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Using Wavelet Transformation Recognizing Iris

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***Abstract*—The demand for an accurate biometric system that provides reliable identification and verification of an individual has increased over the years. A biometric system that provides reliable and accurate identification of an individual is an iris recognition system. In which paper describes the segmentation and the normalization processing for biometric iris recognition system, implemented and validated in MATLAB Software. In this work we use the image database digitized in greyscale, where segmentation algorithms were implemented based on region growing using wavelet decomposition with Gabor filter, finally an alternative segmentation algorithm was designed and implemented, its performance was evaluated with satisfactory results. This approach exploits multiple higher order local pixel dependencies to robustly classify the eye region pixels into iris or non-iris regions. The experimental results provide significant improvement in the segmentation accuracy. For the implementation of this proposed work we use the Image Processing Toolbox under MATLAB software.**

Index Terms—biometric, iris

I. Introduction

The term "Biometrics" refers to the authentication techniques a science including the biological characteristics. These measurable characteristic can be physical or behavioural such as eye, retina vessel, face, fingerprint, hand, voice, signature and typing rhythm. Biometrics is unique person identification, is one of the research that is growing fast. The merits of unique identification are several, such as secure access control and fraud prevention. A biometrics system provides great aids with esteem to other authentication techniques. They assured the physical existence of the user and more users friendly. Iris recognition is best reliable biometric technology for verification performance and identification. The iris is the blue colour portion that surrounds the pupil of the eye as shown in Fig. 1. This portion controls light levels inside the eye like as aperture on a camera. The iris is firmly with tiny muscles that enlarge and constrict the pupil size. The black colour portion inside the iris is called the pupil. This is fully rich textured patterns that offer various individual attributes which are distinct between the left and right eye of a person and between the identical twins. Iris patterns are highly stable with unique and time as compared with other biometric features, as the possibility of the presence of two irises that alike is probable to be as low as.

In this paper, image enhancement techniques are applied such that only useful data are encoded. Furthermore, the best combination of wavelet coefficient is found and used for effective ID and the finest quantity of bits used for converting the feature vector has been deduced while maintaining low template size. Baughman [3] offered the first positive implementation of an iris recognition system on the 2-D Gabor filter to generate a 2048 bits iris code by extracting texture phase structure information of the iris. Several biometric methods have been marshalled in support of this experiment. The results are based on recognition of handwritten signature, retinal vasculature, hand shape, fingerprints, face and voice. The most important aspects for evaluating different biometric methods are universality, measurability, user friendliness, uniqueness, non-invasiveness, and permanence. For identification uses requiring a huge database of people's records and effective comparison is necessary for biometric IDs.

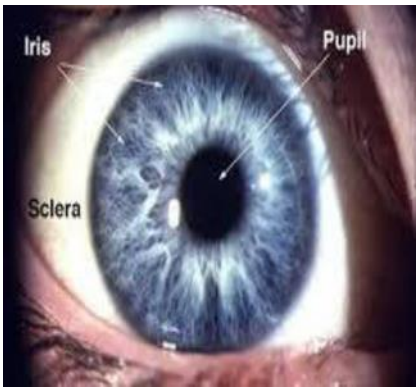

Fig. 1. Image of the eye

As per the above requirements, iris pattern is for reliable visual recognition of persons when imaging done at distances of smaller than one meter. A pattern of human eye's iris varies from person to person, even in identical twin. Then size and shape changes continuously causing the iris, irises react with high sensitivity to light, extremely difficult the counterfeiting based on Iris patterns. However, the pattern is fully detailed so it is also hard to recognize it. We present a general framework for image processing of iris images with a specific view on feature extraction. The process uses the set of texture and geometrical features based on the information of the difficult vessel structure of the sclera and retina. The extraction of feature contains the segmentation of the region of interest (ROI), image pre-processing and locating. The image processing of region of interest and the feature extraction are preceded then the feature vector is resolute for the human recognition and ophthalmology diagnosis. In the proposed method we implement "Biometric Iris Recognition based on the Region Growing using Wavelet Decomposition". Iris recognition systems are divided into four blocks, iris

segmentation, iris normalization, and feature extraction and matching. Iris segmentation separates an iris region from the entire captured eye image. Iris normalization fixes the dimensions of segmented iris region to allow for accurate comparisons. Feature extraction draws out the biometric templates from normalized image and matches this template with reference templates. The performance of an iris system closely depends on the precision of the iris segmentation. The existing methods assume that pupil is always central to an iris; hence both pupil and iris share a central point. This inaccurate assumptions results in wrong a segmentation of an iris region. The upper and the lower parts of the outer iris boundary are generally obstructed by eyelids and eyelashes, this provides problems during segmentation. These eyelids and eyelashes act as noise which needs to be eliminated to achieve optimum segmentation results. The remainder of this paper is organized as the following. At first, in Section II we illustrate the various components of our proposed technique to ocular detection. Further, in Section III we present some key experimental results and evaluate the performance of the proposed system. At the end we provide conclusion of the paper in Section IV and state some possible future work directions.

