



The face recognition company





Cognitec develops market-leading face recognition technologies and applications for customers and government agencies around the world.

Face recognition is a complex technology that is used in a variety of applications. Cognitec's products implement efficiently the different processes involved in today's identity management systems using facial data:

- acquisition of standard facial photographs
- duplicate check
- background check
- real-time identification in video streams

At the same time, Cognitec's products enable new commercial and consumer applications using facial data:

- recognizing VIP customers
- enabling digital signage devices to tailor advertisements
- analyzing people flow by count, age, gender and other measures
- indexing and sorting photographs in photo albums

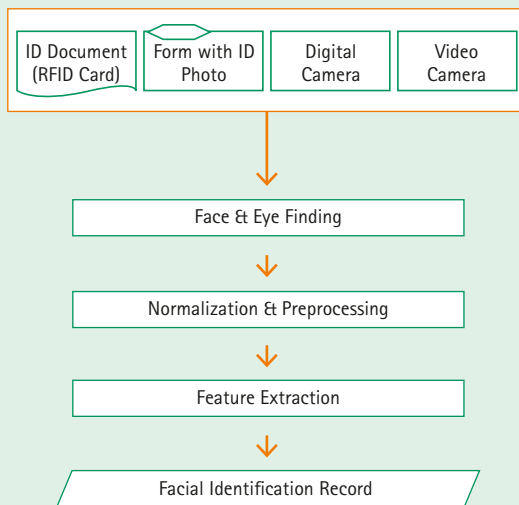
Biometric performance has always been a major focus of Cognitec's R&D. Continued tests of government authorities and industry have validated Cognitec's leadership position within the face recognition market since 2002, resulting in a track record of successful reference projects worldwide.

Leading the Industry

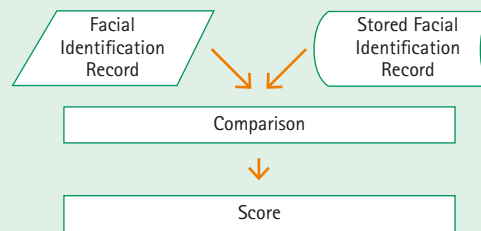
Cognitec's patented FaceVACS technology accurately recognizes persons – independent of variances that appear on human faces. More specifically, this technology handles pose, mimic, age variance, as well as variances coming from a new hair style, glasses or temporary lighting changes.

Our long-standing algorithmic research, optimization and fine-tuning have resulted in best-in-class independency from variances in facial appearance. FaceVACS provides excellent verification and identification results. Performance, that is accuracy and reliability of the recognition engine, is the key to the quality of face recognition systems.

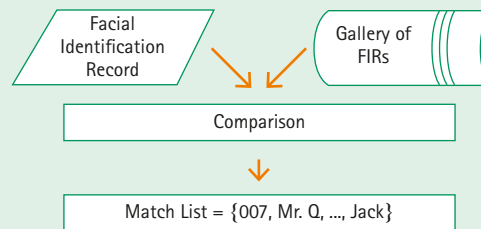
Enrollment is the process of generating a Facial Identification Record from any kind of digital image source showing a face. The face and the eyes positions are detected on the media, the facial image information is filtered, and the features are extracted and transformed to a Facial Identification Record.



Verification mode: An image is processed and compared to a reference record. Based on the similarity threshold, the identity is verified.



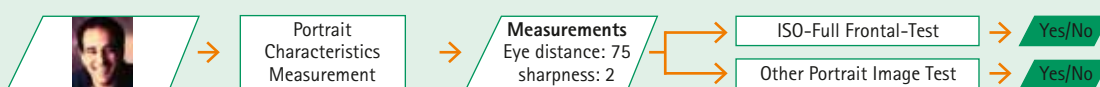
Identification mode: An image is processed and compared to a database of reference records. The most similar reference data are taken as an evidence of the person's identity.



Face Tracking is the process of locating one or several moving faces in time and space on a video stream. The FaceVACS tracking algorithm analyzes the video stream frames in real time and delivers the face tracks as they appear on the video stream. Face and eye finding technology is used to determine position and size of faces on video frames. Face tracks are determined through the temporal and spatial closeness information of the various face positions and sizes.



