ISSN: 0976-9102 (ONLINE)
DOI: 10.21917/ijivp.2019.0294

EFFECTIVE IMAGE PROCESSING TECHNIQUES BASED IRIS ATTENDANCE SYSTEM

S. Athinarayanan[1], K. Navaz[2], R. Lakshmi Priya[3] and V. Ebenezer[4]

[1,2]Department of Computer Science and Engineering, Annamacharya Institute of Technology and Sciences, India
[3]Department of Computer Science and Engineering, Sreenidhi Institute of Science and Technology, India
[4]Department of Computer Science and Engineering, Karunya Institute of Technology and Sciences, India

Abstract

In this paper, the iris prediction gives an incipient conception for Biometric benchmark process. Biometrics is the most secure and utilize-cordial benchmark implement. Iris perception technology contains pattern perception and optics method. It identifies an individual person by utilizing their individual physical characteristics. Iris perception system is very wide compared with other biometric systems. The main wholesomeness of iris perception system is its stability and uniqueness that results in a single enrolment for the lifetime. It provides increasingly varies than the fingerprint and the other biometrics systems, where the information cannot be stolen.

Keywords:

Iris Prediction System, Pattern Analysis, Biometric Authentication, Human Eye

1. INTRODUCTION

Biometric authentication is a security process that relies on the unique biological characteristics of an individual to verify that he is who is verbalizes he is. Biometric authentication systems compare a biometric data capture to stored, attested authentic data in a database. If both samples of the biometric data match, authentication is substantiated. Typically, biometric authentication is utilized to manage access to physical and digital resources such as buildings, rooms and computing contrivances.

Once visually perceived mostly in spy movies (where it might be acclimated to bulwark access to a top-secret military lab, for example), biometric authentication is becoming relatively commonplace. In advisement to the security provided by hard-to-fake individual biological traits, the acceptance of biometric verification has withal been driven by accommodation: One cannot clearly forget or lose ones biometrics. The oldest kenned utilization of biometric verification is fingerprinting. Thumbprints made on clay seals were utilized as an expedient of unique identification as far back as antediluvian China. Modern biometric verification has become virtually instantaneous and is increasingly precise with the advent of computerized databases and the digitization of analog data.

2. TYPES OF BIOMETRIC AUTHENTICATION TECHNOLOGIES

1. Retina scans engender an image of the blood vessel pattern in the light-sensitive surface lining the individual's inner ocular perceiver.
2. Iris perception is utilized to identify individuals predicated on unique patterns within the ring-shaped region circumventing the pupil of the ocular perceiver.
3. Finger scanning, the digital version of the ink-and-paper fingerprinting process, and works with details in the pattern of raised areas and branches in a human finger image.
4. Finger vein ID is predicated on the unique vascular pattern in an individual's finger.
5. Facial perception systems work with numeric codes called face prints, which identify 80 nodal points on a human face.
6. Voice identification systems rely on characteristics engendered by the shape of the verbalizer's mouth and throat, rather than more variable conditions.

3. HUMAN EYE WITH LOCATION OF IRIS

In humans and most mammals and birds, the iris (plural: irides or irises) is a thin, circular structure in the eye, responsible for controlling the diameter and size of the pupil and thus the amount of light reaching the retina. Eye color is defined by that of the iris. In optical terms, the pupil is the eye's aperture, while the iris is the diaphragm. The human eye with iris location Shown in Fig.1.

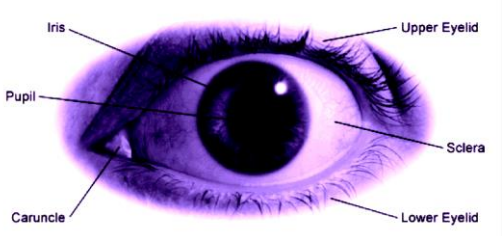

Fig.1. Human Eye and Iris Location

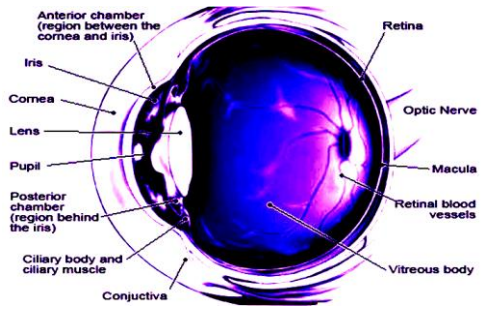

Fig.2. Anatomy of Eye (Picture of Eye Anatomy Detail)

The Fig.2 represents the details of eye anatomy and this illustrates the ocular perceiver is our organ of visual perception. The ocular perceiver has a number of components which include but are not constrained to the cornea, iris, pupil, lens, retina, macula, optic nerve, choroid and vitreous.

