# IriCore

*State-of-the-Art Iris Recognition Software Development Kit*
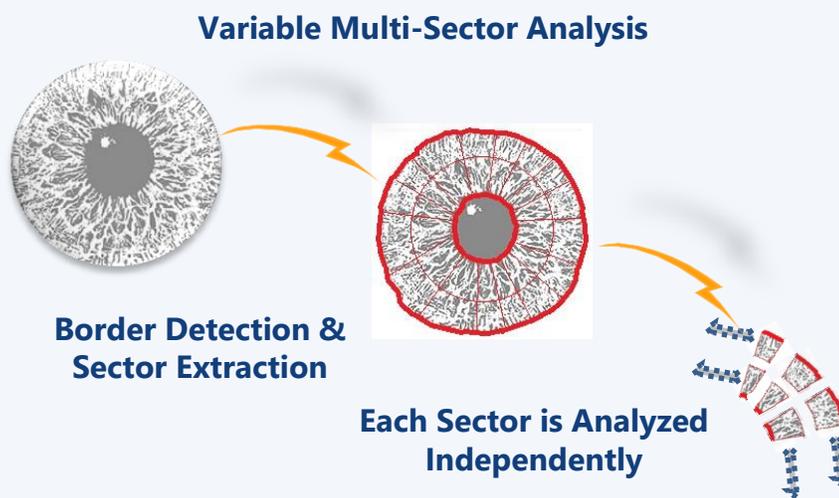


**Iritech, Inc.**
Technology with the Iris

## Overview

IriCore SDK is an iris recognition library that provides various application programming interfaces (APIs) and functions to generate iris templates from iris images for enrollment and to match an iris image against array of iris templates for identification. IriCore SDK is intended for biometric system developers or integrators to develop security applications using iris recognition. IriCore SDK is designed for large-scale iris identification applications and enterprise applications on Windows and Linux platforms.

IriCore SDK consists of various IriTech's accurate iris segmentation and fast matching algorithms based on the variable multi-sector analysis world-wide patent. IriCore SDK also consists of image quality assessment algorithms to perform the analysis of image quality. IriTech's highly-acclaimed iris recognition technology has been examined and proven in many systems and evaluated by prestigious organizations such as NIST (National Institute of Standards and Technology).

### Variable Multi-Sector Analysis

**Border Detection & Sector Extraction**

**Each Sector is Analyzed Independently**

### KEY FEATURES

- Support various image formats including raw and compressed images format like BMP, JPEG, JPEG2000.

- Supports ISO iris image interchange formats such as uncompressed (K2), cropped (K3), cropped and masked and polar (K7) image formats.

- Support various ISO standard quality metric (IREX II) for quality assessment like sharpness, contrast, iris texture, usable iris area, and self-defined metric.

- Support multiplatforms (Windows and Linux) and multiple programming languages (C/C++, .NET and Java).

- Thread-safe capability for multithread applications.

- Short learning curve with simple, easy-to-use, and well-engineered APIs.

- Non-linear detection of iris border and pupil border

- The region between pupil and iris is decomposed into a multitude of sectors

- Each sector is allowed to deform independently while still maintaining overall coherence

The variable multi-sector analytic method selectively utilizes only the good portions of the captured iris image. Even if the iris image is adversely affected by eye glasses, contact lenses, tears, eyelids, or eyelashes, IriCore SDK can operate with no discernible performance degradation as long as at least 50% of the iris image sectors are good at the time of enrollment and at least 25% are good at the time of identification.

