
**Information technology — Biometric data
interchange formats —**

**Part 2:
Finger minutiae data**

**AMENDMENT 1: Detailed description of
finger minutiae location, direction, and type**

*Technologies de l'information — Formats d'échange de données
biométriques —*

Partie 2: Données du point caractéristique du doigt

*AMENDEMENT 1: Description détaillée du point caractéristique du
doigt, direction et type*

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

Amendment 1 to ISO/IEC 19794-2:2005 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 37, *Biometrics*.

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IMPORTANT — The electronic file of this document contains colours which are considered to be useful for the correct understanding of the document. Users should therefore consider printing this document using a colour printer.

Page 39

Insert the following new annex after D.3:

Annex E (informative)

Detailed description of finger minutiae location, direction, and type

E.1 Scope

Even if all conform to this part of ISO/IEC 19794, different minutiae data blocks extracted from the same finger image may differ not only in the exact locations, the directions, and the types of those minutiae that they have in common, but also in the number of minutiae they contain, especially in blurred fingerprint regions where even the "manual" detection of minutiae is hard. The description of the minutia location in 6.4 refers to a single-pixel-wide skeleton of the friction ridges. The minutia direction is defined in 6.4, based on tangents to the skeleton. The skeletonisation algorithm itself is not described and also the method to determine the tangents is left open.

The scope of this informative annex is to provide a more precise definition of location, direction, and type of minutiae in gray-scale finger images and a detailed description of the quality field. It enhances the readability of this part of ISO/IEC 19794 and decreases the possibility of misinterpretation. The standardisation of algorithms is out of scope of this informative annex. This informative annex does not supersede the existing standard.

E.2 Terms and definitions

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

E.2.1

4-neighbour of a pixel p

pixel that is the top, bottom, left, or right neighbour of p

EXAMPLE The pixels e , f , g , and h in Figure E.1 are 4-neighbours of pixel p .

a	e	b
h	p	f
d	g	c

Figure E.1 — 4- and 8-neighbours of a pixel p

E.2.2

4-path from pixel p_0 to pixel p_n

sequence of pixels $(p_0, p_1, p_2, \dots, p_n)$ such that p_i is a 4-neighbour of p_{i-1}

E.2.3

4-connected set of pixels

set S of pixels such that for any two pixels $p, q \in S$ there exists a 4-path from p to q

E.2.4

8-neighbour of a pixel p

pixel that is a 4-neighbour or a diagonal (top-left, top-right, bottom-left, or bottom-right) neighbour of p

EXAMPLE The pixels a, b, c, d, e, f, g , and h in Figure E.1 are 8-neighbours of pixel p .

E.2.5

8-path from pixel p_0 to pixel p_n

sequence of pixels $(p_0, p_1, p_2, \dots, p_n)$ such that p_i is an 8-neighbour of p_{i-1}

E.2.6

8-connected set of pixels

set S of pixels such that for any two pixels $p, q \in S$ there exists an 8-path from p to q

E.2.7

border ∂S of a set of pixels S

subset $\partial S = \{x \in S : x \text{ is 4-neighbour of } q, q \notin S\}$ of pixels of S that are 4-neighbours of pixels outside S

E.3 Minutiae detection strategy

E.3.1 "Liberal-conservative" spectrum

Minutia detection algorithms may use different discriminative practices in the minutia detection strategy. A liberal minutia detection strategy is supposed to detect a large number of minutiae which will increase the probability to include spurious minutiae while a conservative strategy will detect only a few minutiae and increase the probability to miss some. The following subclauses provide an explanation of some types of spurious (false) minutiae which may result from the use of a 'liberal' strategy but which may not be detected if a more 'conservative' strategy is employed.

The following images show examples of applying a conservative or liberal minutia detection strategy to the same sample images. These examples are not meant to suggest a liberal or conservative strategy. The best detection strategy for a particular application depends on the business processes and their associated security requirements that the biometric components of the system are designed to support or enable.



Figure E.2 — Liberal minutia detection (left) versus conservative minutia detection (right)



Figure E.3 — Liberal minutia detection (left) versus conservative minutia detection (right)



Figure E.4 — Liberal minutia detection (left) versus conservative minutia detection (right)



Figure E.5 — Liberal minutia detection (left) versus conservative minutia detection (right)



Figure E.6 — Liberal minutia detection (left) versus conservative minutia detection (right)

E.3.2 Fingerprint boundary

No minutia should be set outside the fingerprint boundary.

Minutiae may be set below the first phalange, even it is not the usual case.

E.3.3 Sweat pore

No minutia should be set at a sweat pore. A pore could happen to lie at the position of the forking of a friction ridge (bifurcation, see Figure E.16 below), but a sweat pore without connectivity to three legs must not be misinterpreted as a minutia.

E.3.4 Touching ridges

No minutia should be set where thick ridges touch each other.

E.3.5 Incipient ridge

No minutia should be set at an incipient (very short and thin) ridge.

E.3.6 Crease

No minutia should be set at a crease (accidental interruption of ridges).

E.3.7 Core

No minutia should be set at a core.

A core represents a singularity in the direction field, hence a proper angle value cannot be assigned to this location.

NOTE Information about cores can be expressed in a standardised way in the extended data block (see 8.5.3).