Iris based attendance system

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Abstract— Iris based paper gives a new idea for Biometric authentication process. Biometrics is the most secure and convenient authentication tool. Iris recognition technology contains pattern recognition and optics method. It identifies individual person by using their individual physical characteristics. Iris recognition system is very advanced compared with other biometric system. The main advantage of iris recognition system is its stability and uniqueness that results in a single enrolment for the lifetime. It provides more accuracy than the finger print and the other biometrics systems. It cannot steal

Index Terms— HD, CHT, XOR, Matching, Extraction etc…

I. INTRODUCTION

Biometric authentication is a process of identifying an individual based on behavioral characteristics. The ophthalmologist Frank Burch in 1936 proposed the idea of pattern recognition for personal identification purpose. In 1980 the pattern recognition was used in the film of James Bond but it was miracle at that time. This process of pattern recognition was firstly developed by John Daugman. An iris system has a function of most secure identification. That is why it is the most popularly used recognition system. Uniqueness, stability, permanency are the features that makes the iris recognition system more popularly. It uses the images of iris which is taken from the camera for the unique identification.

II. LITERATURE SURVEY

An iris recognition system provides an automatic recognition of single person based on unique characteristic possessed by the each person or single person. Iris is present inside the eye and it is protected with different layers. Iris of human is having very complex structure and it will remain unchanged throughout the life from the birth. Aram Safir & Leonard Flom patented the idea and asked John Dougman to create actual algorithms for that. John Dougman created this algorithm and patented that in the year of 1994.

The algorithm which Daugman developed in 1994 is the basis for all current iris recognition systems. Daugman algorithm is owned by Iridian one active imaging system developed in 1996 by licensee Sensar deployed special cameras in bank ATM to capture IRIS images at a distance of up to 1 meter.

III. ANATOMY

An Iris is the organ present inside the eye, which is having complex structure and externally visible. The main feature of iris is uniqueness. It is developed from the age of one year which is having very complex structure that will remain unchanged throughout the lifetime. The front part of the eye is made up of two parts: sclera i.e. white of the eye and cornea. Iris is protected by a layer of cornea from the damage. The cornea consist of different fibre's which are arranged in a particular fashion; due to this the cornea becomes the transparent which allow the light to filter. The fluid known as aqueous humour is filled in the anterior chamber and behind the cornea in the anterior chamber. This fluid is used for carry oxygen and nutrients to the different organ. Normally, it is a function of blood vessels. However, the blood vessels are opaque and would block the transmission of light. Edge of the cornea is surrounded by the spongy tissue. A ring of muscles which is immersed in the aqueous humor is commonly referred as iris.

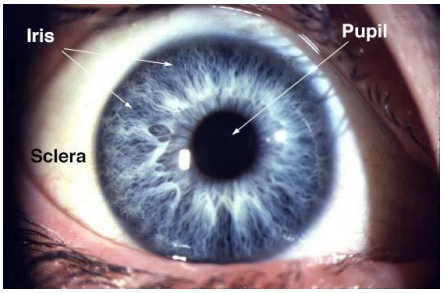

Fig -1: The human eye with the location of iris

The sclera consists of closely interwoven fibers and covers the entire surface of the eye, except for a small section in the back, where the optic nerve leaves the eye, and a small section directly in front and centered, known as the cornea. Leaves the eye and a small section directly in front and centered, known as the cornea.