II. Literature Survey

Amritpal kaur, The demand for an accurate biometric system that provides reliable identification and verification of an individual has increased over the years. A biometric system that provides reliable and accurate identification of an individual is an iris recognition system. In which paper describes the segmentation and the normalization processing for biometric iris recognition system, implemented and validated in MATLAB Software. In this work we use the image database digitized in greyscale, where segmentation algorithms were implemented based on region growing using wavelet decomposition with Gabor filter, finally an alternative segmentation algorithm was designed and implemented, its performance was evaluated with satisfactory results. This approach exploits multiple higher order local pixel dependencies to robustly classify the eye region pixels into iris or non-iris regions. The experimental results provide significant improvement in the segmentation accuracy. For the implementation of this proposed work we use the Image Processing Toolbox under MATLAB software.

III. Proposed System

This section illustrates the overall technique of our proposed "Iris Recognition based on the Region Growing using Wavelet Transformation". In this paper iris segmentation using Wavelet transformation is effective in segmenting the iris portion. But the segmentation accuracy should be improved. Thus a novel segmentation approach based on region growing has been provided. Region growing segmentation is a direct construction of regions. Region growing methods are usually better in noisy images where edges are enormously difficult to detect. The region based segmentation is splitting of the image into homogenous areas of connected pixels through the application

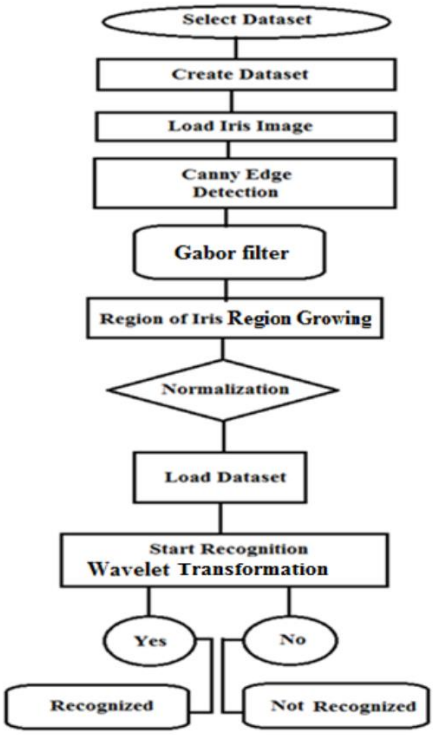

Fig. 2. Flowchart of the proposed method

of homogeneity criteria among candidate sets of pixels. Each of the pixels in a region is similar with respect to some characteristics or computed property such as colors, intensity and texture. Three major procedures involved in the proposed iris segmentation approach, namely papillary detection, limbic boundary localization, and eyelids and eyelash detection, were carefully designed in order to avoid unnecessary and redundant image processing, and most importantly, to preserve the integrity of iris texture information. Iris recognition is most accurate and reliable biometric identification system available in the current scenario. Iris recognition captures an image of an individual's eye; the iris is used for segmentation and normalized for feature extraction process. The performance of iris recognition systems highly depends on the segmentation process. With the help of segmentation, localization of the iris region in an eye is detected and it must be done correctly and accurately to remove the eyelashes, eyelids, pupil noises and reflection present in iris region. In our proposed paper we are using wavelet decomposition for Iris Recognition. In which iris images are chosen from the CASIA Database, then detected the iris and pupil boundary from rest portion of the eye image and removing the noises. Normalized segmented iris region to minimize the dimensional contradictions between iris regions by using Dogman's Rubber Sheet Model. Techniques the Gaussian smoothing may be done. The actual image is generally much larger than a convolution mask. Segmentation of iris is the main stage of iris recognition, because if areas that are erroneously identified as iris regions will fraudulent biometric templates so resulting in worst recognition. So the iris region should be identified very accurately. By applying

canny edge detection and region growing the Iris inner and outer boundary can be shown very accurately. In this work, wavelet decomposition is proposed in order to help the segmentation step in what was found to be robust way regardless of the segmentation approach used region growing algorithm for thresholding are discussed. Our proposed method has more accuracy and capacity of recognition.

IV. Conclusion

We present Iris Recognition based on the Region Growing using Wavelet Transformation. Canny algorithm for edge detection among others is characterized for its versatility. Its applied to images with objects of different shapes, in this particular case to find the circular edges of the iris and pupil human showing remarkable results, however, this detection criterion, does not always prevent the elimination of significant edges, so it may appear false edges and can force the program to execute more functions in downstream processes. As the Gabor filter can be calculated using a simple mask and is used in the canny algorithm exclusively. When suitable masks have been computed, using standard convolution techniques the Gaussian smoothing may be done. The actual image is generally much larger than a convolution mask. Segmentation of iris is the main stage of iris recognition, because if areas that are erroneously identified as iris regions will fraudulent biometric templates so resulting in worst recognition. So the iris region should be identified very accurately. By applying canny edge detection and region growing the Iris inner and outer boundary can be shown very accurately. In this work, wavelet decomposition is proposed in order to help the segmentation step in what was found to be robust way regardless of the segmentation approach used region growing algorithm for thresholding are discussed. Our proposed method has more accuracy and capacity of recognition.

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