IriCore SDK supports any iris scanners available on the market. Besides, IriTech also provides a cost-effective version, IriCoreLite SDK, an Iris SDK that is exclusively intended for IriTech's iris scanners. IriCoreLite SDK is designed for large-scale iris identification applications on PC and enterprise applications using IriTech's iris scanners.
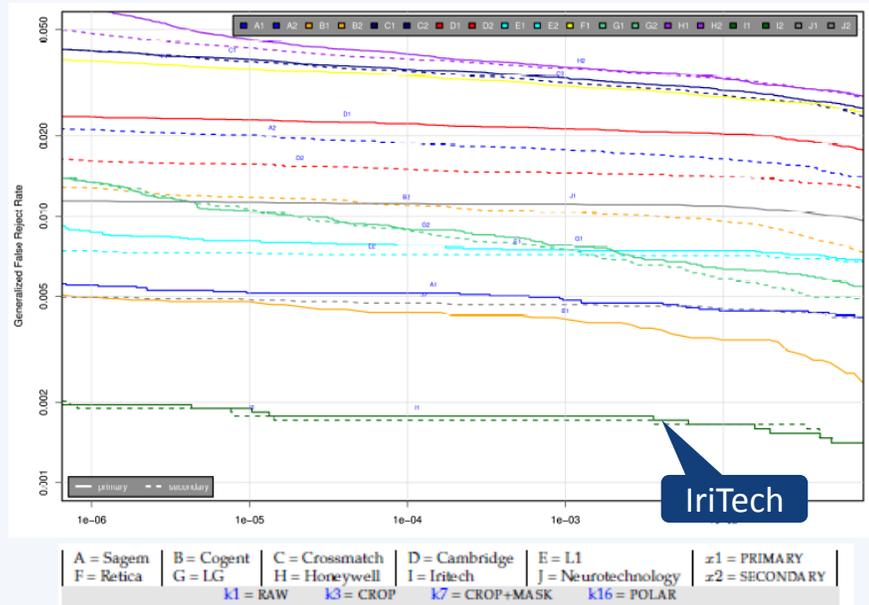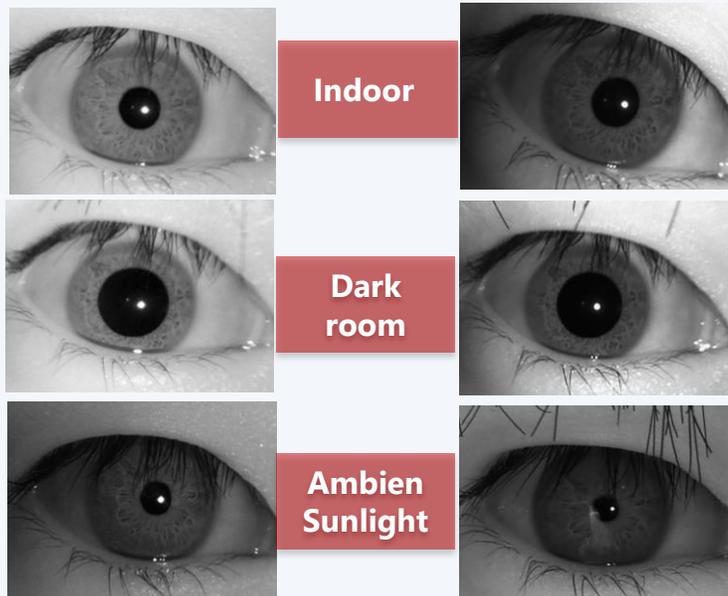
## Superior iris recognition algorithms

IriCore is an iris recognition SDK which has been developed by IriTech for many years. All of the IriTech's state-of-the-art iris recognition algorithms packaged in IriCore have been tested and proven to be solid in performance by the NIST's ICE & IREX.

1. Highly accurate iris segmentation for feature extraction based on variable multi-sector analysis and non-linear segmentation

2. Robust to various obstructions to the images like pupil dilation due to different levels of illumination .

3. Ability to handle images with visual noise or blurry by a strong image enhancer.

4. Power occlusion detection algorithms to eliminate eyelids and eyelashes to enhance the accuracy.

5. Fast and accurate iris matching algorithms for large-scale applications

6. Strong image quality assessment algorithm which provides various quality metrics.

With the aforementioned characteristics, IriTech's iris SDK was proven as the most accurate and interoperable algorithm by NIST report.

*[Graph taken directly from NIST's IREX I Test Report, Page 41]*

| A = Sagem | B = Cogent | C = Crossmatch | D = Cambridge | E = L1 | x1 = PRIMARY |
| F = Retica | G = LG | H = Honeywell | I = Iritech | J = Neurotechnology | x2 = SECONDARY |
| | | k1 = RAW | k3 = CROP | k7 = CROP+MASK | k16 = POLAR |

Indoor

Dark room

Ambien Sunlight

*Example images of pupil dilation due to illumination*

The speed of IriTech's latest algorithm measured on a PC (Intel Core i7, 6 cores, 3.33 GHz, 12GB RAM) is as follows.

❖ Template generation speed: 8.42 templates/ sec/ core (for 640x480 pixels iris images).

❖ Template matching speed: 293,000 matches/ sec/ core (for 1:1 matching) and 388,000 matches/ sec/ core (for 1:N matching).

