Review of Iris Recognition: An evolving Biometrics Identification Technology

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Abstract*— A biometric system provides automatic identification of an individual based on a unique feature or characteristic possessed by the individual. Unlike other biometric such as fingerprints and face recognition, the distinct aspect of iris comes from randomly distributed features. Iris recognition is regarded as the most reliable and accurate biometric identification system available. This paper provides the review of related work in the iris recognition. A general framework of the iris recognition system is proposed and finally the advantages and disadvantages of the iris recognition technology are analyzed. It is commonly accepted that users of a biometric system may have differing degrees of accuracy within the system. Some people may have trouble authenticating, while others may be particularly vulnerable to impersonation. The estimation results reveal, as expected, that a wide variety of factors affect security transit times including the number of enplaning seats (reflecting flight schedules), weather conditions, day of week, as well as obvious variables such as traveler volume and the number of open security lanes. The recognition accuracy of a single biometric authentication system is often much reduced due to the environment, user mode and physiological defect. Iris and Retina biometric recognition offers a highly reliable solution to person authentication. Instead of using the entire iris code, only the bits that are consistent in the iris code called the best bits are considered in the feature matching process. This reduces the computational time and storage requirements of iris code. To enhance the performance of recognition, the iris recognition process is applied to left and right irises separately and the corresponding distance scores are generated for each iris of a person. These scores are combined using the weighted sum fusion rule which further increases the recognition rate. Iris recognition system is composed of segmentation, normalization, feature encoding and matching.

Index Terms*— biometric system, Iris recognition, segmentation, normalization.

I. INTRODUCTION

Iris recognition is an automated method of biometric identification than uses mathematical pattern-recognition techniques on images of the irides of an individual's eyes, whose complex random patterns are unique and can be seen from some distance. Not to be confused with another, less prevalent, ocular-based technology, retina scanning, iris recognition uses camera technology with subtle infrared illumination to acquire images of the detail-rich, intricate structures of the iris. Digital templates encoded from these patterns by mathematical and statistical algorithms allow the identification of an individual or someone pretending to be that individual. Databases of enrolled templates are searched by matcher engines at speeds measured in the millions of templates per second per (single-core) CPU, and with infinitesimally small false match rates. Many millions of persons in several countries around the world have been enrolled in iris recognition systems, for convenience purposes such as passport-free automated border-crossings, and some national ID systems based on this technology are being deployed. A key advantage of iris recognition, besides its speed of matching and its extreme resistance to false matches, is the stability of the iris as an internal, protected, yet externally visible organ of the eye. An iris-recognition algorithm first has to localize the inner and outer boundaries of the iris (pupil and limbus) in an image of an eye. Further subroutines detect and exclude eyelids, eyelashes, and specular reflections that often occlude parts of the iris. The set of pixels containing only the iris, normalized by a rubber-sheet model to compensate for pupil dilation or constriction, is then analyzed to extract a bit pattern encoding the information needed to compare two iris images. In the case of Daugman's algorithms, a Gabor wavelet transform is used. The result is a set of complex numbers that carry local amplitude and phase information about the iris pattern. In Daugman's algorithms, most amplitude information is discarded, and the 2048 bits representing an iris pattern consist of phase information (complex sign bits of the Gabor wavelet projections). Discarding the amplitude information ensures that the template remains largely unaffected by changes in illumination or camera gain (contrast), and contributes to the long-term usability of the biometric template. For identification (one-to-many template matching) or verification (one-to-one template matching), a template created by imaging an iris is compared to stored template(s) in a database. If the Hamming distance is below the decision threshold, a positive identification has effectively been made because of the statistical extreme improbability that two different persons could agree by chance ("collide") in so many bits, given the high entropy of iris templates.

II. GENERAL FRAMEWORK

Fig. 1 shows block diagram for a biometric system of iris recognition in unconstrained environments in which each block’s function is briefly discussed as follows:

- Image acquisition: in this stage, a photo is taken from iris.
- Pre-processing: involving edge detection, contrast adjustment and multiplier.

