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An Efficient Approach for Textured Contact Lenses Detection in IRIS Recognition

V.GREESHMA SWAPNIKA
M.Tech Student, Dept of ECE
Priyadarshini College of Engineering & Technology
Nellore, A.P, India

GUNAPATI SURESH
Associate Professor, Dept of ECE
Priyadarshini College of Engineering & Technology
Nellore, A.P, India

JOGEE SRINIVASULU
Assistant Professor, Dept of ECE
N. B. K. R Institute of Science & Technology
Nellore, A.P, India

Abstract: **The effective implementation associated with a product is largely based on its reliability,authenticity and the quantity of secrecy it offers.In the current high techno world where privacy and security are the worries of prime importance,the important systems must employ techniques to do this. Our project is simply a small step towards this.The iris based system can deal with lots of individual biological versions but still supply the identification system with a lot more precision and reliability. Within this project we've developed a system that involves recognition of the person using IRIS like a biometric parameter.We've first segmented the pupil and iris structure in the original eye image.Whenever we have normalised it to construct an element vector which characterizes each iris clearly.This selection vector will be employed for matching among various templates and identifies the person. The job provided within this project is principally targeted at supplying a recognition system to be able to verify the distinctiveness of human iris as well as its performance like a biometric.The paper has implementation of calculations on CASIA database.The different outcomes of different implementations as well as their accuracies happen to be examined within this paper. Overall within this paper,a truthful effort in recommending a competent system for implementation from the human identification system according to iris recognition and powerful recognition of textured contact contacts in iris recognition of images. This project presents an Iris recognition system, that was examined on CASIA iris image database, to be able to verify the stated performance of iris recognition technology.**

Keywords: **IRIS Recongnition; Biometric Parameter; Segmentation;**

I. INTRODUCTION

Biometrics refers back to the identification or authentication of the individual according to certain improvements or qualities. Biometric identifiers would be the distinctive and measurable features which are used to label and describe people. There are two groups of biometric identifiers namely physiological and behavioral qualities. Iris, fingerprint, DNA, etc. fit in with the previous type of biometric identifiers whereas typing rhythm, gait, voice, etc. fit in with the second. The iris is really a thin circular physiological structure within the eye. The iris's function would be to control the diameter and size the pupils and therefore it controls the quantity of light that progresses towards the retina. The iris includes two layers: the pigmented front fibro vascular known as stromal and beneath it would be the pigmented epithelial cells. The stromal is attached to the sphincter muscle which accounts for the contraction from the pupil also to the group of dilator muscles, accountable for the enlargement from the pupil so it does by tugging the iris radially [1]. The iris is split into two fundamental regions: the pupillary zone, whose edges make up the boundary from the pupil and also the culinary zone which comprises the relaxation from the iris. A lot of research has examined the Daugman system and all sorts of have reported failing rate of zero. It's stated the Daugman system can identify a person perfectly from the million options. The Wildes et al. system also offers a perfect performance, whereas the Lim et al. system accomplishes a precision rate of 98.four percent. Iris recognition can be viewed as among the most accurate and reliable approach to biometric technology when in comparison along with other biometric technologies for example face, fingerprint and speech recognition. The goal of this project would be to implement a method that may recognize human iris designs for use for biometric identification. The tool that'll be accustomed to develop this technique is going to be MATLAB. The projects emphasis is going to be on creating software that may perform iris recognition rather than hardware components to capture a watch image. The machine will contain numerous sub-systems, akin to each stage of iris recognition. The stages could be considered segmentation, normalization and have encoding. The dataset utilized in this project may be the CASIA database which consists of as many as 2657 gray scale images. To maintain a precise approach to recognition of people, the characteristics that are

most distinctive within an iris pattern should be removed. Only these significant parts should be removed to enable them to be encoded into biometric templates that you can use for evaluations. Iris recognition systems usually use band-pass approach to decompose an iris image right into a biometric template. The biometric templates produced within this process could be in comparison together utilizing an appropriate matching formula.

