
**Information technology —
Biometrics — Multimodal and other
multibiometric fusion**

*Technologies de l'information — Biométrie — Fusion multimodale et
autre fusion multibiométrique*



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Foreword

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

This second edition cancels and replaces the first edition (ISO/IEC/TR 24722:2007), which has been technically revised with the following changes:

- the original Clause 2 (Terminology issues) and Clause 7 (Scope and options for standardisation) are removed in this edition;
- [Clause 2](#) (Terms and definitions) is aligned with ISO/IEC 2382-37;
- the current [Clause 3](#), [Clause 4](#), and [Clause 5](#) have been technically revised in terminology, the state of arts updates, and other aspects. Such modifications have also been reflected in the bibliography.

Introduction

Some applications of biometrics require a level of technical performance that is difficult to obtain with a single biometric measure. Such applications include prevention of multiple applications for national identity cards and security checks for air travel. In addition, provision is needed for people who are unable to give a reliable biometric sample for some biometric characteristic types.

Use of multiple biometric measurements from substantially independent biometric sensors, algorithms, or characteristic types typically gives improved technical performance and reduces risk. This includes an improved level of performance where not all biometric measurements are available such that decisions can be made from any number of biometric measurements within an overall policy on accept/reject thresholds.

Of the various forms of multibiometric systems, the potential for multimodal biometric systems, each using an independent measure, has been discussed in the technical literature since at least 1974.[\[22\]](#)[\[45\]](#) Advanced methods for combining measures at the score level have been discussed in Reference [\[15\]](#) and Reference [\[16\]](#). At the current level of understanding, combining results at the score level typically requires knowledge of both genuine and impostor distributions. All of these measures are highly application dependent and generally unknown in any real system.

Research on the methods not requiring previous knowledge of the score distributions is continuing and research on fusion at both the image and feature levels is still progressing.

Given the current state of research into those questions and the highly application-dependent and generally unavailable data required for proper fusion at the score level, work on multibiometric fusion can, in the meantime, be considered mature. By intention, this Technical Report is not issued as an International Standard, in order not to force industrial solutions to conform to the methodology described herein. However, this Technical Report revision provides a mature technical description for developments of multibiometric systems. It will also provide a reference on multibiometric fusion for developers of other biometric standards and implementers.

Information technology — Biometrics — Multimodal and other multibiometric fusion

1 Scope

This Technical Report contains descriptions of and analyses of current practices on multimodal and other multibiometric fusion, including (as appropriate) references to more detailed descriptions.

This Technical Report contains descriptions and explanations of high-level multibiometric concepts to aid in the explanation of multibiometric fusion approaches including multi-characteristic-type, multiinstance, multisensorial, multialgorithmic, decision-level and score-level logic.