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- Segmentation: including localization of iris inner and outer boundaries and localization of boundary between iris and eyelids.
- Normalization: involving transformation from polar to Cartesian coordinates and normalization of iris image.
- Feature extraction: including noise removal from iris image and generating iris code.
- Classification and matching: involving comparing and matching of iris code with the codes already saved in database.

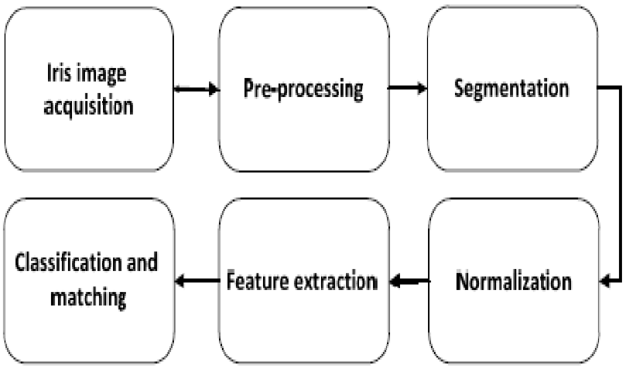

Fig. 1 Block Diagram of an Iris Recognition System

Regarding the fact that in an unconstrained environment iris may have occlusions caused by upper or lower eyelids or eyes may roll left and rightwards, as the paper goes on, these blocks are introduced and such issues are solved.

III. RELATED WORK

Iris masks play an important role in iris recognition. They indicate which part of the iris texture map is useful and which part is occluded or contaminated by noisy image artifacts such as eyelashes, eyelids, eyeglasses frames and specular reflections. The accuracy of the iris mask is extremely important. The performance of the iris recognition system will decrease dramatically when the iris mask is inaccurate, even when the best recognition algorithm is used. Traditionally, people used the rule-based algorithms to estimate iris masks from iris images. However, the accuracy of the iris masks generated this way is questionable. Yung-Hui Li, Marios Savvides proposed by [1] to use Figueire do and Jain's Gaussian Mixture Models (FJ-GMMs) to model the underlying probabilistic distributions of both valid and invalid regions on iris images. Authors also explored possible features and found that Gabor Filter Bank (GFB) provides the most discriminative information for our goal. Finally, they applied Simulated Annealing (SA) technique to optimize the parameters of GFB in order to achieve the best recognition rate. Experimental results show that the masks generated by the proposed algorithm increase the iris recognition rate on both ICE2 and UBIRIS dataset, verifying the effectiveness and importance of our proposed method for iris occlusion estimation. IrisCode is the most influential iris recognition algorithm. A thorough understanding of IrisCode is essential, because over 100 million persons have been enrolled by this algorithm and many biometric personal identification and template protection methods have been developed based on IrisCode. Adams Wai-Kin Kong proposed by [2], indicates that a template produced by IrisCode or its variants is a convex polyhedral cone in a hyperspace. Its central ray, being a rough representation of the original biometric signal, can be computed by a simple algorithm, which can often be implemented in one MATLAB command line. The central ray is an expected ray and also an optimal ray of an objective function on a group of distributions. This algorithm is derived from geometric properties of a convex polyhedral cone but does not rely on any prior knowledge (e.g., iris images). The experimental results show that biometric templates, including iris and palmprint templates, produced by different recognition methods can be matched through the central rays in their convex polyhedral cones and that templates protected by a method extended from IrisCode can be broken into. These experimental results indicate that, without a thorough security analysis, convex polyhedral cone templates cannot be assumed secure. Additionally, the simplicity of the algorithm implies that even junior hackers without knowledge of advanced image processing and biometric databases can still break into protected templates and reveal relationships among templates produced by different recognition methods. By simply adding a triangle aperture (TA) in front of a camera lens, iris autofocus can be easily achieved. Through the TA, the corneal reflection of a light source forms a triangle glint on the image plane. The size and orientation of the glint can be used to infer the amount and the direction of the focus adjustment. A gradient-descent autofocus control law is proposed by [3] for uncalibrated lenses. Results from theoretical analysis and real experiments show that the proposed method is more efficient and accurate than the conventional circular aperture approach. In general, the visible image-based eye-gaze tracking system is heavily dependent on the accuracy of the iris center (IC) localization. A novel IC localization method based on the fact that the elliptical shape (ES) of the iris varies according to the rotation of the eyeball proposed by [4]. Authors use the spherical model of the human eyeball and estimate the radius of the iris from the frontal and upright view image of the eye. By projecting the eyeball rotated in pitch and yaw onto the 2-D plane, a certain number of the ESs of the iris and their corresponding IC locations are generated and registered as a database (DB). Finally, the location of IC is detected by matching the ES of the iris of the input eye image with the ES candidates in the DB. Moreover, combined with facial landmark points-based image rectification, the proposed IC localization method can successfully operate under natural head movement. Experimental results in terms of the IC localization and gaze tracking show that the proposed method achieves superior performance compared with conventional ones. Cemre Candemir, et al. [5] suggests the use of radial based neural networks for classification of the landmark points from retina vessels in the retinal vascular images to diagnose the disease in the diabetic retinopathy patients and to track the periodic differences in retinal vessel images. In the suggested method, Gold Standard images from DRIVE database are used.