- **Cornea**: the clear front window of the ocular perceiver that transmits and focuses light into the ocular perceiver.
- **Iris**: colored part of the ocular perceiver that avails regulate the amount of light that enters
- **Pupil**: dark aperture in the iris that determines how much light is let into the ocular perceiver
- **Lens**: transparent structure inside the ocular perceiver that focuses light rays onto the retina
- **Retina**: nerve layer that lines the back of the ocular perceiver, senses light, and engenders electrical impulses that peregrinate through the optic nerve to the encephalon
- **Macula**: minute central area in the retina that contains special light-sensitive cells and sanctions us to visually perceive fine details limpidly
- **Optic nerve**: connects the ocular perceiver to the encephalon and carries the electrical impulses composed by the retina to the visual cortex of the encephalon
- **Vitreous**: a clear, jelly-like substance that fills the middle of the ocular perceiver.

4. LITERATURE SURVEY

In today's world people faces fake identification problem as a major problem in the whole world [1]. The high confidence levels are important because they allow very large databases to be searched exhaustively (one-to-many identification mode) without making false matches, despite so many chances. Biometrics that lack this property can only survive one-to-one (verification) or few comparisons [2]. A review of major iris recognition researches. There are three main stages in iris recognition system that includes image preprocessing, feature extraction and template matching [3].

A wireless iris recognition attendance management system is designed and implemented using Daugman algorithm. This system based biometrics and wireless technique resolves the problem of spurious attendance and the trouble of laying the corresponding network [4]. To design and implement an iris recognition based attendance management system with the latest facilities at an accessible price to think about the financial situation of the large figure of developing countries [5]. Iris recognition is an automated method of biometric identification that uses mathematical pattern-recognition techniques on video images of one or both of the irises of an individual, whose complex patterns are unique, stable, and can be seen from some distance [6].

Iris recognition technology is used to identify individuals by photographing the iris of their eye, has become popular in security applications because of its ease of use, accuracy, and safety in controlling access to high-security areas. Fusion of multiple algorithms for biometric verification performance improvement has received considerable attention [7]. In today's globally connected world there is increasing interest in using biometrics (personal physical attributes such as fingerprints, facial images, voice patterns, iris codes, and hand geometry) for human verification, identification, and "screening" applications. Biometrics are attractive because they cannot be "forgotten," are not easily stolen, and provide a direct, undeniable link between a user and a transaction [8]. A new approach based on the Hausdorff distance measure is proposed for iris recognition. In contrast to existing approaches that consider grey or colour images, the new approach considers the binary edge maps of irises. Edge maps have advantages in terms of low storage space, fast transmission, fast processing and hardware compatibility. A new measure, called local partial Hausdorff distance, is computed between the binary edge maps of normalized iris images [9].

5. PROPOSED IRIS RECOGNITION SYSTEM

The proposed IRIS recognition system shown in the following Fig.3.

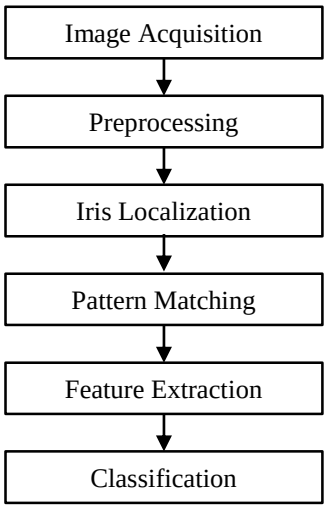

Fig.3. Proposed Iris Recognition System

5.1 IMAGE ACQUISITION

The iris perception process commences with image acquisition. Image acquisition is a process which deals with the capturing of a high quality image of the iris with the avail of a digital camera. The major challenge in the process of iris perception is to capturing high quality image of the iris. It is desirable to acquire images of the iris with adequate resolution and sharpness to fortify perception. It is essential to have good contrast in interior iris pattern without any diversion in the image. These images must be well framed. The Daugman system of iris perception is widely utilized, which captures images with the iris diameter typically between 100 and 200 pixels from a distance of 46cm utilizing a 330mm lens.

5.2 PREPROCESSING

The Original Iris Image, regardless of whether it is a typical, splendid or dim picture, first it is changed over into their separate Red, Green and Blue Plane Images. At that point every R, G and B plane of a unique picture was first locally edge by utilizing given conditions in Eq.(1)-Eq.(3) i.e. the mean estimation of the first info picture was increased with the components α, β and γ, by altering the estimation of this elements we get fragmented division of the core. So outside iris locales were expelled by playing out a Morphological shutting task utilizing a structure component littler than the littlest core and atomic in homogeneity was rectified by a morphological opening of comparative size. The subsequent divided picture for the particular R, G and B plane

were utilized for recognizing the core with a larger number of subtle elements than the first picture and it is given in Eq.(4)-Eq.(6)