II. PREVIOUS STUDY

Daugman's Integra-differential Operator: This process was suggested by Daugman to be able to localize the iris region. The operator assumes the pupil and limbus region to become circular contours also it performs circular edge recognition. Hough transform is really a standard image processing technique and analysis tool which is used for locating curves and shapes that may be symbolized inside a parametric form for example lines, circles and polynomials. Within the way in which was suggested by Wildes et al. an advantage map is acquired first by thresholding the look intensity gradient's magnitude, having a Gaussian function employed for smoothing using the scalar parameter which is used to decide on the proper scale. Active contour designs include been utilized by Ritter et al. for localizing the pupil in digitized eye images. Daugman had devised a homogenous rubber sheet model which remapped each point within the iris region onto a set of polar co-ordinates (r) .The Boles system utilizes a method that the iris images are first scaly to ensure that all images possess a constant diameter. Hence while evaluating two images, among the images are selected like a reference image. This process differs from other techniques meaning that normalization isn't done till we are attempting to match two images. Some Gabor filters that have different wavelengths and match different orientations may be used in removing helpful information or features from a picture [2]. The regularity and orientation representation provided by Gabor filters act like individuals within the human visual system, and therefore they've been discovered to be particularly helpful in texture representation and discrimination. Within the spatial domain, a 2D Gabor filter is really a sinusoidal plane wave that's modulated with a kernel Gaussian function.

III. PROPOSED SYSTEM

This is actually the first paper to think about set up iris should be precisely segmented to be able to identify the existence of textured contacts. The stages in suggested method are 1Pattern recognition: Iris imaging requires utilization of a top quality camera. Today's commercial iris cameras typically use infrared light to light up the iris without causing harm or discomfort towards the subject. Upon imaging an iris, a 2D Gabor wavelet filters and maps the segments from the iris into phases (vectors). These phases include info on the orientation and spatial frequency ("what" from the image) and also the position of those areas ("where" from the image). This post is accustomed to map the Iris Codes. 2 Segmentation: Partitioning a picture into regions akin to objects. All pixels inside a region share a typical property .Simplest property that pixels can share intensity [3]. Thresholding=separation of sunshine and dark regions. The easiest approach to image segmentation is known as the thresholding method. This process is dependent on a clip-level (or perhaps a threshold value) to show a grey-scale image right into a binary image. There's additionally a balanced histogram thresholding. 3. Feature Extraction: In machine learning, pattern recognition as well as in image processing, feature extraction starts from a preliminary group of measured data and develops derived values (features) intended as informative and non-redundant, assisting the following learning and generalization steps, and perhaps resulting in better human interpretations. Feature extraction relates to dimensionality reduction. In machine learning, pattern recognition as well as in image processing, feature extraction starts from a preliminary group of measured data and develops derived values (features) intended as informative and non-redundant, assisting the following learning and generalization steps, and perhaps resulting in better human interpretations. Feature extraction relates to dimensionality reduction. 4 BSIF: Our method computes a binary code string for those pixels of the given image. The code worth of a pixel is recognized as a nearby descriptor from the image intensity pattern within the pixel's surroundings.

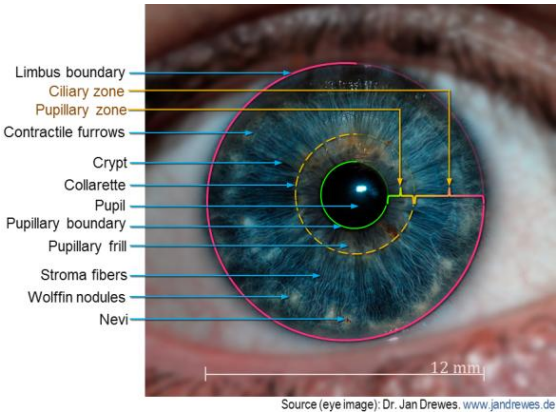

Fig 1:A front view of the Human Iris

Further, histograms of pixels' code values allow characterizing texture qualities within image sub regions. Binaries Statically Image Feature (BSIF) analysis is used at multiple scales to create feature vectors. The kernel size for that BSIF pattern analysis is s = f3 5 7 9 11 13 15 17g5 for as many

as 8 different feature vector sets. The kernel depth occurred constant at 8-bits producing a feature vector of length 256. Three different programs of BSIF are evaluated within this work: Whole Image, Best Guess and Known Segmentation. Entirely Image, the BSIF feature vector is calculated for that whole from the image [4]. In Best Guess, the kernel is evaluated in the set torus, getting rid of the requirement for a segmentation formula, whilst excluding eyebrow along with other noise from nearly all images.