The performance of landmark detection by the suggested method shows that the method can be used as an algorithm for registration of retinal images. Biometric recognition technology is correlated generally with very expensive top secure applications. Iris recognition system is one of the effective biometric recognition systems. The main purpose of study by [6], is to recognize the human from different eye images according to their iris texture characteristics. The digital crop images are derived from CASIA iris image database. The texture feature vectors are extracted from the local iris regions by using Laws Texture Energy Measure (TEM) which is a new method for image texture feature extraction. The obtained feature vectors are separated by k-Nearest Neighbor (k-NN) classifier as taking the neighbor number (k) parameter in different values and the performance results of each system are compared according to disparate k values. Finally, the best average performance is observed as 80.74 % in k=1 and 2 neighbors structure of k-NN classifier. Nowadays eye states are used as inputs to various applications such as facial expression recognition systems, human-computer interaction and driver fatigue detection systems. Especially with the pervasion of human computer interaction, eye state detection has drawn great attention in the past decade. An eye state detection system based on circular Hough transform has been offered by [7]. Initially, a face image is extracted from a given image. Eye pair images are obtained from this face image, and eyes are acquired from the eye pair images. After preprocessing, existence of circular iris structure is searched with the help of circular Hough transform within the eye image. Eyes are decided as open if iris is visible. Ibrahim Mesecan et al. investigate [8], the use of Scale Invariant Feature Transform (SIFT) for iris recognition problem with sub-segments. Instead of using the whole iris, authors extracted sub-segments from the iris image for classification. These sub segments were used separately for classification. Also, feature based fusion is applied using different sub-segments from the same iris. A preprocessing step for cropping the iris area from the images was address in this paper as well to increase performance of the system. The simulation results show high performance on the used database. A new model of a Multi-Objective Hierarchical Genetic Algorithm (MOHGA) based on the Micro Genetic Algorithm (μGA) approach for Modular Neural Networks (MNNs) optimization is proposed Daniela Sánchez et al.[9].The proposed method can divide the data automatically into granules or sub modules, and chooses which data are for the training and which are for the testing phase. The proposed Multi-Objective Genetic Algorithm is responsible for determining the number of granules or sub modules and the percentage of data for training that can allow to have better results. The proposed method was applied to human recognition and its applicability with good results is shown, although the proposed method can be used in other applications such as time series prediction and classification. Unimodal biometric systems have to contend with a variety of problems such as noisy data, intra-class variations, spoof attacks, and unacceptable error rates. Some of these limitations can be addressed by multimodal biometric systems that integrate multiple sources of human information to identify as well to provide ultra secure system for the information. The main objective by [10], is to analyze the performance of two traits, namely, ear and iris, individually and combined them by applying score level fusion technique. Ear and Iris Recognition system was built by extracting their features using Principal Component Analysis (PCA) technique by determining the Eigen vectors for dimensionality reduction without information loss. The similarity between the test data and the training set is measured and combined together using sum rule based score level fusion method. This proposed system is implemented to study and analyze the performance of multi traits during fusion. The fusion work results to 95% success rate, which is higher rather than a Unimodal system. An analyses of the iris biometric authentication as it has low error rates compared to other biometric authentication methods and its robustness of the algorithms provided by [11]. Authors uses Gabor filters for feature extraction methods for iris authentication, which is more advantageous than already available methods. Matching algorithms such as binary Hamming distance and Euclidean distance is used in this paper for comparing the Feature extraction methods. After the Features are extracted it is implemented in Analog devices to achieve fast verification Performance. Milos Stojmenovic et al. [12], define an iris detection algorithm that performs an order of magnitude faster than the state of the art, while preserving accuracy. The algorithm isolates the pupil boundary by extracting image edges, then finding the largest contiguous set of points that satisfy the circularity criterion and contain mostly dark pixels. The iris/sclera boundary is found by horizontally and simultaneously searching along both directions of the pupil center for the highest cumulative difference in intensities. Authors apply a measure of circularity to isolate both the sclera and pupil boundaries, avoiding the exhaustive search required by [D]. The method correctly identifies the iris region in 95% of test cases in the CASIA 3 dataset [CA]. Biometric authentication is among the most convenient, reliable and secure techniques for human identification and recognition. In general, iris-based biometric systems provide very good results in terms of recognition accuracy but, as the noise in input images increases, the performance of these systems starts to fall down. Using multiple templates at enrollment time can be very effective for improving recognition accuracy in noisy iris image datasets. Sheikh Ziauddin, Sajida Kalsoom at [13], introduce techniques to generate a more reliable final template from multiple enrollment templates. The experiments with CASIA 1, CASIA 3 and BATH iris image datasets show that recognition performance is significantly improved using the proposed techniques. Admas W. K. Kong, et al. [14], states that IrisCode is an iris recognition algorithm developed in 1993 and continuously improved by Daugman. It has been extensively applied in commercial iris recognition systems. IrisCode representing an iris based on coarse phase has a number of properties including rapid matching, binomial impostor distribution and a predictable false acceptance rate. Because of its successful applications and these properties,

