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Hybrid Approach for Face Recognition Combining Gabor Wavelet and Linear Discriminant Analysis

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Abstract : Face recognition system finds many applications in surveillance and human computer interaction systems. As the applications using face recognition systems are of much importance and demand more accuracy, more robustness in the face recognition system is expected with less computation time. In this paper, a hybrid approach for face recognition combining Gabor Wavelet and Linear Discriminant Analysis (HGWLDA) is proposed. The normalized input grayscale image is approximated and reduced in dimension to lower the processing overhead for Gabor filters. This image is convolved with bank of Gabor filters with varying scales and orientations. LDA, a subspace analysis techniques are used to reduce the intra-class space and maximize the inter-class space. The techniques used are 2-dimensional Linear Discriminant Analysis (2D-LDA), 2-dimensional bidirectional LDA ((2D)2LDA), Weighted 2-dimensional bidirectional Linear Discriminant Analysis (Wt (2D)2 LDA). LDA reduces the feature dimension by extracting the features with greater variance. k-Nearest Neighbour (k-NN) classifier is used to classify and recognize the test image by comparing its feature with each of the training set features. The HGWLDA approach is robust against illumination conditions as the Gabor features are illumination invariant. This approach also aims at a better recognition rate using less number of features for varying expressions. The performance of the proposed HGWLDA approaches is evaluated using AT&T database, MIT-India face database and faces94 database. It is found that the proposed HGWLDA approach provides better results than the existing Gabor approach.

Keywords : face recognition, Gabor wavelet, LDA, k-NN classifier
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