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Part 10: Quantifying biometric system performance variation across demographic groups

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Partie 10: Quantification de la variation des performances du système biométrique selon les groupes démographiques

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Contents

Page

Foreword ..... **v**

Introduction ..... **vi**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **2**

4 Conformance **4**

5 Planning the evaluation **4**
5.1 Identifying the scope of the evaluation 4
5.2 Demographic variables 5
5.2.1 Ground truth requirements 5
5.2.2 Categorical demographic variables 5
5.2.3 Continuous demographic variables 7
5.2.4 Other demographic variables 8

6 Executing the evaluation **8**
6.1 Generation of mated comparison and identification trials 8
6.2 Generation of non-mated comparison and identification trials 8
6.2.1 General 8
6.2.2 Verification (1:1) 8
6.2.3 Identification (1:N) 8
6.3 Selection of a threshold 9
6.4 Calculating differential performance based on categorical variables for two specific demographic groups 9
6.4.1 General 9
6.4.2 Differential performance between two groups based on mathematical difference 9
6.4.3 Differential performance between two groups based on mathematical ratio 10
6.5 Calculating differential performance based on categorical variables for more than two groups 10
6.5.1 General 10
6.5.2 Differential performance for more than two groups based on the largest error rate relative to the geometric mean 10
6.5.3 Differential performance for more than two groups based on the Gini coefficient 11
6.6 Calculating differential performance in identification trials 11
6.7 Calculating demographic differentials for failure-to-enrol rate, failure-to-acquire rate and transaction duration 12
6.8 Calculating demographic differentials for continuous variables 12
6.9 Comparison score differential measures 13
6.10 Calculating uncertainty 14
6.10.1 Uncertainty in demographic differentials 14
6.10.2 Sampling the target population 14
6.10.3 Sample size requirements 15

7 Reporting the evaluation results **16**
7.1 Reporting the experimental design 16
7.2 Reporting the target application 16
7.3 Reporting the test population 16
7.4 Reporting differential performance 17
7.4.1 Reporting differential performance on previously collected datasets. 17
7.4.2 Reporting differential performance for two or more groups 17
7.4.3 Reporting differential performance against a benchmark 18
7.4.4 Reporting error trade-off metrics 18
7.4.5 Reporting threshold management policy 18
7.5 Reporting comparison score differential measures 18
7.6 Reporting exception handling 19

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Annex A (informative) **Example of estimating sample size for differential performance** **20**
Annex B (informative) **Calculating aggregate equitability measures** **23**
Bibliography **25**

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Foreword

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Introduction

As the use of biometric technology increases, so too does public interest in establishing whether the technology performs similarly for all individuals. Stakeholders are asking government and industry organizations that use biometric technology to establish whether these technologies vary in performance for different demographic groups. The intention of this document is to provide guidance on how to measure and report performance variation across demographic groups.[2]

This document is intended to help organizations evaluate demographic performance in biometric systems and report their results. Specifically, this document outlines how to measure and report biometric performance variations across demographic groups. It provides a set of metrics and best practices to facilitate such testing. However, this document does not provide guidance on how to establish specific causes for the observed variations. The following demographic variables are explicitly discussed in this document:[7][10][12]

— biological characteristics, such as:

  — sex, age, weight, height and skin lightness;

— social constructs, such as:

  — ethnicity, gender and language.

Many other variables can cause systematic changes in biometric characteristics or in how individuals interact with biometric systems. The following demographic variables are relevant although not explicitly discussed in this document:

— performance variations based on temporary states, such as:

  — self-styling (e.g. makeup, eyewear, mask-wearing, clothing, hairstyles),

  — behavioural or emotional states (e.g. intoxication),

  — behaviours (e.g. smiling, closing eyes, varying pose);

— performance variation caused by diseases or injuries, such as:

  — eye surgery, cataracts, vision correction,

  — stroke, cleft lip, Apert's syndrome,

  — missing digits;

— performance variation caused by disabilities.

Demographic performance variation for applications other than biometric recognition, such as emotion, gender or age estimation, are not considered in this document.

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Information technology — Biometric performance testing and reporting —

Part 10: Quantifying biometric system performance variation across demographic groups

1 Scope

This document establishes requirements for estimating and reporting on performance variations observed when cohorts belonging to different demographic groups engage with biometric enrolment and recognition systems. In this context, performance refers to failure-to-enrol rate, failure-to-acquire rate, shifts in comparison score, recognition error rates, and aspects of response and processing time (throughput).

This document is applicable to the following:

— demographic group membership;

— using phenotypic measures;

— reporting on tests;

— stating statistical uncertainty estimates;

— operational thresholds settings;

— equitability;

— procurement agency activities.

This document also provides terms and definitions to be used when reporting performance variation across demographic groups.

This document is applicable to:

— technology evaluations of algorithms, subsystems and systems;

— scenario evaluations of systems;

— operational evaluations of fielded systems.

Application of this document does not require detailed knowledge of a system's algorithms but it does require specific knowledge of the demographic characteristics for the population of interest.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 2382-37, *Information technology — Vocabulary — Part 37: Biometrics*

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