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Fusion Based Face Recognition System using 1D Transform Domains

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Abstract

The biometric is used to recognize a person based on physiological and behavioral traits. In this paper, we propose Fusion based Face recognition using 1D transform domain. The two dimensional face images are converted into one dimensional (1D). 1D- DWT and FFT are used to extract features of face images. The features of 1D- DWT and 1D- FFT are compared between database and test images using Euclidian Distance (ED) to compute the performance parameters, which are fused at matching level to obtain better results. It is observed that, the performance of the proposed method is better compared to extracting methods.

Keywords: Biometrics; Face Recognition; FFT; DWT; Fusion Techniques;

1. Introduction

The biometrics is unique way of identifying humans based on physical and behavioral characteristics. The biometric is derived from Greek word bio i.e., life and metric i.e., measure, which used to measure the human characteristics to authenticate a person. The biometrics is classified into two group's viz., physiological and behavioral biometrics.

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The physiological biometrics are related to the parts of human body and normally do not vary in the life time. The example of physiological biometrics is face, fingerprint, DNA, iris, Hand geometry etc. The behavioral biometrics are related to the behavior of a person and the characteristics are varied based on mood of a person and circumstances. The examples are signature, gait, key stroke, voice etc. The biometric system is used to recognize a person based on human characteristics. The system works in two modes viz., (i) Verification mode in which one to one comparison of biometric features. The captured biometric trait is compared with a specific biometric trait stored in a biometric database in order to validate a person to be claimed. (ii) Identification mode in which one to many comparisons of biometric features. The captured biometric trait is compared with many biometric traits stored in the biometric database in order to establish the identity of an unknown person. The face is a powerful biometric trait to recognize a person, as the face image can be captured without any cooperation of humans. The challenges in the face recognition are pose verifications, illumination variations, expressions, occlusions, age factors, gender factors etc. The biometrics are used in banks, logical access control, health care, cloud computing, consumer and residential, Border control, Airports, Biometric locks, automobiles, justice and low enforcement etc.

Contribution: In this paper, Fusion based face recognition system using 1D- transform domains is proposed. The face images are converted into 1D transform domains using FFT and DWTs. The performance parameters are computed by comparing features of database and test face images. The performance parameters are fused at matching level to obtain better results.

Organization: Section 2 literature survey of recent research papers. Section 3 presents proposed method and algorithm is given in Section 4. Section 5 explains performance analysis of proposed method. The conclusion is given in section 6

2. Literature Survey

In this section, the existing techniques of feature extraction based on spatial and transformed domain methods are explained. The preprocessing techniques to modify original face images and classifiers to identify face images are also described. RamyC.G.Chehata, et al.,[1] proposed face recognition method using transform domain techniques on the MPCA. The techniques are two dimensional and diagonal modular PCA. The diagonal modular PCA provides more background information of the face image and it is applied on both overlapping and non-overlapping blocks. Md. Iqbal Quraishi, et al., [2] presented a face recognition method using Artificial Neural Network. In this method the ripplet transform is used for feature extraction, after preprocess and image enhancement of the face image. Jing Wang, et al., [3] have proposed method that uses both the sparsity and correlation. Previously many papers suggested that the sparsity representation based classification (SRC) gives the improved performance. The sparsity is useful for selecting the sample and the correlation is better for comparing the query image and the training samples. Zhao-Rong Lai, et al., [4] developed a robust method for face recognition using discriminative and compact coding. In this method two sets of coding models are used, viz., Discriminative Coding (DC) and Compact Coding (CC). The DC gives the distinguishing decisions and gives the multi-scale error measurements where as the CC is useful for the face images with different illuminations. The proposed method combines both DC and CC to perform classification. Dmitry Gorodnichy and Eric Granger [5] introduced the target based evaluation of face recognition technology for video surveillance applications. In this two methods are mentioned Cohert based and Target based methodologies for Watch List Screening (WLS). The proposed method is evaluated for the choke post public dataset. If the person in the video surveillance matches with the criminal dataset then the system makes an alarm. Compared to the both above mentioned techniques the target based method is suitable for the WLS. Yi Jin, et al., [6] proposed a method for identifying heterogeneous face recognition the set which contains different types of face dataset. Coupled Discriminative Feature Learning (CDFL) method is used to recognize the face for heterogeneous database. In the training session the CDFL seeks to provide most favorable filters to discriminative face recognition. The subjects with same shape indicates same person. Asem M. Ali, [7] proposed a method of 3D-Based Pose Invariant Face Recognition at a Distance Framework for 3D faces recognition. In this method the face image acquisition camera is used. The captured face image features are extracted and given as input to the second camera, which will capture the faces of the subject in