



## Multimodal Belief Fusion for Face and Ear Biometrics

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### ABSTRACT

This paper proposes a multimodal biometric system through Gaussian Mixture Model (GMM) for face and ear biometrics with belief fusion of the estimated scores characterized by Gabor responses and the proposed fusion is accomplished by Dempster-Shafer (DS) decision theory. Face and ear images are convolved with Gabor wavelet filters to extract spatially enhanced Gabor facial features and Gabor ear features. Further, GMM is applied to the high-dimensional Gabor face and Gabor ear responses separately for quantitative measurements. Expectation Maximization (EM) algorithm is used to estimate density parameters in GMM. This produces two sets of feature vectors which are then fused using Dempster-Shafer theory. Experiments are conducted on two multimodal databases, namely, IIT Kanpur database and virtual database. Former contains face and ear images of 400 individuals while later consist of both images of 17 subjects taken from BANCA face database and TUM ear database. It is found that use of Gabor wavelet filters along with GMM and DS theory can provide robust and efficient multimodal fusion strategy.

### KEYWORDS

multimodal biometrics, gabor wavelet filter, gaussian mixture model, belief theory, face, ear

### Cite this paper

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