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Information technology — Biometrics — Evaluation of examiner assisted biometric applications

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Information technology — Biometrics — Evaluation of examiner assisted biometric applications

Technologies de l'information — Biométrie — Évaluation des applications biométriques assistées par un examinateur

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Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Terms and definitions ... **1**
3 Symbols and abbreviated terms ... **2**
4 Example of an examiner assisted search process ... **2**
5 Factors to consider when evaluating examiner assisted biometric applications ... **4**
5.1 General ... 4
5.2 System-related factors to consider when evaluating examiner assisted biometric applications ... 5
5.2.1 Dependencies in the flow process — Where does the examiner interact with the system? ... 5
5.2.2 System and stage-level performance measurement ... 5
5.2.3 Measuring 'true' operational performance ... 7
5.2.4 The impact of prior probabilities on human performance ... 8
5.2.5 Confidence Levels ... 8
5.2.6 The impact of automated systems on human performance ... 9
5.3 Examiner-related factors to consider when evaluating examiner assisted biometric applications ... 9
5.3.1 An Examiner's perception of the system's accuracy ... 9
5.3.2 Usability and examiner acceptance ... 10
5.3.3 Training and expertise ... 10
5.3.4 Workload ... 11
5.3.5 Bias in decision making ... 11
5.3.6 Individual differences between examiners ... 12
6 Performance evaluation of examiner assisted systems ... **12**
6.1 Types of Evaluation ... 12
6.2 Performance measures for examiner assisted biometric systems ... 13
6.2.1 Introduction ... 13
6.2.2 Measures of accuracy ... 13
6.2.3 Examiner-assisted performance considerations in watch list scenarios ... 14
6.2.4 Discrimination and bias ... 14
6.2.5 Examiner Decision Confidence ... 14
6.2.6 Processing speed ... 14
6.3 Usability assessment ... 15
6.3.1 Introduction ... 15
6.3.2 Qualitative observations ... 15
6.3.3 Questionnaires ... 15
6.3.4 Interviews and focus groups ... 15
6.4 Reporting results ... 15
6.5 Applying controls in evaluations ... 16
6.5.1 Introduction ... 16
6.5.2 Controls for examiner expertise ... 16
6.5.3 Controls for examiner decision bias ... 16
6.5.4 Controls for the test environment ... 17
6.5.5 Controls for variations in examiner input ... 17
6.6 Evaluation challenges ... 18
6.6.1 Introduction ... 18
6.6.2 Challenges with testing on a live operational system ... 18
6.6.3 Challenges in repeatable operational test ... 18
Bibliography ... **19**

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Foreword

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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).

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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*, Subcommittee SC 37, *Biometrics*.

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Introduction

Biometric identification systems such as those used in forensic applications are typically examiner assisted and not automated to the extent that most biometric systems are. This is particularly the case for applications such as latent fingerprint searching where sample quality can be so poor that the system requires human input. Key processes such as sample capture and preparation, enrolment, template generation, matching result adjudication, and final decision that would otherwise require minimal manual intervention are instead heavily reliant on input from experts (fingerprint examiners in the case of AFIS). These experts can interact with the system at each of these stages to prepare, launch, and/or review the results of biometric searches. The execution and performance of the "end-to-end" search process is thus, a combination of the examiner's role (and capability) and the functionality of the automated biometric system.

This partially automated approach to biometrics using "*examiner assisted*" biometric systems provides value both in assisting the human examiner to perform their role more effectively, and in allowing the expertise of the human examiner to be exploited to assist the automated matching process. Therefore, such systems are most likely to be beneficial in non-real time scenarios where the search response is not necessarily required immediately but the throughput of the system is still high.

Understanding the role of the examiner is crucial, as it impacts on the design of the system, the manner in which it is used, how it is tested, and how the system performance and its individual subcomponents are defined and measured.

The main objectives of this Technical Report are to describe the characteristics of *examiner assisted* biometric applications and, where appropriate, to contrast such applications with mainstream biometric applications.

