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Abstract

Useful properties of the Contourlet Transform (CT) are exploited in this paper to investigate more discriminant features to enhance the face identification performance. In this paper a face identification system is suggested based on CT, and Multi-Layer Perceptron (MLP) Classifier. The main reasons behind using the CT are: First, the CT supports progressive data compression/expansion, hence it is used for image compression. Second, since the features in human face are not just horizontal or vertical. CT is utilized for feature extraction because it is a genuine 2-D transform that can capture the edge information in all directions. After decomposing an image by CT, low and high frequency coefficients of CT are calculated in different scales and various angles. The frequency coefficients are utilized as an input feature vector for a neural network classifier. Simple feed forward MLP neural network is used to achieve the identification process. The network parameters are tuned to optimal values, in order to produce fair comparison between different types of feature vectors. To evaluate the algorithm performance five different databases are used. Some of them of high variability, which examines the algorithm robustness against variability. In addition, the proposed algorithm is

evaluated using a generated database which composes two databases. Then the suggested method is compared to other classical feature-based methods such as, wavelet, and Principle Component Analysis (PCA). The results indicate that the CT-based method has better identification rate, and is faster than the Wavelet-based and the PCA-based methods. This is due to the high sparsity of the CT and its efficient capability of compression. An average identification rate of 93.94% is obtained for the CT-based method, 85.12% for the Wavelet and 79.96% for the PCA.

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Index Terms

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Keywords

Contourlet Transform, Face Identification, Multi-Layer Perceptron Neural Network.