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
Face Identification based on Contourlet Transform and Multi-layer Perceptron Classifier

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.

References

1. Yanjun Yan, Rajani Muraleedharan, Xiang Ye and Lisa Ann Osadciw, "Contourlet Based
   Image Compression for Wireless Communication in Face Recognition System", IEEE
2. Walid Riad Boukabou and Ahmed Bouridane "Contourlet-Based Feature Extraction with
   PCA for Face Recognition" The Institute of Electronics, Communications and Information
   Technology (ECIT).
3. Majid Iranpour Mobarakheh, Mehran Emadi, Majid Emadi,"FRBF Neural Network Base for
   Face Recognition using Zernike Moments and PCA", International Journal of Computer
5. Belhumeur, P.N., Hespanha, J.P., Kriegman, D.J. Eigenfaces vs. Fisherfaces: Recognition
   using class specific linear projection, IEEE Trans. Pattern Analysis and Machine
6. Bartlett, M.S., Movellan, J.R., Sejnowski, T.J. "Face Recognition by Independent
   Component Analysis," IEEE Transactions on Neural Networks, vol. 13, no. 6, pp. 1450-1464,
   2002.
7. N.G.Chitaliya, A.I.Trivedi, "Feature Extraction using Wavelet-PCA and Neural network for
8. XUEBIN XU, DEYUN ZHANG, XINMAN ZHANG ,"An efficient method for human face
   recognition using nonsubsampled contourlet transform and support vector machine ", Optica
10. Tanaya Mandal, Anshul Majmudar, Q.M.Jonathan W U," Face recognition by Curvelet
    based feature extraction", International Conference on Intelligent Automation and Robotics,
11. Xuebin Xu, Deyun Zhang, Xinman Zhan Zhang,"An efficient method for human face
    recognition using nonsubsampled Contourlet transform and support vector machine * Optica
    application in enhancement", Proceedings – International Conference on Image Processing,
18. Mohanad A.M. Abukmeil and Dr. Hatem ELaydi, " Palmprint Recognition System By Using Contourlets Transform And Artificial Neural Network" The Islamic University Of Gaza, 2013.

Index Terms

Computer Science

Image Processing

Keywords

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