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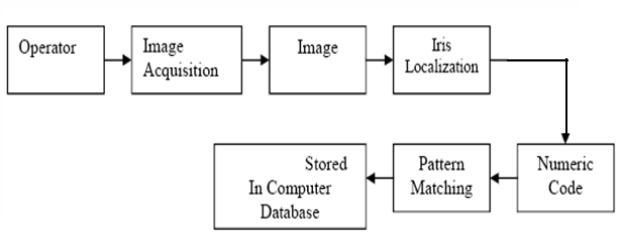

Fig -2: Block diagram of iris recognition system

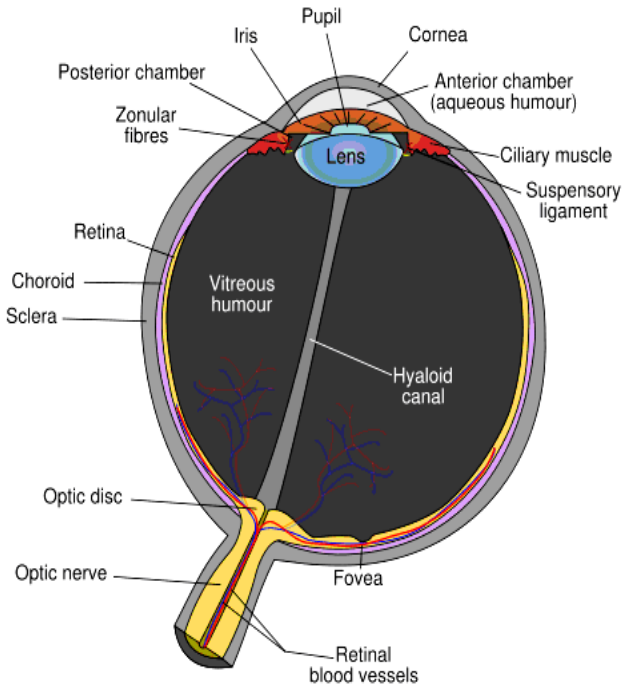

Fig -3: Anatomy of a frontal image of eye

IV. TECHNICAL ISSUE

1) Image Acquisition
2) Iris Localization
3) Pattern Matching

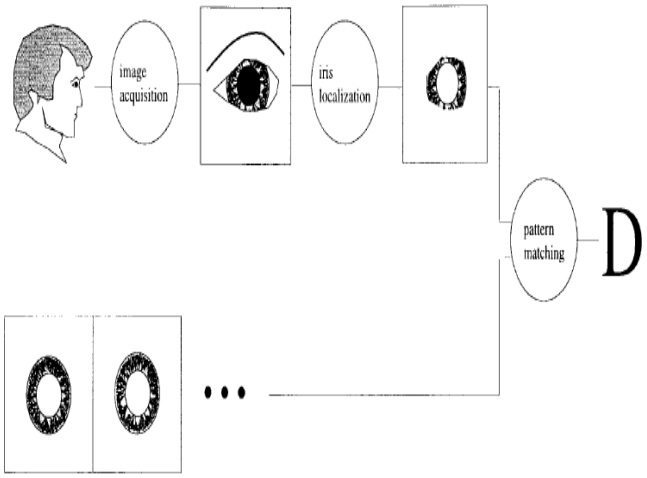

Fig -4: Schematic diagram of iris recognition system

IV. I. IMAGE ACQUISITION

The iris recognition process begins with image acquisition. Image acquisition is a process which deals with the capturing of a high quality image of the iris with the help of a digital camera. The major challenge in the process of iris recognition is to capturing high quality image of the iris. It is desirable to acquire images of the iris with sufficient resolution and sharpness to support recognition. It is essential to have good contrast in interior iris pattern without any distraction in the image. These images must be well framed. The Daugman system of iris recognition is widely used, which captures images with the iris diameter typically between 100 and 200 pixels from a distance of 46 cm using a 330 mm lens.

IV. II. IRIS LOCALIZATION

This is the method which is used for localization purpose of iris image. It is the necessity to localize the image portion which is derived from the pupil. Iris localization is a process that delimits the iris from the rest of the acquired image. Desired characteristics of iris localization: Sensitive to a wide range of edge contrast. Robust to irregular borders. Capable of dealing with variable occlusions.

