31),
      leftUpperPalm(32),
      leftOtherPalm(33),
      leftInterdigital(34),
      leftThenar(35),
      leftHypothenar(36),
      rightGrasp(37),
      leftGrasp(38),
      rightIndexMiddleFingers(40),
      rightMiddleRingFingers(41),
      rightRingLittleFingers(42),
      leftIndexMiddleFingers(43),
      leftMiddleRingFingers(44),
      leftRingLittleFingers(45),
      rightIndexLeftIndexFingers(46),
      rightIndexMiddleRingFingers(47),
      rightMiddleRingLittleFingers(48),
      leftIndexMiddleRingFingers(49),
      leftMiddleRingLittleFingers(50),
      rightFourFingertips(51),
      leftFourFingertips(52),
      rightFingertips(53),
      leftFingertips(54),
      leftMiddleIndexRightIndexMiddleFingers(55),
      unknownSole(60),
```

```
    rightSole(61),
    leftSole(62),
    unknownToe(63),
    rightBigToe(64),
    rightSecondToe(65),
    rightMiddleToe(66),
    rightFourthToe(67),
    rightLittleToe(68),
    leftBigToe(69),
    leftSecondToe(70),
    leftMiddleToe(71),
    leftFourthToe(72),
    leftLittleToe(73),
    rightFrontBallFoot(74),
    rightBackHeelFoot(75),
    leftFrontBallFoot(76),
    leftBackHeelFoot(77),
    rightMiddleFoot(78),
    leftMiddleFoot(79),
    rightCarpalDelta(81),
    leftCarpalDelta(82),
    rightFullWithWriterPalm(83),
    leftFullWithWriterPalm(84),
    rightBracelet(85),
    leftBracelet(86),
    otherPosition(999)
}

AnsiNistItlPalmPositionCode ::= ENUMERATED {
    leftFullPalm(23),
    leftWritersPalm(24),
    rightLowerPalm(25),
    rightUpperPalm(26),
    leftLowerPalm(27),
    leftUpperPalm(28),
    rightOtherPalm(29),
    leftOtherPalm(30),
    rightInterdigital(31),
    rightThenar(32),
    rightHypothenar(33)
}

PositionExtensionBlock ::= SEQUENCE {
    fallback [0] PositionCode,
    ...,
    [[2022: -- added in ISO/IEC 39794-4:2019/Amd.1:2022
      ansiNistItlPalmPositionCode [1] AnsiNistItlPalmPositionCode OPTIONAL
    ]]
}

Position ::= CHOICE {
    code [0] PositionCode,
    extensionBlock [1] PositionExtensionBlock
}

ImpressionCode ::= ENUMERATED {
    plainContact(0),
    rolledContact(1),
    latentImage(4),
    swipeContact(8),
    stationarySubjectContactlessPlain(24),
    stationarySubjectContactlessRolled(25),
    movingSubjectContactlessPlain(41),
    movingSubjectContactlessRolled(42),
    otherImpression(28),
    unknownImpression(29)
}

AnsiNistItlImpressionCode ::= ENUMERATED {
    movingSubjectContactlessRolled(41),
    movingSubjectContactlessPlain(42)
```

```
}

ImpressionExtensionBlock ::= SEQUENCE {
   fallback [0] ImpressionCode,
   ...,
   [[2022: -- added in ISO/IEC 39794-4:2019/Amd.1:2022
     ansiNistItlImpressionCode [1] AnsiNistItlImpressionCode OPTIONAL
   ]]
}

Impression ::= CHOICE {
   code [0] ImpressionCode,
   extensionBlock [1] ImpressionExtensionBlock
}

CaptureDeviceTechnologyIdCode ::= ENUMERATED {
   unknownCaptureDeviceTechnology(0),
   otherCaptureDeviceTechnology(1),
   scannedInkOnPaper(2),
   opticalTIRBrightField(3),
   opticalTIRDarkField(4),
   opticalImage(5),
   opticalLowFrequency3DMapped(6),
   opticalHighFrequency3DMapped(7),
   capacitive(9),
   capacitiveRF(10),
   electroLuminescence(11),
   reflectedUltrasonic(12),
   impediographicUltrasonic(13),
   thermal(14),
   directPressure(15),
   indirectPressure(16),
   liveTape(17),
   latentImpression(18),
   latentPhoto(19),
   latentMolded(20),
   latentTracing(21),
   latentLift(22)
}

CaptureDeviceTechnologyIdExtensionBlock ::= SEQUENCE {
   fallback [0] CaptureDeviceTechnologyIdCode,
   ...
}

