The following three diagrams show the performance of the current B9T8 engine and, for reference, the previous engine B8T8 in the closed-set identification, the open-set identification and the verification scenario.

All measurements were done using the same set of low-quality facial images. Most images of that set show a face that is either blurry, in low resolution, badly illuminated (with over- or underexposure, or hot spots), in a distinctly non-frontal pose, or exhibit a combination of those conditions. For the performance measurements, the set was divided into a gallery containing 518 images of 518 subjects (i.e. one image per subject) and a probe gallery consisting of 699 images of 254 subjects (each of which also occurs in the gallery).


Diagram 1: Closed-set identification performance on the set of low-quality face images

Diagram 2: The open-set identification performance curve reflects application scenarios for passport/visa or driver’s license issuance and for video surveillance.

Disclaimer
Face recognition technology, like any biometric application, cannot provide 100% recognition accuracy.
Further improvements over the previous engine B8

In the development of the engine B9 we focused on improving the recognition performance on difficult image material, in particular images with faces in low resolution or in non-frontal poses, which are typical for video surveillance applications. The four diagrams on the next two pages show the performance increase over B8 on such images.

In diagrams 4 and 5, the performances of B8 and B9 are compared under head pose variation, using a set of 994 frontal pose images in the public Color FERET database as the gallery. The probe set consists of all non-frontal pose images from the Color FERET database in which both eyes are visible. Head poses up to half-profile are included in the probe set. For more information on the Color FERET database, see the articles listed under References.

Diagram 4: Closed-set identification performance in the pose variation test

The rank 1 identification rate has increased from 90% to 92.5%.
Diagrams 6 and 7 show the performance on faces in low resolution. For the measurements, a gallery of 4108 faces of 4108 different subjects was matched with a probe set of 7677 different faces of 4114 different subjects (the same subjects as in the gallery, except for a few), resulting in 7654 genuine scores and more than 31 million imposter scores. The images are in passport style, mildly affected by JPEG compression artifacts, and mostly of Caucasian and African-American adults. The average inter-eye distance is 62 pixels.

All probe images were scaled down to achieve an inter-eye distance of 20 pixels, while the gallery images were left at their original size. This corresponds, for example, to a video surveillance situation where the gallery consists of good quality photographs and the probes are extracted from video footage taken with a typical video camera.

Diagram 5: Verification performance in the pose variation test

At a typical False Match Rate of 0.1%, the True Match Rate rose from 88.5% to 92.5%.

Diagram 6: Closed set-identification performance in the low resolution test
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Portions of the research in this paper use the Color FERET database of facial images collected under the FERET program [5].

**References**