Iris recognition is the process of recognizing a person by the analysis of random pattern of iris. Iris scan uses the unique characteristic features of iris in the human eye in order to verify an individual. The pigmented or colored circles are normally brown and blue which is nothing but the iris area of the eye. Iris recognition systems uses camera which has small size, but have a high resolution photograph of the iris. This process occurs within a two seconds, which provides the details of the iris that are stored for future

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matching/verification. This method is considered to be one of the secure, fastest and most accurate biometric technologies.

IV. III. PATTERN MATCHING

This is the next step to the iris localization method. Bringing the recent iris pattern which is taken from the camera is then transferred into spatial alignment with a candidate data base which is already saved. An aligned iris pattern represents the distinctive apparent pattern. Evaluating the goodness of the iris and matching the pattern between the recent acquired image of iris and data base of iris representations. If the recently acquired image of iris and the saved images of iris in the data base were derived from the same iris; then the goodness of the iris is matched. The Iris Code which is derived from this process is compared with previously generated Iris Code which is referred as pattern matching. Using integer XOR logic, a long vector of each iris code is XOR[ed] to generate a new integer. Each bit shows the mismatch between the vectors being compared.

The fraction of mismatched bits represents the difference between two iris codes termed as hamming distance. In the template, number of 1s represents the total number of mismatches between the two binary codes. The hamming distance is 0 only when if the two iris codes matched perfectly otherwise the hamming distance is 1 if the iris is not matched perfectly.

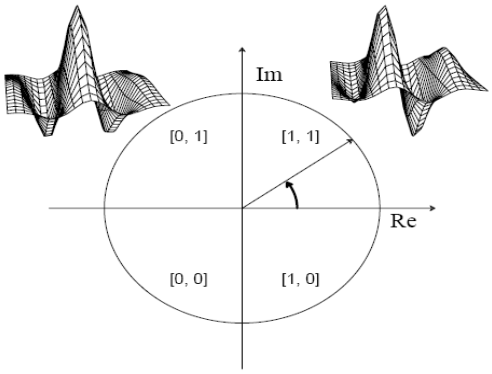

Fig -5: The phase transformation used to convert the angles into iris template [8].

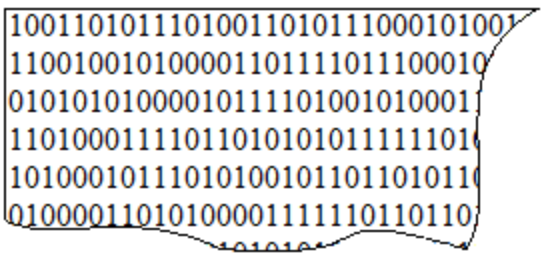

Fig -6: Sample of iris bit template

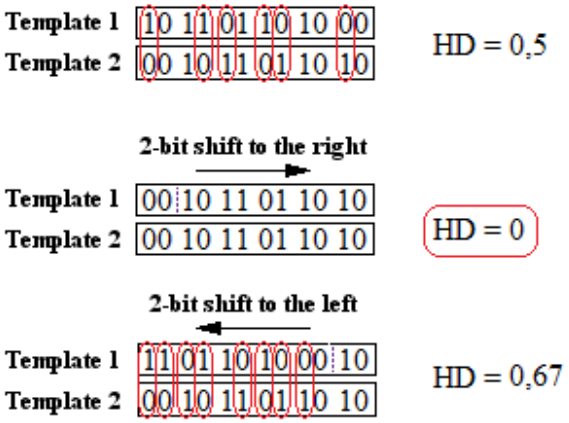

Fig -7: Example of calculating the Hamming distance (HD) with one step shift of iris bit templates

V. FEATURE EXTRACTION

Selection Transformation is used to find the feature with the help of normalized iris image with 2D Gabor wavelet. It will give the optimal results of frequencies of the signal in the 2D space. Set of complex values is the result of the transformation, which can be divided into real and imaginary part. With the help of this complex number we can find out the phase angle. Then create a bit template where each angle generates two bits of the template as evident from Fig.5. The bit template (Fig. 6) is thus twice the size of the polar normalized iris image.

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