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many similar coding methods have been developed for iris and palmprint identification.

The aim of this paper is to provide such an analysis as a way of better understanding IrisCode, extending the coarse phase representation to a precise phase representation, and uncovering the relationship between IrisCode and other coding methods. This analysis demonstrates that IrisCode is a clustering algorithm with four prototypes; the locus of a Gabor function is a 2-D ellipse with respect to a phase parameter and can be approximated by a circle in many cases; Gabor function can be considered as a phase-steerable filter and the bitwise hamming distance can be regarded as a bitwise phase distance. A segmentation methodology that aims at compensating various nonidealities contained in iris images during segmentation proposed by [15]. The virtue of this methodology lies in its capability to reliably segment nonideal imagery that is simultaneously affected with such factors as specular reflection, blur, lighting variation, occlusion, and off-angle images. They demonstrate the robustness of our segmentation methodology by evaluating ideal and nonideal data sets, namely, the Chinese Academy of Sciences iris data version 3 interval subdirectory, the iris challenge evaluation data, the West Virginia University (WVU) data, and the WVU off-angle data. Research work provides solutions to designing such personal tokens where biometric authentication is required by [16]. In this paper, iris biometrics has been chosen to be implemented due to the low error rates and the robustness their algorithms provide. Several design alternatives are presented, and their analyses are reported. With these results, most of the needs required for the development of an innovative identification product are covered. Results indicate that the architectures proposed herein are faster (up to 20 times), and are capable of obtaining error rates equivalent to those based on computer solutions. Simultaneously, the security and cost for large quantities are also improved. Recognition of iris based on visible light (VL) imaging is a difficult problem because of the light reflection from the cornea. Nonetheless, pigment melanin provides a rich feature source in VL, which is unavailable in near-infrared (NIR) imaging. This is due to the biological spectroscopy of eumelanin, a chemical not stimulated in NIR. In this case, a plausible solution to observe such patterns may be provided by an adaptive procedure using a variational technique on the image histogram. To describe the patterns, a shape analysis method is used to derive the feature code for each subject. An important question is how the melanin patterns, which are extracted from VL, are independent of the iris texture in NIR. With this question in mind, the present investigation by [17], fusion of features extracted from NIR and VL to boost recognition performance. We have collected our own database (UTIRIS), consisting of both NIR and VL images of 158 eyes of 79 individuals. This investigation demonstrates that the proposed algorithm is highly sensitive to the patterns of chromophores and improves the iris recognition rate. Vishnu Naresh Boddeti, V.K. Vijaya Kumar [18], investigate the feasibility of skipping the image restoration step with minimal degradation in recognition performance while still increasing the depth of field of the whole system compared to an imaging system without a phase mask. By using a simulated wavefront-coded imagery, we present the results of two different iris recognition algorithms, namely, Daugman's iriscode and correlation-filter-based iris recognition, using more than 1000 iris images taken from the Iris Challenge Evaluation database. A video-based non cooperative iris image segmentation scheme that incorporates a quality filter to quickly eliminate images without an eye, employs a coarse-to-fine segmentation scheme to improve the overall efficiency, uses a direct least squares fitting of ellipses method to model the deformed pupil and limbic boundaries, and develops a window gradient-based method to remove noise in the iris region. A remote iris acquisition system is set up to collect non cooperative iris video images. An objective method is used to quantitatively evaluate the accuracy of the segmentation results. The experimental results demonstrate the effectiveness of this method. The proposed method would make non cooperative iris recognition or iris surveillance