

ICA, LDA, and Gabor Jets for Robust Ear Recognition, and Jet Space Similarity for Ear Detection

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Abstract

Fully automatic and robust ear recognition systems that use only 2D grayscale still images are presented. To exploit robustness against pose variation, changes in lighting, and hair occlusions, we thoroughly examined the techniques: linear discriminant analysis (LDA), independent component analysis (ICA), and Gabor jets. We obtained a 93.3% rank-one recognition rate on a dataset of 121 subjects in 4 image sets taken on various days from the public face database XM2VTS, where 47.0% of the images show hair occlusion, pose variation, and jagged images. To fully automate the recognition algorithm, we developed an ear detection algorithm that uses Gabor jets subjected to training using principal components analysis. A 1.0% equal error rate was obtained in experiments on the XM2VTS database. Our experiments provide evidence that ear biometrics has the potential for use in real-world applications for identifying individuals by their ears.