



FIReBIRD – Facial Image Recognition Benchmark Including Realistic Disturbances

International Face Image
Database

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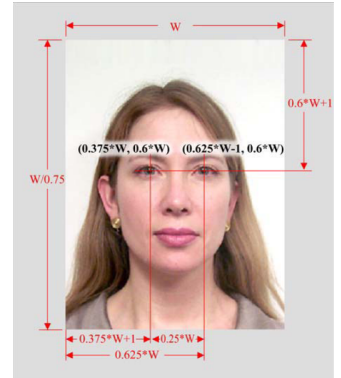
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The ISO standard for biometric face images (ISO/IEC 19794-5 Biometric data interchange formats – Part 5: Face image data) which is in particular used for the acquisition of facial images for e-passports defines a number of scene, photographic quality and digital requirements for facial images.

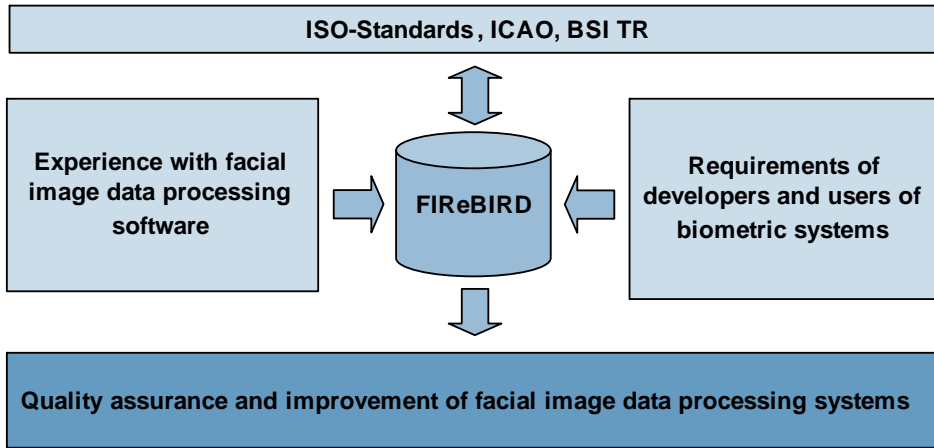
In the past, the assessment of these image properties during application for an e-passport was usually performed using manual tools such as photograph sample tables and templates. By means of a quality assurance software (QA software) not only photographic image properties (such as pose, head and image size, height-width ratio) but also technical image properties will be automatically checked in the future.

Experiences with QA software, however, show that a correct evaluation of facial images on the basis of the standard is not always possible. Reasons for insufficient performance of QA software are e. g. inaccurate specifications or requirements in the standard document that cannot be automatically checked with state-of-the-art technology.

Therefore a collection of facial images including valid and invalid images with respect to the ISO standard is needed for performance and conformance testing and for the development of new algorithms.



Sample image showing geometric
format requirements for facial images
[ISO/IEC 19794-5]



Project Objectives

The objective of the FIReBIRD project series (Facial Image Recognition Benchmark Including Realistic Disturbances) is quality assurance and improvement of facial image processing systems. For this reason a facial image database shall be built that can be used for conformance and performance tests of facial image processing systems (e.g. systems for automatic face recognition or for quality assessment of facial images based on ISO/IEC 19794-5).

The first subproject started in June 2008 and is carried out by Fraunhofer IGD on behalf of the German Federal Office for Information Security (BSI). The goal is to develop a concept for the creation of an internationally available and composed database, jointly with the American National Institute of Standards and Technology (NIST) and the British National Physical Laboratory (NPL).

Furthermore the requirements of regulation documents shall be analyzed and recommendations shall be developed for adaptations and extensions of the ISO standard.

Project Overview

The requirements defined in the ISO standard concerning photographic and technical image properties shall be reviewed. A *ground truth* shall be defined by specifying and describing a defined reference value or a general reference point for each required image property. In the following the *qualitative extent of the image database* shall be specified, i.e. for each relevant image property variants for valid and invalid images shall be determined.

It can be expected that *morphological face properties* – such as certain face or nose shapes, mouth curvature, characteristics of the eye area – will also have

an impact on the performance of face recognition systems. The objective is to include the semantics of the face based on the state of the art of anthropological and forensic expertise.

A *test setup* shall be developed to produce all specified image types by photographic actions and/or operations using (software) tools. The developed structure shall be reusable and suitable for generating big amounts of data (some thousand images). In addition, at least one photo per identity shall be made with a 3D camera system presenting the head in a neutral pose.

The developed concept will be implemented in a *proof of concept*, verified, and, if necessary, adjusted. The test setup shall be used to verify that all facial images required for the database can be produced.

Furthermore, based on the analysis of requirements for facial images and the experiences with biometrically supported verification of official documents, recommendations shall be developed for the adaptation of regulating documents (ISO standards and technical directives), which shall be introduced to the related bodies.