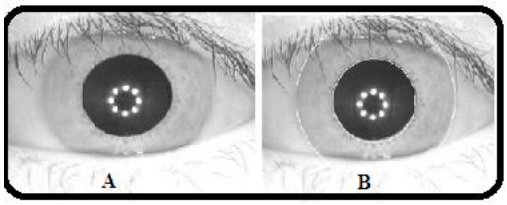

Fig 2: A.Original image, B. Segmented iris image

IV. IMPLEMENTATION

Of all of the various approaches available circular Hough transform was utilized for localizing the iris. It calls for first using canny edge recognition around the eye image in order to generate an advantage map. The gradients were first biased within the vertical direction in order to identify the outer iris/sclera boundary as have been recommended by Wildes et al. The vertical and horizontal gradients were weighted equally in order to identify the interior iris/pupil boundary. To reduce looking range, the plethora of radius values of images within the CASIA database (that was known in advance) was set by hand. Segmentation: Partitioning a picture into regions akin to objects. All pixels inside a region share a typical property. Simplest property that pixels can share intensity Thresholding=separation of sunshine and dark regions Thresholding: 1. the intensity values will vary in numerous regions 2. within each region, which signifies the related object inside a scene, the intensity values offer a similar experience. Image thresholding classifies pixels into two groups: Individuals that some property measured in the image falls below a threshold and individuals where the home equals or surpasses a threshold. Thresholding produces a binary image linearization e.g. performs cell counts in histological images. Thresholding may be the simplest segmentation method. The pixels are partitioned based on their intensity value. I Global thresholding, utilizing an appropriate threshold:

$$g(x,y)=\begin{cases}1, & \text{if } f(x,y)>T\\ 0, & \text{if } f(x,y)\le T\end{cases}$$

On getting effectively segmented the attention image, the next thing is to change the iris region from the eye image in order that it has fixed dimensions to be able to permit the feature extraction tactic to compare two images [5]. To normalize the iris region a method much like Daugman's rubber sheet model was utilized. The pupil's center was selected because the reference and you will find redial vectors that go through the iris region. Along each radial line, certain figures of information points are selected which is known as because the radial resolution.

Fig 3: Output

The entire quantity of radial lines that are connecting round the iris region is known as because the angular resolution. Pupils may always 't be concentric using the iris. For such situations a remapping formula can be used to rescale what exactly with respect to the position it can make round the circle. This really is provided by:$r' = \sqrt{\alpha\beta} \pm \sqrt{\alpha\beta^2 - \alpha - r_1{}^2}$ With $\alpha = o_x^2 + o_y^2$

$$\beta = \cos\left(\pi - \tanh^{-1}\left(\frac{o_x}{o_y}\right) - \theta\right)$$

For applying feature encoding the normalized iris designs were convolved with 1D Log Gabor wavelets [6]. One disadvantage with Gabor filters is the fact that there are some Electricity components within the even symmetric filter. However, if using Log-Gabor filter (a Gabor filter that is Gaussian but on the logarithmic scale) all of the Electricity components are removed. Log-Gabor filters could be symbolized as:$G(f) = e^{\left(\frac{-(log(f/f_0)^2)}{2(log\left(\frac{\sigma}{f_0}\right)^2)}\right)}$

The output acquired from filtering will be demodulated and phase quantized using Daugman's method. The feature encoding process creates a bitwise biometric template that contains information by means of bits along with a noise mask akin to exactly the same image which represents the corrupt areas or noise designs within the iris and marks individuals bits within the template.

