

# Face Recognition Software

## Introduction

A new Face Recognition software which will be based on our core technology for fingerprint, will be developed very soon as an alternative or complementary to fingerprint authentication technology.

Up to this point, our parent company had been using *eigenfaces method*, which is capable of producing synthesized face versions by applying this method to face images. It has been proved that most faces can be represented as a linear combination of several eigenfaces. So, recognition can be achieved by determining the corresponding combination. Given a set of high dimensional (HD) face images, eigenfaces are the eigenvectors derived from the covariance matrix of its probability distribution. This provides a compact representation of faces, as it can be seen in Figure 3.2.1.i.



*Diagram 3.2.1.i: Example of Eigenfaces method, only most prominent features are kept*

Since the concept is derived from our umbrella technology which is the Patented technology, IZZIX – BSPV2.2/3.0 Fingerprint Recognition Algorithm, obtaining good quality results for face recognition is actually quite difficult. The main challenge would be face detection in an image (i.e. ID Card, Passport) and followed by recognizing the face. There are also other tasks that needed to be performed in-between, such as frontalizing faces, or extracting additional features from them.

After a long research and continuous R&D to develop face recognition, our parent company, Digent Co, Ltd. does not seem to reach the optimum result for face recognition. Therefore, we Digent Technology has decided to initiate a new development of face recognition software using the new Deep Learning technology.

## Certificate of Performance

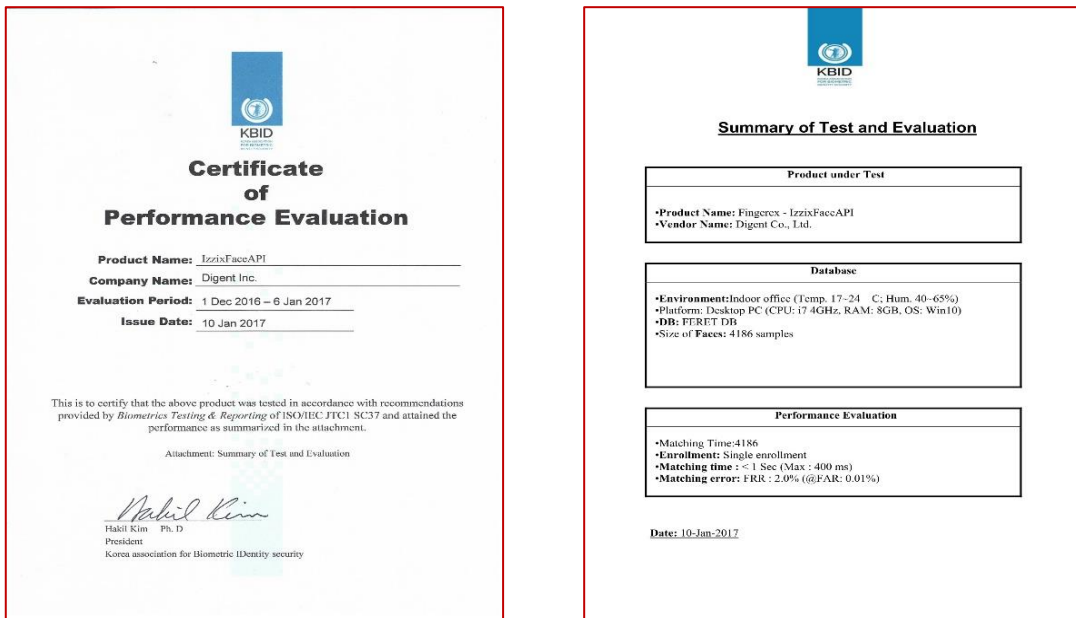


Illustration 3.2.1.ii: Face Recognition Performance Evaluation

As refer to the Illustration3.2.1.ii, we received a certificate of performance evaluation from Korean Biometric Identification (KBID) for our face recognition software. However, we have not reach our target to reach an optimum performance. It is still a long way before we could come out with a perfect solution for face recognition solution.

**Bio Data Extraction.** The template size for each face is estimated to be 3,000 bytes while the enrollment speed is around 0.2~0.3 second.

**Bio Data Comparison.** The False Acceptance Rate(FAR) is < 0.01% while False Reject Rate(FRR) is < 2.0 %. Similar to our fingerprint software. Matching speed for (1:1) verification is between 1,100 to 1,200.

Speed for 1 Core Processor theoretically is expected to be 200,000 face data processing per second. Speed for Matching server base (24 core) is expected to be 4,800,000 face data processing per second. \* 1:N Speed is dependent on the number of core.

| Item                       | Specification                                   |                                           |
|----------------------------|-------------------------------------------------|-------------------------------------------|
| <b>Bio Data Extraction</b> | Template size                                   | 3,000 bytes                               |
|                            | Enrollment speed                                | 0.2~0.3 second                            |
| <b>Bio Data Comparison</b> | False Acceptance Rate(FAR)                      | < 0.01%                                   |
|                            | False Reject Rate(FRR)                          | < 2.0 %                                   |
|                            | Matching speed (1:1)                            | 1,100~1,200                               |
| <b>Speed</b>               | 1 Core                                          | 200,000 face data processing per second   |
|                            | Matching server base (24 core)                  | 4,800,000 face data processing per second |
|                            | * 1:N Speed is dependent on the number of core. |                                           |