CaptureDeviceTechnologyId ::= CHOICE {
   code [0] CaptureDeviceTechnologyIdCode,
   extensionBlock [1] CaptureDeviceTechnologyIdExtensionBlock
}

ImageDataFormatCode ::= ENUMERATED {
   pgm(0),
   wsq(1),
   jpeg2000Lossy(2),
   jpeg2000Lossless(3),
   png(4)
}

ImageDataFormatExtensionBlock ::= SEQUENCE {
   ...
}

ImageDataFormat ::= CHOICE {
   code [0] ImageDataFormatCode,
   extensionBlock [1] ImageDataFormatExtensionBlock
}

CoordinateBlock ::= CoordinateCartesian2DUnsignedShortBlock

CoordinatesBlock ::= SEQUENCE (SIZE(2..MAX)) OF CoordinateBlock
```

```
SegmentBlock ::= SEQUENCE {
   position [0] Position,
   enclosingCoordinatesBlock [1] CoordinatesBlock,
   orientation [2] INTEGER (0..255) OPTIONAL,
   qualityBlocks [3] QualityBlocks OPTIONAL,
   confidence [4] ScoreOrError OPTIONAL,
   ...
}

SegmentBlocks ::= SEQUENCE (SIZE(1..4)) OF SegmentBlock

SegmentationBlock ::= SEQUENCE {
   algorithmIdBlock [0] RegistryIdBlock,
   segmentBlocks [1] SegmentBlocks,
   ...
}

AnnotationReasonCode ::= ENUMERATED {
   unknown(0),
   other(1),
   amputated(2),
   unableToPrint(3),
   bandaged(4),
   physicallyChallenged(5),
   diseased(6)
}

AnnotationReasonExtensionBlock ::= SEQUENCE {
   fallback [0] AnnotationReasonCode,
   ...
}

AnnotationReason ::= CHOICE {
   code [0] AnnotationReasonCode,
   extensionBlock [1] AnnotationReasonExtensionBlock
}

AnnotationBlock ::= SEQUENCE {
   position [0] Position,
   reason [1] AnnotationReason,
   ...
}

UnitDimensionCode ::= ENUMERATED {
   inch(0),
   cm(1)
}

SpatialSamplingRateBlock ::= SEQUENCE {
   samplesPerUnit [0] INTEGER (0..65535),
   unitDimension [1] UnitDimensionCode
}

CaptureDeviceBlock ::= SEQUENCE {
   modelIdBlock [0] RegistryIdBlock,
   technologyId [1] CaptureDeviceTechnologyId OPTIONAL,
   certificationIdBlocks [2] CertificationIdBlocks OPTIONAL,
   ...
}

FingerRotation ::= INTEGER (0..359)

SegmentationBlocks ::= SEQUENCE OF SegmentationBlock

AnnotationBlocks ::= SEQUENCE OF AnnotationBlock

CommentBlock ::= VisibleString

CommentBlocks ::= SEQUENCE OF CommentBlock

VendorSpecificDataBlock ::= ExtendedDataBlock
```

```
   VendorSpecificDataBlocks ::= SEQUENCE OF VendorSpecificDataBlock

   RepresentationBlock ::= SEQUENCE {
      position [0] Position,
      impression [1] Impression,
      imageDataFormat [2] ImageDataFormat,
      imageData [3] OCTET STRING,
      captureDateTimeBlock [4] CaptureDateTimeBlock OPTIONAL,
      captureDeviceBlock [5] CaptureDeviceBlock OPTIONAL,
      qualityBlocks [6] QualityBlocks OPTIONAL,
      spatialSamplingRateBlock [7] SpatialSamplingRateBlock OPTIONAL,
      positionComputedByCaptureSystem [8] BOOLEAN OPTIONAL,
      originalRotation [9] FingerRotation OPTIONAL,
      imageRotatedToVertical [10] BOOLEAN OPTIONAL,
      imageHasBeenLossilyCompressed [11] BOOLEAN OPTIONAL,
      segmentationBlocks [12] SegmentationBlocks OPTIONAL,
      annotationBlocks [13] AnnotationBlocks OPTIONAL,
      pADDataBlock [14] PADDataBlock OPTIONAL,
      commentBlocks [15] CommentBlocks OPTIONAL,
      vendorSpecificDataBlocks [16] VendorSpecificDataBlocks OPTIONAL,
      ...
   }

   RepresentationBlocks ::= SEQUENCE OF RepresentationBlock

   FingerImageDataBlock ::= [APPLICATION 4] SEQUENCE {
      versionBlock [0] VersionBlock,
      representationBlocks [1] RepresentationBlocks,
      ...
   }

