INTERNATIONAL STANDARD

ISO/IEC 29197

First edition
2015-04-01

Information technology — Evaluation methodology for environmental influence in biometric system performance

Technologies de l'information — Méthodologie de l'évaluation de l'influence environnementale dans la performance d'un système biométrique

Reference number
ISO/IEC 29197:2015(E)

© ISO/IEC 2015



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2015

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword ..... **v**

Introduction ..... **vi**

1 Scope **1**

2 Conformance **1**

3 Normative references **1**

4 Terms and definitions **2**

5 Overview **3**
5.1 Introduction 3
5.2 Scenario evaluations 4
5.3 Operational evaluations 4

6 Evaluation conditions specification **5**
6.1 Introduction 5
6.2 Definition of evaluation conditions 5
6.2.1 Description of the evaluation conditions 5
6.2.2 Types of environmental parameters 5
6.3 Selection of the evaluation conditions 6
6.3.1 General 6
6.3.2 Reference evaluation environment for scenario evaluations 6
6.3.3 Target evaluation environments 6
6.4 Measurement and recording of the environmental conditions 8
6.4.1 General 8
6.4.2 Instruments to measure and record environmental conditions 8
6.4.3 Requirements for measuring and recording environmental conditions 8

7 Biometric scenario evaluation **9**
7.1 Introduction 9
7.2 Define evaluation objectives 9
7.3 Environment 9
7.3.1 Environment for enrolment 9
7.3.2 Generation and control of the environmental conditions 9
7.3.3 Biometric system placement 10
7.4 Test population 10
7.4.1 General 10
7.4.2 Size 10
7.4.3 Selection 11
7.4.4 Training and guidance of test subjects 11
7.4.5 Visits 12
7.5 Acclimatization 12
7.6 Levels of effort and decision policies 12
7.7 Exception handling protocols 12
7.8 Data to record and test results 13
7.8.1 General 13
7.8.2 Requirements for recording data 13
7.8.3 Requirements for calculating results 13
7.8.4 Requirements for reporting results 14
7.9 Execution sequence 15
7.9.1 General 15
7.9.2 Pre-test activities 15
7.9.3 Test activities 15
7.9.4 Post-test activities 16

© ISO/IEC 2015 – All rights reserved

8 Operational evaluation **17**
8.1 Introduction 17
8.2 Environment 17
8.3 Test period 17
8.4 Data recording processes 17
8.5 Performance measurements 18
8.6 Impostor transactions 18
8.7 Reporting 18
Annex A (informative) **Values for environmental parameters** **19**
Annex B (informative) **Test equipment** **21**
Bibliography **23**

 © ISO/IEC 2015 – All rights reserved

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/IEC JTC 1, *Information technology*, SC 37, *Biometrics*.

© ISO/IEC 2015 – All rights reserved

Introduction

The performance of biometric systems can vary according to environmental conditions (see e.g. ISO/IEC 19795-1:2006, C.2.6, ISO/IEC TR 19795-3:2007, Table 4). Environmental conditions can affect subjects' ease of use and comfort in using the systems, subjects' biometric characteristics, and also the devices used for acquisition of biometric samples.

This International Standard provides a generic methodology to analyse the influence of environmental conditions on biometric system performance.

NOTE Environmental conditions can affect several elements involved in the recognition process. However, the proposed evaluation methodology does not distinguish which of them is affected. The intention of this methodology is to quantify the overall influence analysing the biometric system performance.

For this International Standard, environmental conditions has to be understood as all atmospheric parameters (e.g. temperature, humidity) and other physical and chemical phenomena (e.g. illumination, noise) that can surround the biometric system and influence in its performance. Certain environmental conditions such as vibration are not dealt with in this International Standard.

These evaluations consist of carrying out a similar "end-to-end" biometric performance evaluation in one or more predefined environments. These environments can be real (naturally occurring) or modelled (artificially controlled).

There are two possible ways to carry out an "end-to-end" biometric performance evaluation: performing scenario evaluations or operational evaluations. In scenario evaluations, biometric systems are assessed in modelled environments considering a real-world target application and population. These evaluations are specified as a special case of scenario test based on ISO/IEC 19795-2. An evaluation performed in a controlled environment can be reproducible, unlike in an operational environment which uncontrolled parameters can affect the system. In operational evaluations, biometric systems are analysed in real environments using a target population. These evaluations are specified as a special case of operational evaluations based on ISO/IEC 19795-6. Operational testing can lack the precision of scenario testing (in terms of the levels of the environmental parameters), but the testing will benefit in terms of being operationally realistic. This International Standard provides testing requirements specific to environmental testing for both kinds of evaluations.

The methodology addresses how to test several environmental factors; however, an evaluation that conforms to this International Standard can consider as few as one single environmental parameter. The test parameter or parameters to assess and control has to be previously defined by participants involved in the evaluation.

The targets of this kind of evaluations include:

— Analyse how one or a combination of environmental factors can affect the biometric system performance and quantify this influence.

— Analyse how a biometric system works in a specific controlled environment, compared to the same system working in a reference evaluation environment.

— Analyse how a biometric system behaves in a real environment compared to the same system working in a modelled environment simulating the operational environment.

The results of these evaluations can inform suppliers and users so that they can assess which environmental conditions are likely to affect the performance of a biometric system under conditions they expect to encounter. Results can also indicate whether the particular biometric modality and method of implementation is appropriate for the situation under which the system is expected to be used. Also this methodology can be used for examining environmental parameters under which biometric systems poorly.

 © ISO/IEC 2015 – All rights reserved

Information technology — Evaluation methodology for environmental influence in biometric system performance

1 Scope

This International Standard addresses

— fundamental requirements for planning and execution of environmental performance evaluations for biometric systems based on scenario and operational test methodologies,

— specifications to define, establish, and measure specific conditions to assess, including requirements for equipment,

— requirements for establishing a baseline performance in order to compare the influence of environmental parameters,

— a specification of the biometric evaluation including requirements for test population, test protocols, data to record, and test results, and

— procedures for carrying out the overall evaluation.

This International Standard does not

— determine which parameters should be analysed for a specific biometric modality (This is currently covered in ISO/IEC/TR 19795-3.),

— specify requirements to perform a vulnerability analysis modifying environmental factors (This is covered by ISO/IEC 19792.),

— classify biometric systems upon performance against different environmental conditions, or

— specify requirements for determining the functional effects of environmental conditions on hardware components (such as corrosion, electrical interference, breakage, etc.) of biometric systems.

2 Conformance

Environmental tests of biometric systems shall be based on scenario evaluations or operational evaluations. Scenario evaluations shall conform with mandatory requirements of Clause 7 whereas operational evaluations shall conform with mandatory requirements of Clause 8.

Further, a scenario evaluation that conforms to this International Standard shall analyse at least two evaluation conditions: the reference evaluation environment and one target evaluation environment. Both shall consider at least one environmental parameter to assess such as temperature, humidity, illumination, etc. These evaluation conditions shall be selected, specified, measured, and recorded in accordance with Clause 6.

3 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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*

© ISO/IEC 2015 – All rights reserved