possible presented by [19]. A personalized iris matching strategy using a class-specific weight map learned from the training images of the same iris class. The weight map can be updated online during the iris recognition procedure when the successfully recognized iris images are regarded as the new training data. The weight map reflects the robustness of an encoding algorithm on different iris regions by assigning an appropriate weight to each feature code for iris matching. Such a weight map trained by sufficient iris templates is convergent and robust against various noises. Extensive and comprehensive experiments demonstrate by [20], personalized iris matching strategy achieves much better iris recognition performance than uniform strategies, especially for poor quality iris images. An algorithm is designed by [21], to perform this decompression by exploiting a graph composed of the bit pairs in Iris Code, prior knowledge from iris image databases, and the theoretical results. To remove artifacts, two post processing techniques that carry out optimization in the Fourier domain are developed. Decompressed iris images obtained from two public iris image databases are evaluated by visual comparison, two objective image quality assessment metrics, and eight iris recognition methods. The experimental results show that the decompressed iris images retain iris texture that their quality is roughly equivalent to a JPEG quality factor of 10 and that the iris recognition methods can match the original images with the decompressed images. A novel possibilistic fuzzy matching strategy with invariant properties, which can provide a robust and effective matching scheme for two sets of iris feature points. In addition, the nonlinear normalization model is adopted to provide more accurate position before matching. Moreover, an effective iris segmentation method Chung-ChihTsai et al.[22], to refine the detected inner and outer boundaries to smooth curves. For feature extraction, the Gabor filters are adopted to detect the local feature points from the segmented iris image in the Cartesian coordinate system and to generate a rotation-invariant descriptor for each detected point. Ryan Connaughton et al.[23],compares three commercially available iris sensors and three iris matching systems and investigates the impact of cross-sensor matching on system performance in comparison to single-sensor performance. Several factors which may impact single-sensor and cross-sensor performance are analyzed, including changes in the acquisition environment and differences in dilation ratio between iris images. The sensors are evaluated using three different iris matching algorithms, and conclusions are drawn regarding the inter action between the sensors and the matching algorithm in both the cross-sensor and single-sensor scenarios. Finally, the relative performances of the three sensors are compared. A new iris segmentation framework which can robustly segment the iris images acquired using near infrared or visible illumination. Chun-Wei Tan, Ajay Kumar [24], approach exploits multiple higher order local pixel dependencies to robustly classify the eye region pixels into iris or non iris regions. Face and eye detection modules have been incorporated in the untied framework to automatically provide the localized eye region from facial image for iris segmentation. We develop robust post processing operations algorithm to effectively mitigate the noisy pixels caused by the mis-classification , explains use of Figueiredo and Jain's Gaussian Mixture Models (FJ-GMM) to model the underlying probabilistic distributions of both valid and invalid regions on iris images. We also explored possible features and found that Gabor Filter Bank (GFB) provides the most discriminative information for our goal. Last, we applied simulated annealing technique to optimize the parameters of GFB in order to achieve the best recognition rate. Experimental results show that the masks generated by the proposed algorithm increase the iris recognition rate on both ICE2 and UBIRIS dataset, verifying the effectiveness. Focuses on studying the geometrical structure changes in irises that are caused by gastrointestinal diseases, and on measuring the observable deformations in the geometrical structures of irises that are related to roundness, diameter, and other geometric forms of the pupil and the collarette. Pupil- and collarette-based features are defined and extracted by Yung-Hui Li, Marios Savvides [25]. A series of