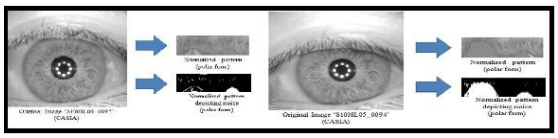

Fig 4. Normalization process

V. SOFTWARE DESCRIPTION

Matrix Laboratory is really a high end language for technical dimensions. It's accustomed to integrate the computation, visualization, and programming in a good way to make use of the atmosphere where problems and solutions are expressed in familiar mathematical notation. Segmentation: The automated model implemented for that segmentation process demonstrated to become quite effective. The pictures within the CASIA database have been particularly taken for research associated with iris recognition and therefore the limitations between your iris, the pupil and also the sclera were quite distinctive [7]. The segmentation technique when put on the CASIA database was built with a rate of success of 80%. Normalization: The normalization process also demonstrated to become quite accurate and a few results happen to be show within the figures such as the following. Precision: The False Reject Rate (FRR) measures the probability that someone who has enrolled in to the product is not recognized through the system. It's also referred to as Type-I error.

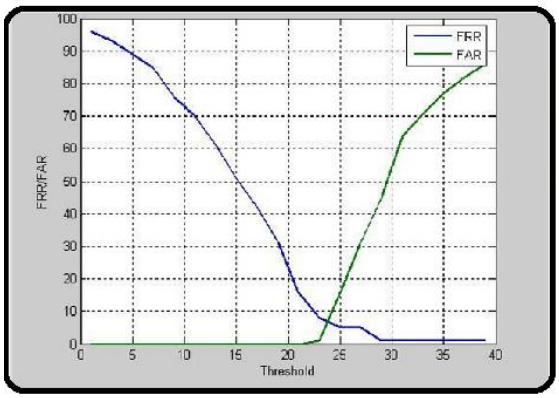

Fig 5: FRR/FAR paired error graph

VI. CONCLUSION AND FUTURE WORK

The iris recognition system which was developed demonstrated to become a highly accurate and efficient system you can use for biometric identification. The work again demonstrated that iris recognition is among the most dependable techniques currently available the biometrics field. The precision accomplished through the system was excellent and could be elevated through more stable equipment and scenarios where the iris image is taken. The programs from the iris recognition system are countless and happen to be deployed at a lot of locations that require security or access control. 1.Segmentation is an extremely crucial part of Iris Recognition Systems also to whatever extent its precision could be elevated can lead to more enhanced results. To enhance segmentation formula, intricate eye lid and eyelash recognition might be implemented. 2.Presently our template size varies with the kind of wavelet applied. So some measures can automatically get to avoid this effect. Our goal of project is principally to possess a really low FAR, which we've accomplished to some large extent. Also, our segmentation part has an excellent precision and it has labored satisfactorily over entire CASIA database. Since, we'd restricted ourselves to software a part of implementation and never taken an excessive amount of hardware implications in too concern, our efforts have led to efficient Recognition System.

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AUTHOR's PROFILE

GREESHMA SWAPNIKA V ,has received her

B.Tech degree in Electronics and Communication Engineering from JNTU, Anantapur in 2014. She is now pursuing the M. Tech (Digital Electronics and Communication System) degree at Priyadarshini College Of Engineering & Technology, Nellore 524004 Andhra Pradesh, India. Her areas of Research are in Image Processing.

GUNAPATI SURESH M. Tech,Working as an Associate Professor in Department of E.C.E . at Priyadarshini College Of Engineering & Technology, Nellore 524004 . Andhra - Pradesh, India . He is having more than 10 years of Teaching Experience. His areas of Research are in V L S I Design and Wireless Communications.

JOGEE SRINIVASULU M. Tech,Working as an Assistant Professor in Department of E.C.E . at N. B. K. R Institute Of Science & Technology, vidyanagar, Vakadu. Andhra Pradesh, India . He is having more than 10 years of Teaching Experience. His areas of Research are in V L S I Design.