Portrait Characteristics like face geometrics, exposure, sharpness, eyes open, mouth open, glasses as well as ethnicity, age and gender, are measured by a portrait characteristics measurement module. The measured data is input for tests like the Full Frontal Image Type test according to the ISO 19794-5 standard. Also, a significant subset of those measurements can be used to determine the quality of a facial image in terms of suitability for face recognition.



Applications

Face recognition technology can be applied in many different ways. The main market today is security related, but there are a variety of applications emerging related to personal use, convenience, productivity enhancement and more.



Security

Face recognition technology can help enhance security in areas where it is important to verify the identity of persons based on facial images. Examples of such applications include border control, passport or driver's license issuance, law enforcement investigations, video surveillance and physical access control.



Public security

There is a fast growing demand from government, law enforcement, retail and industry customers for solutions to identify persons from live video cameras or video footage.

Cognitec has addressed this demand by offering products that are optimized for the analysis of video streams, in order to detect, locate, track, and identify faces by real-time comparison to watch list databases.

Matching Product: [FaceVACS-VideoScan](#)



Border control

The worldwide deployment of electronic travel documents like ePassports are revolutionizing border control applications.

While border control officers are using biometric tools to increase the security of immigration processes, self-service immigration using ePassports and face recognition is now a reality at many airports. Face recognition, in combination with ePassports, ensures the secure verification of the traveler's documents and identity, allowing for streamlined and cost-efficient immigration procedures.

At passport checkpoints, facial traits are captured automatically and passenger friendly. The high-quality images are passed on to a verification unit (as provided by the FaceVACS engine) and compared with the digital image from the ePassport. The captured image can also be forwarded to a video screening system (as provided by FaceVACS-VideoScan) and checked against a watch list of undesired immigrants in real time.

Matching Products: [FaceVACS-VideoScan](#) / [FaceVACS-SDK](#)

Cognitec offers essential components that allow fully customized integration into existing and future border control systems.

Use high-quality photos
Cognitec offers products to assure optimized capturing of photos as well as to check if images meet the requirements for the respective photo-ID document (e.g., compliance with the ISO standard 19794-5 for facial image quality).



Issuing of photo-ID documents

International travel documents like ePassports, eVisas as well as national identity documents and drivers' licenses represent essential prerequisites for national security. Photo-ID documents are also used by private enterprises, health insurance organisations, and more.

Prevent ID fraud

Issuing agencies have to make sure that applicants cannot gain ID documents that enable a 'second identity'. Checking applicants photos by facial appearance helps to minimize such fraudulent attacks. FaceVACS-DBScan is an answer to the challenge of finding duplicate faces in large photo databases, and is ready for integration into existing issuing processes.

Furthermore, there are certain requirements related to the quality of images to be used in combination with photo-ID documents which can be checked by the portrait characteristics test of FaceVACS-SDK.

Matching Products: [FaceVACS-PortraitAcquisition](#) / [FaceVACS-DBScan](#) / [FaceVACS-SDK](#)



Law enforcement - criminal investigation

Similar to a fingerprint search (AFIS) system, face recognition technology can assist law enforcement agencies to identify suspects. Whenever a photograph or video footage of a suspect is available, the images can be compared to image databases of known criminals and show the most similar faces (match list).

Similarly, the system can be applied to missing persons. This capability has turned out to be a very useful tool in the investigation process.

Matching Products: [FaceVACS-DBScan with Examiner tool](#)

Law enforcement – mobile identity check

Identifying suspects on the street by mobile devices has become a requirement by police, intelligence and military forces.

Cognitec's face recognition technology has been made available on handheld devices so that a photo of a suspect can be captured and compared to image databases on the device as well as on central systems connected through mobile networks.

FaceVACS-SDK enables customers to integrate face recognition technology into their existing applications on mobile devices. It provides a clear and logical API, is easy to integrate and to redistribute to customer applications.

Matching Product: FaceVACS-SDK



Physical access control

Access to buildings, office space, stadiums, and other locations can be made more secure by authenticating authorized persons using face recognition.

This is an example of a 1:1 verification application where the image captured by a camera is compared to the image stored for the authorized person.