This Technical Report addresses the issues with assessing the system as a whole, or by testing the *examiner assisted* and automated elements separately.

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Information technology — Biometrics — Evaluation of examiner assisted biometric applications

1 Scope

The purpose of this Technical Report is to identify and characterize those aspects of performance testing that are unique to examiner assisted biometric applications.

An examiner assisted biometric system has the following characteristics:

— reliant on the interaction and skill of a human examiner for one or more stages of the complete biometric process, be it data capture, enrolment, template generation, or final decision;

— can incorporate identification functionality, verification functionality, or both;

— will use a combination of the examiner's input and the functionality of the biometric algorithm to execute the complete biometric process;

— will likely have inbuilt examination toolsets to assist the human examiner when enrolling biometric samples or when comparing the match results provided by the biometric algorithm.

Although there is a wide variation in the use of the term "examiner" in the context of an "examiner assisted biometric system", as defined in this Technical Report, an "examiner" typically has the following characteristics:

— field expert in the biometric modality being exploited;

— trained to use the system to an advanced degree of proficiency;

— authorized to override the biometric system's decisions in particular when accepting or rejecting a match decision based on their own examination of the biometric samples and the results returned.

Assessing an examiner's level of expertise is excluded from the scope of this Technical Report. However, the skill of the examiner does have a major bearing on system performance and vice versa. Measuring or assessing the ability of an examiner to employ their skills might be necessary to properly evaluate the performance of an examiner-assisted system.

Other individuals, such as administrative users, or subjects whose biometrics are used within the system are not considered in this Technical Report. It is outside the scope of this Technical Report to consider non-expert examiners.

2 Terms and definitions

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

2.1
examiner
person responsible for examining biometric data and biometric system outputs for the purpose of either preparing data suitable for a system or confirming, overriding, or modifying a decision output from the biometric system

Note 1 to entry: This decision output could be a match decision or simply the location of a biometric feature point (e.g. a fingerprint core and delta points, or the location of eye co-ordinates on a facial image).

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2.2
examiner assisted
feature or quality of a process, application, system, or any other element that refers to the fact that an examiner takes part by contributing his/her knowledge and expertise

2.3
suspected match
decision state indicating qualified support on the part of an examiner that a match exists, based on the outcome of the examination process and on the limitations of the relevant comparable data

2.4
suspected non match
decision state indicating qualified support on the part of an examiner that no match exists, based on the outcome of the examination process and on the limitations of the relevant comparable data

3 Symbols and abbreviated terms

AFIS Automated Fingerprint Identification System

4 Example of an examiner assisted search process

Consider the diagram below in Figure 1 which illustrates at a very high level, some of the basic stages of a biometric search process. With the exception of the "search" which is fully automated, all other processes are potentially assisted by the interaction of a human examiner. Figure 2 shows each of the examiner assisted points in a diagram representing a generic biometric application.

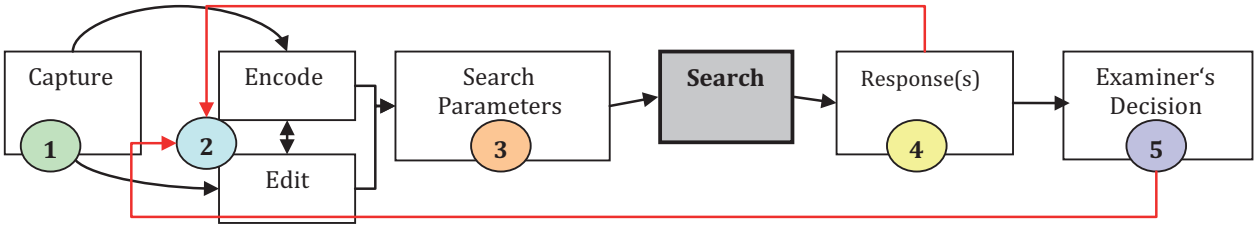

Figure 1 — Basic stages of a biometric search process

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