TECHNICAL REPORT

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Information technology — Biometric performance testing and reporting —

Part 3:
Modality-specific testing

Technologies de l'information — Essais et rapports de performances biométriques —

Partie 3: Essais de modalité spécifique

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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.

In exceptional circumstances, the joint technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when the joint technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

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.

ISO/IEC TR 19795-3, which is a Technical Report of type [1/2/3], was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 37, *Biometrics*.

ISO/IEC TR 19795 consists of the following parts, under the general title *Information technology — Biometric performance testing and reporting*:

— *Part 1: Principles and framework*

— *Part 2: Testing methodologies for technology and scenario evaluation*

— *Part 3: Modality-specific testing* [Technical Report]

Performance and interoperability testing of data interchange formats will form the subject of a future Part 4.

Introduction

In biometric performance testing and reporting, careful consideration should be given to the characteristic differences of each modality (fingerprint, face, iris, etc.). These differences naturally require variations within the general methodology defined in ISO/IEC 19795-1.

Since there are many modality-dependent variations, it is desirable that each modality be specified with specific testing and reporting methods. This ensures that not only specialists of biometrics but also non-specialists can carry out reasonably accurate testing.

The characteristics that affect evaluation methodology can at least be discussed from the following viewpoints:

— characteristics of users, including the definition of impostors;

— restrictions that come from practical situations in which that biometric modality is used in applications.

Characteristics of impostors:

There are two factors to consider regarding the definition of impostors: (1) multiple biometric data from one person, and (2) impostor attempts for behaviour-based modalities, such as voice or signature.

For modalities in which multiple biometric data can be collected from one person, e.g. finger (ten fingerprints from one person) and iris (two iris-images from one person), a rule for permitting or prohibiting use of these data as impostor attempts needs to be clearly defined.

In the case of behaviour-based modalities, testing results regarding impostor attempts [false match rate (FMR) or false acceptance rate (FAR)] can be influenced depending on whether (or how much) an impostor tries to imitate an authorized user's behaviour or not. For instance, the case in which an impostor physically traces an authorized user's signature that the impostor obtained differs significantly in FMR or FAR from the case where the impostor only looks at the signature and imitates it. For these modalities, a criterion regarding impostor attempts needs to be defined.

Characteristics of modality specific to applications

In general, almost all modalities of biometrics are used for user authentication. However, some modalities are expected to be used in different classes of applications; for example, face-based identification is widely used in surveillance applications. While we can expect a user's cooperation in the former, we cannot expect it in the latter case. Thus variation of testing methodologies needs to be considered depending on the way the modality is used in real applications.

These restrictions can be divided into two classifications:

— factors relating to users, such as facial expressions that affect the countenance of the face, wearing eye-glasses or contact lenses for the iris;

— factors relating to external environments that are uncontrollable by the algorithm or system, such as illumination change for face or background noise for voice.

These factors naturally affect the performance, and the types and number of factors are different in each modality. These modality-dependent variations need to be considered in testing and reporting. In addition, a concept of robustness testing needs to be introduced to evaluate the sensitivity or robustness of the technology toward environmental factors, in case the variation of the factors strongly influences the observed performance.

This part of ISO/IEC 19795 is intended to describe the variations in methodologies relating to these modality-dependent characteristics. It presents and defines methods for determining, given a specific biometric modality, how to develop a technical performance test.

This part of ISO/IEC 19795 has been developed based on six technical reports [1-6], which are the outputs of standardization activities in Japan for biometric testing and reporting, and have been published by the Japanese Standards Association as JIS-TRs (Japanese Industrial Standards Technical Reports). They have been prepared through discussions by experts of respective modalities, and have extensive considerations particular to different procedures specific to each modality. They are intended to define detailed procedures for testing, including specifications of a test database and how to collect data. These documents can be used as reference when designing specific evaluation procedures.

Information technology — Biometric performance testing and reporting —

Part 3:
Modality-specific testing

1 Scope

In biometric performance testing and reporting, careful consideration needs to be given to the characteristic differences of each modality (fingerprint, face, iris, etc.). These differences naturally require variations within the general methodology defined in ISO/IEC 19795-1.

This part of ISO/IEC 19795 describes the methodologies relating to these modality-dependent variations. It presents and defines methods for determining, given a specific biometric modality, how to develop a technical performance test.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 19795-1:2006, *Information technology — Biometric performance testing and reporting — Part 1: Principles and framework*