Matching Product: FaceVACS-SDK



Convenience and Productivity

The use of digital cameras has become wide-spread in recent years. Large amounts of photographs are being handled by private PC users or uploaded on various websites. Face recognition technology can help use such images more efficiently. This is one of many examples where face recognition is present in daily life. Examples of application areas that take advantage of face recognition include photo albums, event photography, VIP recognition, digital signage and automotive applications.

Photo album application

Collections of photographs or movies can be searched by face recognition software in order to identify known persons; as a result, photos or videos can be 'indexed' automatically. Such applications can run on PC's or websites.

Matching Products: [FaceVACS-DBScan](#) / [FaceVACS-SDK](#)



Web applications

Several website providers offer users the ability to compare facial photographs with databases, e.g. of celebrities or user groups. The most similar faces are then displayed to the user.

Matching Products: [FaceVACS-DBScan](#) / [FaceVACS-SDK](#)



Event photography

Professional photographers take a large number of photos at events like cruise ship dinners, leisure park visits, award ceremonies, etc.

Face recognition software helps sort these photos by person so that only the relevant photos will be offered to the potential buyer.

Matching Products: *FaceVACS-DBScan / FaceVACS-SDK*



VIP recognition

An example of 'positive watch list' applications, registered customers in clubs, bank branches, or leisure parks can be automatically identified to allow access or to offer special handling.

Matching Products: *FaceVACS-VideoScan / FaceVACS-SDK*



Digital signage

Cognitec's technology can not only identify persons by their faces but also dynamically detect certain personal attributes from the facial appearance, like gender, age, ethnicity, glasses present, etc. These attributes can be used to tailor advertisement messages to the actual audience.

Matching Product: *FaceVACS-VideoScan, FaceVACS-SDK*



Automotive applications

Automobile manufacturers have started to incorporate cameras in cars and trucks. Analysing the faces of drivers and fellow passengers can help to enhance convenience as well as safety, e.g. by identifying the driver, detecting the head positions, detecting gaze direction, detecting closed eyes, etc.

Matching Product: *FaceVACS-SDK*

FaceVACS Products

Cognitec develops and markets face recognition products based on the world-leading FaceVACS technology.

We provide our customers with easy-to-use, flexible and customizable software. Easy integration of our products is ensured through open system architecture and professional support.

In terms of biometric recognition accuracy, response times, scalability, and product reliability, the company's track record is impressive. Please check the corresponding product specification documents for details.

FaceVACS-DBScan



Photograph matching in large databases

FaceVACS-DBScan surveys databases of biometric identities (i.e. trusted face photographs) and other closely related data. This product supports the biometric identification and verification of persons who are members of a large group.

Human inspectors rely on FaceVACS-DBScan to examine non-similar identities automatically, while controlling thresholds and match list sizes. The system then proposes and presents the most similar identities only. This saves time and effort and is less error prone.

FaceVACS-DBScan Examiner tool

The Examiner tool helps investigators identify individuals in crime scene photos and surveillance videos by matching facial images against the agency's mugshot repository. Examiner provides the user with a toolset to analyze and enhance crime scene facial probe input, run searches and examine the resulting candidate lists. It provides a set of innovative tools that helps identify the person in question in a timely manner, allowing investigators to act upon the search results in the critical time period after a crime has been committed. Multiple users can work in parallel on a single investigation case. The toolset includes pose correction through 3D morphing.

FaceVACS-PortraitAcquisition



Acquiring and assessing digital portraits for photo-ID documents

FaceVACS-PortraitAcquisition streamlines the production of high quality portraits for photo-ID documents which are at the same time suitable for face recognition.

The product features a graphical user interface to visually supervise and operate the acquisition process as well as to assess key technical characteristics such as frontal pose, uniform lighting, glasses and open eyes. This product can be specifically configured to assess if an image complies with the ISO 19794-5 standard FullFrontal image type mandatory requirements and best practice recommendations. An Integrators' Kit also allows easy integration into existing document issuing processes and applications.

Cognitec's FaceVACS-PortraitAcquisition application is currently the only photo quality assessment tool that received government certification.