$$MI_R = \text{mean}(I_R)*\alpha \quad (1)$$

$$MI_G = \text{mean}(I_G) * \beta \quad (2)$$

$$MI_B = \text{mean}(I_B)*\gamma \quad (3)$$

$$SI_R = ((TI_R \bullet MC_R) \circ MO_R), \quad (4)$$

$$SI_G = ((TI_G \bullet MC_G) \circ MO_G), \quad (5)$$

$$SI_B = ((TI_B \bullet MC_B) \circ MO_B), \quad (6)$$

where, SI_R, SI_G and SI_B are the subsequent portioned picture for the particular R, G and B plane. TI_R, TI_G and TI_B is the edge picture for the separate R, G and B plane, MI_R, MI_G and MI_B, MO_R, MO_G and MO_B are organizing components for the particular R, G and B plane.

The images ● and ○ mean morphological shutting and opening, individually. At that point by consolidating R, G and B channel segmented image SI_R, SI_G and SI_B, we get the portioned Iris image as in Eq.(7).

$$SI_{RGB} = ((TI_{RGB} \bullet MC_{RGB}) \circ MO_{RGB}) \quad (7)$$

where, SI_{RGB} is the resulting segmented color image, TI_{RGB} is the threshold image; MC_{RGB} and MO_{RGB} are structure elements of both the closing and opening operation [7].

5.3 IRIS LOCALIZATION

This is the method which is utilized for localization purport of iris image. It is the desideratum 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 aberrant borders. Capable of dealing with variable occlusions.

Iris perception is the process of apperceiving a person by the analysis of desultory pattern of iris. Iris scan utilizes the unique characteristic features of iris in the human ocular perceiver in order to verify an individual. The pigmented or colored circles are customarily brown and blue, which is nothing but the iris area of the ocular perceiver. Iris perception systems uses camera which has minuscule 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 matching/verification. This method is considered to be one of the secure, most expeditious and most precise biometric technologies.

5.4 PATTERN MATCHING: MMTH TEXTON METHOD

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 predicate which is already preserved. An aligned iris pattern represents the distinctive ostensible pattern. Evaluating the goodness of the iris and matching the pattern between the recent acquired image of iris and data base of iris representations.

Texton is one of the very important concepts for texture analysis; it was developed 20 years ago. It is a set pattern sharing a common property all over the image. According to the neuropsychological findings, different types of incentive are processed disjoint, yet concurrently, by dissimilar neural mechanism previously to the stimulus are intentionally perceived as a whole. In the proposed method, feature extraction process is done with the help of Modified Multi Texton Histogram (MMTH).

In this method, both histogram and co-occurrence matrix is used for the feature extraction process. The relationship between the values of neighboring pixels is characterized by TCM. Histogram based techniques are simple to compute, but the highest indexing performance. The co-occurrence matrix directly uses a feature representation of the image. If the dimension of the image is high, then the performance is decreased. The spatial information is lost when the histogram is used only for feature representation of the image. Hence, it is essential to combine both histogram and co-occurrence matrix for feature extraction and depiction. In the MMTH method, four special types of textons are used for detecting the texton in the localized Iris image, which is shown in Fig.4.

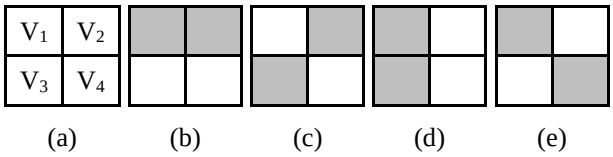

Fig.4. Special texton types of MMTH (a) original 2×2 matrix (b) Texton T_1 (c) Texton T_2 (d) Texton T_3 (e) Texton T_4

5.5 FEATURE EXTRACTION

Consider a 2×2 matrix in the image with four pixels P_1, P_2, P_3 and P_4. If two pixels resembles have the same, then these pixels tend to form a texton. The possible textons formed with different combination of pixels with same intensity values are denoted by T_1, T_2, T_3 and T_4 which are shown in Fig.4. The texton image is formed overriding these four texton patterns with two pixel length as shown in Fig.5.

In Fig.5, the 2×2 matrices are shown in Fig.5(a), the experimental image data are shown in Fig.5(b), the four texton templates that photo over the entire tentative image from left to right and top to bottom with two-pixel length to detect four textons is shown in Fig.5(c). The four different type textons are given in Fig.5(d). The four texton component images that are composed to form a last texton image is shown in Fig.5(e). After the formation of final texton image, the feature vector F(V3) (Eight features such as ASM, entropy, IDM, contrast, Maximum probability, moment, homogeneity and correlation) is extracted from the final texton image.

5.6 CLASSIFICATION

The retrieved features (MMTH) for all the iris images of the applicants classified by using SVM classification technique to identify the real applicants.

