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Project Title:

Identify and Recognize Person Using Iris Biometric Security System

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Abstract:

A biometric system provides special and automatic identification of an individual based on characteristics and unique features showed by individuals. This work will examine the developing automated iris recognition for personal identification in order to verify both uniqueness of the human iris and also its performance as a biometric based system. The iris recognition system consists of the iris acquisition system and iris authentication algorithm. This method will also able to localize the pupil region and circular iris, occluding eyelashes and eyelids, and reflections. The performance will be measured for stored database which is scored 0% each for FRR and FAR. Therefore, iris recognition is shown to be an accurate and reliable biometric technology.

Introduction:

Biometric systems work by first capturing a sample of the feature like recording a digital sound signal for voice recognition or taking a digital color image for face recognition. The sample is then transformed using some sort of mathematical function into a biometric template. The biometric template will provide a normalized, efficient and highly discriminating representation of the feature which can then be objectively compared with other templates in order to determine identity. Most biometric systems allow two modes of operation. An enrolment mode for adding templates to a database, and an identification mode, where a template is created for an individual and then a match is searched for in the database of pre-enrolled templates [1].

The iris analysis algorithm consist of: 1) Detection of human iris using new model which is able to compensate noise introduced by the surrounding eyelashes and eyelids 2) Conversion of isolated iris using a Discrete Wavelet transform into standard domain where common radial patterns of the human iris are concisely represented, and 3) it optimally selects, aligns, and compresses most distinctive transform coefficients for each individual user.

The purpose of "Iris Recognition", a biometrical based technology for personal identification and verification, is to recognize a person from his/her iris prints. In fact, iris patterns are characterized by high level of stability and distinctiveness. Each individual has a unique iris the difference even exists between identical twins and between the left and right eye of the same person. The iris is a thin circular diaphragm which lies between the cornea and the lens of the human eye. The iris is perforated close to its centre by a circular aperture known as the pupil. The function of the iris is to control the amount of light entering through the pupil and this is done by the sphincter and the dilator muscles, which adjust the size of the pupil. The average diameter of the iris is 12 mm, and the pupil size can vary from 10% to 80% of the iris diameter. The iris is an externally visible, yet protected organ whose unique epigenetic pattern remains stable throughout adult life. These characteristics make it very attractive for use as a biometric for identifying individuals. Image processing techniques can be employed to extract the unique iris pattern from a digitized image of the eye and encode it into a biometric template which can be stored in a database.

Objective:

The main objective is build a learning framework for biometric security which will:

- Recognize iris
- Enhance the recognition by storing and learn classifier
- Iris will track human and follow

Methodology:

Step 1: First step of my proposal is to analyze iris. The phases are: 1) detecting the iris center and the pupil; 2) detecting the outer edge of the iris; and 3) removing the surrounding noise from the recovered iris. Each successive step further refines the image removing noise. The result is an image whose size equals that of the image but where the pixels for non-iris regions have been masked.

Step 2: Second step is transformation. Once the iris is detected, it must be transformed into a common domain. The iris width and scale can vary due to dilation and camera positioning, as well as the location of the iris within the image. The annular shape of the iris suggests a transformation of this donut into a rectangle. Further, the dilation of the pupil and its effect on the iris suggests the use of a normalized scale invariant transform.

Step 3: The next step is principal component analysis. PCA is a useful statistical technique that has found application in field such as face recognition and image compression, and is a common technique for finding patterns in data of high dimension.

Step 4: After that, the next step is steganography. Steganography is the art of hiding the fact that communication is taking place, by hiding information in other information. The most widely used technique to hide data is the usage of the LSB- Least Significant Bit technique. Least Significant Bit insertion method is a simple approach to embed information in a cover file. The LSB is the lowest order bit in a binary value. This is an important concept in computer data storage and programming that applies to the order in which data are organized, stored or transmitted.

Step 5: The last step is classifier. Classifier is used classify the users and then to show their corresponding information so as to authenticate them. We have used two classifiers Support Vector Machine and *k*-Nearest Neighbor to do the comparative study.

Socio-economic Importance:

Access control is currently the principal focus of Iris ID's business; it is widely deployed in both public and private sectors around the world, providing state-of-the-art access control to organizations valuing human and physical assets. One area in which Iris ID is gaining considerable attention and acceptance for Iris Access is in data center access control. The repositories of information regarding business, employees, customers and competitors contain a company's most valuable asset - information compiled over time at considerable expense.

Iris recognition technology is finding its way into the education sector - not just for security but for other applications as well. It's being used in daycare and schools to restrict access and establish the identity of school employees, as well as parents or other adults who come to school to pick up particular children.

The iris biometric method is already being used in identification and authentication in many UK airports and the UAE. The effectiveness of the iris biometric method can be much higher if used in combination with other biometrics (to be multimodal), or used in combination with a password/PIN, or token.

Conclusion:

Iris recognition is a vibrant issue in computer vision. For a particular application this needs special attention and modification. In proposed approach iris analysis step performs pupil detection, ring detection & noise removal. For the pupil & iris boundary detection canny edge detection method is used. As canny edge detection holds good results than prewitt's & sobel edge detection as it can identify the weak & strong edges for the image. For noise due to eyelids & eyelashes thresholding technique is used. The proposed research will help in many fields.

References:

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