FaceVACS-VideoScan



A new generation of computer-assisted video surveillance

FaceVACS-VideoScan automatically scans incoming video streams, detects multiple faces and checks for possible 'watch list' matches. If a match is found, operators are notified - in real time - allowing them to focus on the identified person instead of simultaneously observing multiple video screens. Applications include not only the identification of unwanted people in public places, but also the identification of high-ranking customers.

FaceVACS-VideoScan includes powerful camera controls that allow the use in environments with difficult light conditions. The product also comes with an Integrator's Kit so that it can be seamlessly integrated into other video processing solutions.

FaceVACS-SDK



Development kit brings FaceVACS technology to integrators

FaceVACS-SDK enables customers to develop new face recognition applications. It provides a clear and logical API, the comprised FaceVACS engine is easy to integrate and to redistribute to customer applications.

FaceVACS-SDK covers the biometric functions (use cases) of Enrollment, Verification, and Identification. It supports multiple algorithms and works with either popular two-dimensional intensity data, or two-dimensional intensity data plus corresponding range data (3D data). The algorithms are tailored and available on multiple platforms ranging from mobile hand-held devices to high-end servers.

FaceVACS-SDK also offers face-related non-biometric functionality: Face finding and tracking, face cropping, image quality assessment as required for photo-ID documents, estimation of person properties like age, gender, ethnicity, and more.

FaceVACS Performance

Various tests by independent organizations have demonstrated that Cognitec's face recognition technology is industry leading in terms of recognition accuracy and speed.

NIST

FRVT 2002: At the Face Recognition Vendor Test 2002, conducted by the National Institute of Standards and Technology (NIST), Cognitec's face recognition software exhibited the best performance among all participants for large-scale verification, identification and watch list scenarios.

FRVT 2006: The NIST test conducted in 2006 confirmed the outstanding performance of Cognitec's technology.

Of 22 companies and research institutes that participated in FRVT 2006, only Cognitec and 10 participants could complete the large-scale tests, and only Cognitec and one other company could deliver measurements in four different test scenarios for still images and 2D/3D data.

The results also demonstrated that Cognitec exceeded the goal specified by the so-called Face Recognition Grand Challenge, or FRGC, which was to prove increased recognition performance by an order of magnitude as compared to results measured during FRVT 2002. Cognitec again delivered top performance in the majority of the tests, especially with regard to common real-world scenarios (low resolution imagery).

MBE 2010: The latest NIST test (MBE 2010, first part: MBE-STILL) was completed in August 2010. The results reaffirm the excellent performance of Cognitec's algorithms, in particular for identification use cases, and again show a substantial improvement over the performance reported in the previous test.