## Accurate Image Quality Assessment Algorithms
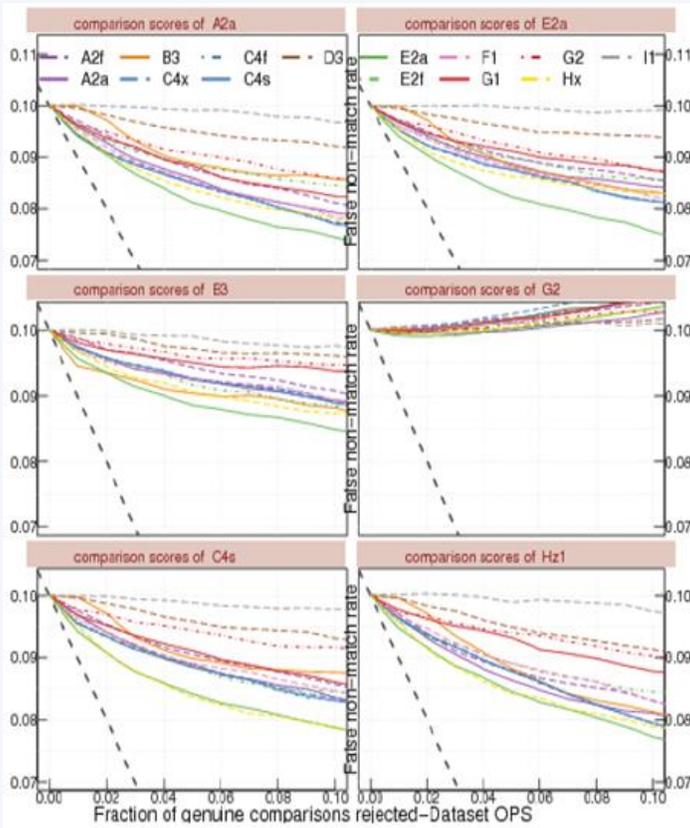


*FNMR vs. quality rejection rate. "E2a [IriTech] is the best performer, followed by Hx and F1." [IREX II Report, Fig. 13, page 56]*

Performs a quality check for iris images which is important for enrollment, verification, identification or de-duplication. IriTech's image quality assessment algorithm has been proven as the most accurate ones in IREX II.

*Why quality assessment important?*

◉ During image acquisition, it can be used for real-time selection of the best image out of streaming video. It also provides feedback to improve quality of image capture

◉ During enrollment and identification, it can help reject unqualified images and provide actionable feedbacks to improve the accuracy.

◉ High correlation of quality score with matching accuracy helps reduce error rates

| Metric | | Metric | |
|---|---|---|---|
| 1 | Scalar overall quality | 10 | Margin |
| 2 | Gray level spread | 11 | Sharpness (defocus) |
| 3 | Iris radius | 12 | Motion blur |
| 4 | Pupil iris ratio | 13 | Signal to noise ratio |
| 5 | Usable iris area | 14 | Magnification |
| 6 | Iris-sclera contrast | 15 | Head rotation |
| 7 | Iris-pupil contrast | 16 | Gaze angle |
| 8 | Iris sclera boundary shape | 17 | Interlace |
| 9 | Iris pupil boundary shape | 32-64 | Vendor-defined metrics |

*Full support of IQCE (IREX II) Quality Metrics + Self-defined Metrics*

## Available APIs

### Iris Enrollment

Performs enrollment of an iris image by extracting template from iris image and store it into the SDK gallery.

### Iris Identification (1:N)

Performs a one-to-many comparison of the given template/image with the enrolled iris templates in the SDK gallery to identify the individuals that are most likely represented by the given template/image.

### Iris Verification (1:1)

Performs a one-to-one comparison of the given template/image with the stored biometric templates in order to verify that the individual is the person he or she claims to be.

### Iris De-duplication

Similar to identification, but it determines the first one among the biometrics database matching with the captured iris image.

### Image Quality Evaluation

Evaluate the iris image quality and assign a scalar quality score to various quality metric from ISO/IQCE

## About IriTech

IriTech is a global leader in Iris Biometric Technology. Our passionate team are diversified Iris Recognition researchers and engineers supporting different OEM partners in various industries such as Mobile, Banking, Health Care, Education, Military and Government.

By focusing on quality and staying up-to-date, IriTech features a high level of data security and identity control with a multifunctional iris scanner and iris recognition software provided to end-users worldwide.

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