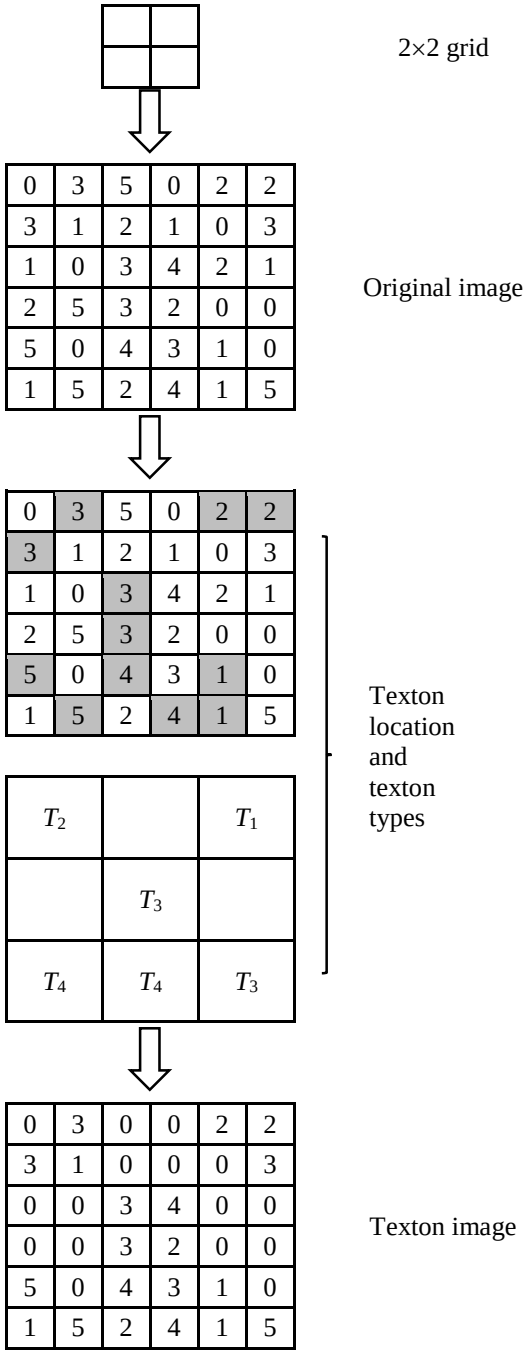

Fig.5. Texton image formation process using MMTH (a) 2×2 matrix (b) Original image intensity value (c) Texton location of the original image (d) Four texton types (e) Final texton image of MMTH

6. COMPARATIVE RESULTS

The final classification results were compared with an existing finger print attendance system, finally the proposed system proves the effective accuracy result in terms of the parameters like Sensitivity, Specificity and Accuracy. The results shown in given Table.1 and the plotted graphs are shown in the Fig.6. Here, *TP* is the correctly identified the correct applicants, *TN* is the correctly identified the in-correct applicants, *FP* is the incorrectly identified the correct applicants, and *FN* is the incorrectly identified the in-correct applicants.

Table.1. Comparative analysis of proposed system with existing system (Total: 100 images, training: 20 images, Testing: 80 images)

Evaluation Metrics (Iris Images)	**Proposed IRIS System**	**Finger Print System**
TP	92	84
TN	3	5
FP	3	6
FN	2	5
Sensitivity (%)	97.87	94.38
Specificity (%)	50	45
Accuracy (%)	95	89

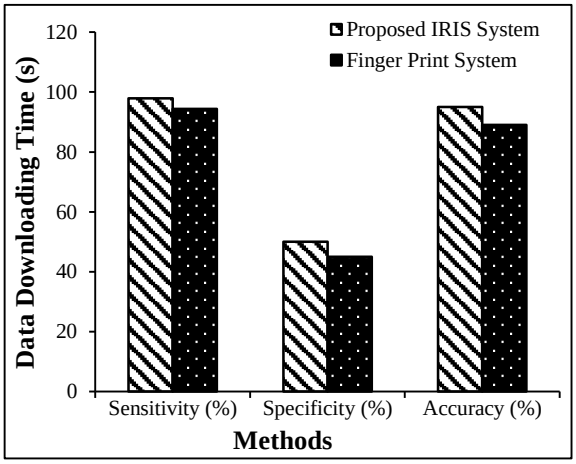

Fig.6. Comparative analysis of proposed system with existing system

7. CONCLUSIONS

Biometrics is one of the most secure and convenient authentication tool. Iris recognition technology contains pattern recognition and optics method. It identifies an individual based on their physical characteristics. Iris recognition system is very advanced compared with other biometric system like fingerprint system. The main advantage of the proposed iris recognition system is that it yields an improved better accuracy results than the fingerprint biometrics systems. Moreover using this system, the forging the identities can be avoided.

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