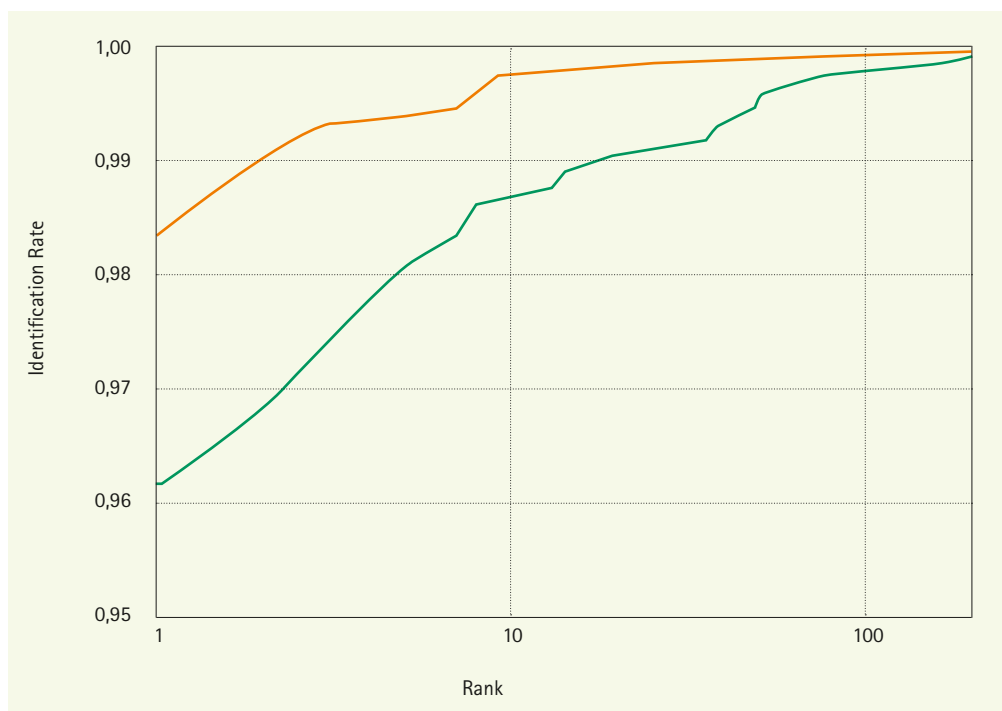


Identification performance

Neither of Cognitec's algorithms is specifically optimized or trained on databases used for tests, like the FERET database. Training and optimization is only done on internal proprietary databases which do not contain data from test databases. Consequently, Cognitec's test results can be generalized to similar unknown sets of data.

The 'Duplicate I' test involves the following subsets of the FERET database: a gallery including 1196 images of 1183 persons and a probe set of 722 images of 242 persons.

The lower curve is based on the FaceVACS engine used in FRVT 2006, the upper curve on the latest FaceVACS recognition engine B5.



Closed-set identification performance in Grayscale FERET Duplicate I Test

— B5 engine

— B2 (FRVT 2006) engine

Reference Projects

Cognitec's technology has been deployed for numerous applications and by many customers world-wide.

Here are a few examples:



Australian Government Passport issuance: The Australian Department of Foreign Affairs and Trade (DFAT) is using Cognitec's face recognition software within the passport issuance process. Passport applications are compared against DFAT's database of more than 10 million images from previous applications. This allows DFAT to detect applicants who are trying to obtain a duplicate passport or to obtain a passport using a stolen identity. Cognitec also supplies software to DFAT that is used to check the quality of passport images against ISO 19794-5 specifications.



German Government Visa issuance: Cognitec's software enables the Federal Office of Administration to compare the photographs of visa applications against the database of existing records. Since photographs have become mandatory on visas, the agency already collected more than 10 million records and expects to have more than 20 million in a few years. The Federal Office of Administration is one of the first agencies in Europe to introduce a database background check based on facial images.



Canadian Bank Note: Canadian Bank Note Company's identification systems division was awarded four contracts in 2008 and are integrating Cognitec's facial recognition technology into these secure identity solutions. Having previously evaluated Cognitec as providing the best overall facial recognition technology, Canadian Bank Note Company was very pleased with these successes and is looking forward to a long-term relationship and many more wins.



FaceFirst Biometric Identification Platform: The FaceFirst® web-based BIP leverages Cognitec's industry leading algorithms, the most efficient image processing technology, and an advanced notification and alerting system. FaceFirst's® patent-pending technology is specified on the US Department of Defense APL and is on the GSA schedule. The infinitely scalable FaceFirst® BIP is architected as a true technology platform, designed to meet the specific needs of each client while integrating with existing infrastructure.

About Cognitec

Cognitec was founded in 2002 by a team of experts who recognized the growing need for software solutions in the field of biometrics.



Our founders have been working on specific algorithms for face recognition technology since 1995. Commencing as early as 1996, government and industry customers began relying on the FaceVACS technology for a wide range of applications.

Our technology and products build upon the extensive knowledge of our scientists and software engineers. This continuing dedication aims to deliver the best performance available on the market. We also offer customization of our products for special needs. Technical support for customers is an essential part of our offerings. Working with system integrators is Cognitec's prime business model, providing our partners with industry-leading performance, open system architecture, and professional support. Various government customers are successfully using Cognitec's software to prevent identity fraud during passport, visa, or driver's license issuance. Software companies all over the world are developing new applications using our software development kit.

Cognitec's products are easy to use, flexible, extendable, and take into account current industry standards. Easy integration of all our products is ensured, assisted by excellent documentation, tutorials and training. In various independent evaluation tests, FaceVACS has proven to be one of the leading products on the market. A successful track record of our products confirms excellent performance in terms of biometric recognition accuracy, response times, scalability, and reliability. In order to be close to our worldwide customers, Cognitec has established sales and support offices in the United States, Hong Kong and Europe.

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