



BIOwatch - Biometric Image Optimization



ID*Watch®

Advantages and Benefits of the NextgenID® BIOwatch

- Scalable and Modular
- Can add multiple cameras and servers for increased surveillance coverage, and pose angle coverage
- Can add multiple Lookout Servers for increased face recognition speed and throughput
- Can capture faces of persons walking at speed of up to 2-3 meters per second ("fast walk")
- Adjustable shutter speed can be set for persons moving at walking speed
- Frame rate of 10 fps at resolution 1024x768 allows capture of several faces per camera as someone walks through a region of interest
- Ideal for surveillance
- Cameras are manually configurable from the application
- Includes Shutter Speed, Gain, and Gamma Correction. This allows camera to be configurable for different environmental and lighting conditions, and also different expected movement speeds of subjects.
- Replicable optics using C-Mount lens allows for configuring coverage region, lens speed, and depth of field.
- 3 different resolution settings to allow for compromise between resolution (coverage) and capture frame rate.
- Detection and Capture of Multiple Faces per Frame
- Proprietary face finding technology detects and captures multiple faces in any given image frame.
- Can capture faces of multiple persons walking abreast (side-by-side).
- Only cropped faces are passed to face recognition engine to provide clear probe (live) image reference and to reduce bandwidth, storage, and processing requirements.
- Multiple and Selectable watch lists
- Operator can select to enable or disable any number of existing watch lists
- NextgenID® WatchList Enrollment application allows for enrollment of either files images or live captured images



The NextgenID® BIOwatch Process

- The Camera captures live video. These images may contain several people at one time in addition to landscape or architecture and other unusable information.
- BIOwatch System detects faces from the live video and crops faces out of each video frame.
- A central security operator is alerted of found matches by the BIOwatch and confirms the match.
- The cropped faces are compared and matched to face images in the watch-lists. Watch-lists are created from existing photos or live camera images.
- Alerts can be created either automatically or by the operator and are sent to the proper authorized personnel.

BIOwatch Processing Capabilities

Once faces have been isolated and extracted they need to be processed. An organization's specific security requirements will determine how to store the faces in a distinct watch list for potential use at a later date. Images can be stored as pictures, or created as templates and stored in the WatchList database.

Security personnel have the option of immediately processing the faces into templates and then performing a matching process against one or multiple watch lists. If a matching process is required then it will also require an Output function.

A core ability of the BIOwatch is to find faces and then process them. In those instances when the processing requires a matching procedure there must now be an Output of the result. This Output can be represented as a match on a screen or monitoring terminal or it can add the ability to open a door, generate an alarm, or even send the match photo image out to a PDA or cell phone.



Deploying the BIOwatch for Surveillance

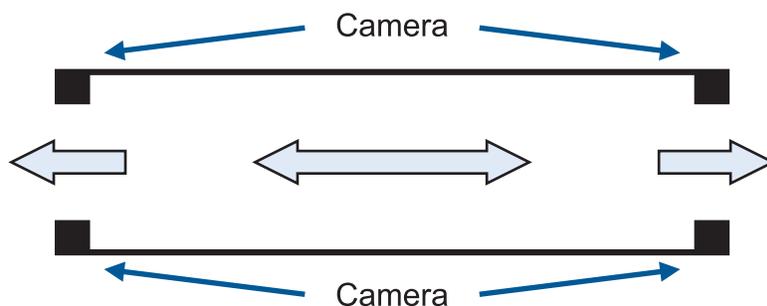
Before deploying BIOwatch in a surveillance situation it is imperative to define what security problem the organization is attempting to solve with that action. For instance, if the goal is to capture a fugitive who is attempting to cross a border it is not enough to merely have a camera, an organization must have security personnel in close proximity so that if the BIOwatch identifies that person of interest that information can be immediately put into action.

BIOwatch Deployment Core Parameters

Once the security objective has been defined, then the process of engineering the solution starts. For face recognition to be effective it is necessary to understand the concept of a Capture Zone.

Capture Zones

For face recognition to be effective it requires some baselines for image size and angle as well as lighting. An additional baseline is needed to determine direction and speed of images that need to be captured for processing. Based on all of these factors it is then necessary to determine in which areas of the security area are going to be labeled the Capture Zone, or in other words that area where the cameras will be placed to capture faces with highest degree of success. The Capture Zone is a volume of space that is determined by height, length, and width. For instance, in a corridor that is 20 meters long, 3 meters wide and 4 meters high, there may be 2 Capture Zones of 2 meters each at each end of the corridor as demonstrated below.



Watch Lists

When used in the context of the BIOwatch a Watchlist is a discrete population of facial images. These images may or may not have any other data, biographical or otherwise related to them. A watch list can be populated with as many images as desired but to be effective the images must be of sufficient quality to perform facial recognition.

Face Recognition Variables

In order to engineer successful Capture Zones we must first consider:

1. Height of camera to determine face angle
2. Light conditions
3. Distance of camera to subjects to determine minimum and maximum image size
4. Flow of people

Once conditions 1-3 are determined to be in the proper range for face capture and face recognition, then condition 4 is left as the basic metric that we must clarify with the following questions:

1. What is the minimum and maximum amount of people that will cross in front of the camera in a given time period?
2. What is the expected capture rate of the faces?
3. What is the required matching processing time element?

An understanding of how each of these affects face recognition is necessary to engineer optimal Capture Zones as well as to determine the appropriate Output process for information. This in turn will define the amount of computer processing that will be required to perform the tasks as required.

Application Scenarios:

Australian Casino deploys BIOwatch

BIOwatch is used to check security personal against staff photos as they pass through the staff entrance. This is to determine suitability to covertly look for persons of interest who are in the casino gaming area.

Railway Station Surveillance

BIOwatch has been deployed in a kiosk styled appliance, where Media screen advertising has been used to attraction attention and therefore allowing CCTV cameras to capture faces so BIOwatch can match in real time against a watch list.

Retail Store Surveillance

BIOwatch is deployed at strategic locations within retail stores and shopping malls to detect and capture faces and then allow a search against noted shop lifters and fraud image databases.

European Country uses BIOwatch

BIOwatch is used to access the suitability of Passport photos submitted to Passport and National ID Card applications for conformance with the ePassport Standard and for use with facial recognition technology. The software automatically assesses the quality of photos and derived images including sharpness, dynamic range, color, balance, head tilt, head rotation, head size, focus and resolution.

BIOwatch in Banking

BIOwatch is deployed in bank customer service desks and windows. This is an ideal place to covertly capture faces to check against a watch list in real time. Stored CCTV footage can also be reviewed to detect and capture faces after the incident for the event investigation.

BIOwatch Fraud Detection Engine

BIOwatch uses a high speed facial image classifier as a front end to prepare small galleries of very similar persons for use by a centralized back end system(s) using one or more Facial Recognition Software packages. This Fraud Detection Engine has been found to be far more accurate in detecting Fraud attempts. The creation of technology can also detect the 3-D orientation of the face and normalize it automatically to the preferred full frontal pose. Also we can detect the presence of an exaggerated gesture on the face, for example a broad smile or squinting frown, and normalize the gesture automatically to the preferred neutral gesture orientation of the face.



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