

**FaceVACS-DBScan** finds duplicate images in large databases by comprehensive facial image analysis. The application quickly compares images from various sources to those stored in multi-million image databases, resulting in user-adjustable candidate lists. Beyond running as a ready-to-use application, FaceVACS-DBScan's open programming and database interfaces allow for integration into any customer application and infrastructure.

### FaceVACS® technology

#### Incorporates B6T8 engine

##### Engine is robust against

- typical gesture changes
- pose (+/- 15° deviation from frontal image)
- partial face occlusion
- beard and hairstyle changes
- glasses (except dark sunglasses)
- lighting changes that do not cause strong shadows

#### Minimal image requirements for facial recognition

- sharp image
- one face is completely visible in the image
- inter-pupil spacing larger than 32 pixels
- at least 64 grayscales within the face area

#### Image requirements for optimal facial recognition

ISO 19794-5 compliant Token Frontal or Full Frontal Images

### Functionality

#### Biometric identity search

- one-to-all and one-to-few identification
- one-to-one verification
- customizable candidate list size (by number of images or by a score threshold)
- candidate list sorted by score
- Examiner application for advanced identity investigations

#### Definition of gallery subsets

- pre-binning by using demographics
- flexible subset definition at configuration time
- allows post-binning after candidate list retrieval

#### Interactive enrollment

- from any digital facial image
- supports visual inspection and manual annotation
- allows re-enrollment

#### Bulk processing

- access to external face photograph databases; can adapt to various naming schemes
- efficient batch enrollment, configurable batch jobs
- interactive correction of failures
- import of demographics
- constant progress feedback

#### Case management

- configurable demographics
- audit logging of operator activities
- query wizard for efficient data inspection and administration

#### Administration

- GUI supported configuration
- GUI supported cluster monitoring
- trigger external applications

### Data storage

#### Case data

supports person identifier (PID) to link cases of the same identity candidate list sorted by score

#### Facial images

- one or more facial images can be assigned to a case
- for each facial image, the eye positions, creation time, data source/ origin and photo quality are stored
- lossless photo storage (optional)

#### Demographics

stores case-related data, like name, year of birth, gender, region of birth, etc. (configurable)

#### Audit logging

- records all activities of the system
- highly configurable (mandatory: time stamp, operator and action)
- audit log database can be physically and / or logically separated from the case database

### Security and access

- supports access profiles
- server-side controlled
- configurable
- PKI infrastructure

### Scalability

- single CPU core @ 2.67 GHz processes up to 1.2 million facial comparisons per second in multiple probe optimization mode
- self-balancing and scalable architecture allows FaceVACS-DBScan cluster configuration according to customers requirements

#### Disclaimer

Face recognition technology, like any biometric application, cannot provide 100% recognition accuracy.

## Client server application

### Topology

- powerful 3-tier application of database server, computation cluster and clients
- computation cluster consists of one or more cluster controllers and multiple computation nodes
- communication protocol is TCP/IP
- central cluster configuration

### Clients

- Client applications requesting services from the server are either
- Cognitec graphical user interfaces or
  - customer developed applications using the Cognitec integration interface

## High availability

- supports cluster configurations avoiding single points of failure
- multiple cluster controllers (active, standby)
- multiple hot spare nodes
- automatic reaction to cluster controller or computing node malfunction (e.g. hardware failure)
- dynamic cluster reconfiguration at runtime (e.g. adding / removing computation nodes and cluster controllers)

## Database inspection

- preconfigured batch jobs for database inspection
- cross identification to support database de duplication (horizontal cleansing)
- mates identification to find cases of different identities but with the same person ID (vertical cleansing)

## Language support

- English
- other languages on request

## Technical facts

### Image format support

JPG, JPEG 2000, PNG, BMP, PPM, PGM, XFD

### Operating system

- Windows XP SP2
- Windows Server 2003 SP1
- Windows Server 2008
- Windows 7
- Suse Linux Enterprise Server 10
- 32 bit/64 bit versions

### Database

- runs with Oracle 10g, Oracle 11g, MS SQL Server 2005 and 2008, IBM DB2 9.1
- other databases on request

### Minimum hardware requirements

- CPU @ 1.8 GHz, SSE2 support, 2 GB main memory
- 2.5 GB free disk space
- covers a gallery of 100k enrollees

## Integrator's kit

Documented customer integration APIs and database schemes supporting a smooth integration, allowing for customized processing and accessing of data

### Functionality available through API

- enrollment
- identification (one-to-all, one-to-few, one-to-subset)
- verification (one-to-one)
- candidate list retrieval

### API programming languages

- C++ interface; network access to remote FaceVACS-DBScan installations
- Web Services API

### Database

- published, extensible and adoptable database scheme
- flexible tools for import of data from existing image repositories

### Integration methods

documented integration methods and best practices

## Examiner

### Investigation case management

- create investigation case
- add probe images to cases
- generate and maintain candidate lists
- inspect image pairs
- manage watch list and exclude list
- print reports

### Inspection views

- superposition of probe and candidate image
- measurement of angles and distances
- single or side-by-side line blending

### Image Enhancement

- modify images to bring out facial data using various filters
- pose normalization filter using 3D technologies to create frontal views from off pose images
- de-interlace filter for images from interlaced video
- median filter to remove noise
- histogram to correct contrast
- band pass to enhance certain frequencies of the light spectrum
- face cropping to isolate a single face
- aspect Ratio to correct for known camera or lens distortion