END
```

Annex A

Insert the following text as Clause A.4.

A.4 ANSI-NIST ITL Harmonized XML schema definition for XML encoding

```
<?xml version="1.0" encoding="utf-8" ?>
<!--Permission is hereby granted, free of charge in perpetuity, to any person obtaining
a copy of the Schema, to use, copy, modify, merge and distribute free of charge, copies
of the Schema for the purposes of developing, implementing, installing and using software
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OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SCHEMA OR THE USE OR OTHER
DEALINGS IN THE SCHEMA. In addition, any modified copy of the Schema shall include the
following notice: THIS SCHEMA HAS BEEN MODIFIED FROM THE SCHEMA DEFINED IN ISO/IEC 19794-
4, AND SHOULD NOT BE INTERPRETED AS COMPLYING WITH THAT STANDARD-->
<xs:schema
   xmlns:xs="https://www.w3.org/2001/XMLSchema"
   xmlns:vc="https://www.w3.org/2007/XMLSchema-versioning"
   xmlns:cmn="https://standards.iso.org/iso-iec/39794/-1"
   xmlns="https://standards.iso.org/iso-iec/39794/-4/v2"
   vc:minVersion="1.0"
   targetNamespace="https://standards.iso.org/iso-iec/39794/-4/v2"
   elementFormDefault="qualified"
   attributeFormDefault="unqualified">

   <xs:import namespace=https://standards.iso.org/iso-iec/39794/-4 schemaLocation="iso-
iec-39794-4-ed-1-v1.xsd" />

  <xs:complexType name="AnsiNistITLPalmPositionCodeType">
   <xs:choice>
```

```
      <xs:element name="leftFullPalm" type="xs:int" fixed="23" />
      <xs:element name="leftWritersPalm" type="xs:int" fixed="24" />
      <xs:element name="rightLowerPalm" type="xs:int" fixed="25" />
      <xs:element name="rightUpperPalm" type="xs:int" fixed="26" />
      <xs:element name="leftLowerPalm" type="xs:int" fixed="27" />
      <xs:element name="leftUpperPalm" type="xs:int" fixed="28" />
      <xs:element name="rightOtherPalm" type="xs:int" fixed="29" />
      <xs:element name="leftOtherPalm" type="xs:int" fixed="30" />
      <xs:element name="rightInterdigital" type="xs:int" fixed="31" />
      <xs:element name="rightThenar" type="xs:int" fixed="32" />
      <xs:element name="rightHypothenar" type="xs:int" fixed="33" />
   </xs:choice>
  </xs:complexType>

  <xs:complexType name="AnsiNistItlImpressionCodeType ">
   <xs:choice>
      <xs:element name="movingSubjectContactlessRolled" type="xs:int" fixed="41" />
      <xs:element name="movingSubjectContactlessPlain" type="xs:int" fixed="42" />
   </xs:choice>
  </xs:complexType>

  <xs:element name="ansiNistItlPalmPositionCode" type="AnsiNistItlPalmPositionCodeType"/>
  <xs:element name="ansiNistItlImpressionCode" type="AnsiNistItlImpressionCodeType"/>
</xs:schema>
```

Clause B.1

Replace:

"An example encoding can be retrieved from https://standards.iso.org/iso-iec/39794/-4/ed-1/en."

with:

"Tagged binary encoding examples can be retrieved from https://standards.iso.org/iso-iec/39794/-4/ed-1 and https://standards.iso.org/iso-iec/39794/-4/ed-1/en/amd/1."

Annex B

Insert the following text as Clause B.3.

B.3 Sample XML encoding showing finger position and impression encodings aligned with ANSI/NIST-ITL 1

```
<?xml version="1.0" encoding="UTF-8"?>
<fir:fingerImageData
  xmlns:fir2022="https://standards.iso.org/iso-iec/39794/-4/v2"
  xmlns:fir="https://standards.iso.org/iso-iec/39794/-4"
  xmlns:cmn="https://standards.iso.org/iso-iec/39794/-1">
  <fir:versionBlock>
    <cmn:generation>3</cmn:generation>
    <cmn:year>2022</cmn:year>
  </fir:versionBlock>
  <fir:representationBlocks>
    <fir:representationBlock>
      <fir:position>
        <fir:extensionBlock>
        <fir:fallback>
            <fir:leftFullPalm/>
          </fir:fallback>
          <fir2022:ansiNistItlPalmPositionCode>
           <fir2022:leftFullPalm/>
          </fir2022:ansiNistItlPalmPositionCode>
        </fir:extensionBlock>
      </fir:position>
      <fir:impression>
        <fir:extensionBlock>
```