

## Human-Machine Cooperation in Facial Comparison Based on Likelihood Scores

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**Abstract :** Image-based facial features can be classified into category recognition features and individual recognition features. Current automated face recognition systems extract a specific feature vector of different dimensions from a facial image according to their pre-trained neural network. However, to improve the efficiency of parameter calculation, an algorithm generally reduces the image details by pooling. The operation will overlook the details concerned much by forensic experts. In our experiment, we adopted a variety of face recognition algorithms based on deep learning, compared a large number of naturally collected face images with the known data of the same person's frontal ID photos. Downscaling and manual handling were performed on the testing images. The results supported that the facial recognition algorithms based on deep learning detected structural and morphological information and rarely focused on specific markers such as stains and moles. Overall performance, distribution of genuine scores and impostor scores, and likelihood ratios were tested to evaluate the accuracy of biometric systems and forensic experts. Experiments showed that the biometric systems were skilled in distinguishing category features, and forensic experts were better at discovering the individual features of human faces. In the proposed approach, a fusion was performed at the score level. At the specified false accept rate, the framework achieved a lower false reject rate. This paper contributes to improving the interpretability of the objective method of facial comparison and provides a novel method for human-machine collaboration in this field.

**Keywords :** likelihood ratio, automated facial recognition, facial comparison, biometrics

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