experiments are implemented on our experimental pathological iris database, including manual clustering of both normal and pathological iris images, manual classification by nonspecialists, manual classification by individuals with a medical background, classification ability verification for the proposed features, and disease recognition by applying the proposed features. An algorithm using a system based on Local Binary Pattern and histogram approaches for feature extraction, and Linear Vector Quantization classifier for classification for this iris recognition investigate by [27]. This model is designed to distinguish clients from unauthorized users so that only valid users can have access to the security systems. Przemyslaw Strzelczyk at [28], presented a novel iris segmentation algorithm, which is suitable both for monochrome and color eye images. The method presented use modified Hough transform to roughly localize the possible iris and pupil boundaries, approximating them by circles. A voting mechanism is applied to select candidate iris regions. The detailed iris boundary is approximated by the spline curve. Its shape is determined by minimizing introduced boundary energy function. New eyelash detection algorithm based on directional filters, which achieves a low rate of eyelash misclassification. A multiscale and multidirectional data fusion method is also introduced to reduce the edge effect of wavelet transformation produced by complex segmentation algorithms proposed by [29]. Finally, an iris indexing method on the basis of corner detection is presented to accelerate exhausted the 1: N search in a huge iris database. The performance evaluations are carried out on two popular iris databases, and the test results are experimentally more robust and accurate with less elapsed time compared with most existing methods. The human eye is sensitive to visible light. Ronaldo Martins da Costa and Adilson Gonzaga at[30], increasing illumination on the eye causes the pupil of the eye to contract, while decreasing illumination causes the pupil to dilate. Visible light causes specular reflections inside the iris ring. On the other hand, the human retina is less sensitive to near infra-red (NIR) radiation in the wavelength range from 800 nm to 1400 nm, but iris detail can still be imaged with NIR illumination. In order to measure the dynamic movement of the human pupil and iris while keeping the light-induced reflexes from affecting the quality of the digitalized image, this paper describes a device based on the consensual reflex. This biological phenomenon contracts and dilates the two pupils synchronously when illuminating one of the eyes by visible light. To capture images of the pupil of one eye using NIR illumination while illuminating the other eye using a visible-light pulse. This new approach extracts iris features called "dynamic features (DFs)." H.B.Kekre, et al. [31], explains an iris recognition system based on vector quantization (VQ) techniques is proposed and its performance is compared with the discrete cosine transform (DCT). The proposed system does not need any pre-processing and segmentation of the iris. We have tested Linde-Buzo-Gray (LBG), Kekre's proportionate error (KPE) algorithm and Kekre's fast codebook generation (KFCG) algorithm for the clustering purpose by [32]. The presence or absence of the new animals reflects properties of the matching system, user population, or an interaction between the two irisdatabase presented by Alexander M. Hainen et al. [33]. These experimental results indicate that, without a thorough security analysis, convex polyhedral cone templates cannot be assumed secure This suggests a new method for investigating and evaluating biometric systems [34]. Iris image acquisition systems differ mainly in the type and location of the illumination they use, the type of sensor, the optical configuration, and the acquisition distance [35]. Thomas Bücher et al.[36], from an industrial point of view a modular and extensible architecture is highly appreciated, due to the simplification of the implementation of the different system tasks. In the selection of biometrics for use in a recognition system and in the subsequent design of the system, the predicted performance is a key consideration investigate Natalia A. Schmid et al.[37]. The zero-crossings of wavelet transform provide meaningful information of image structures [38],for fast iris recognition, it is essential to capture a focused eye image at fast speed. If not, the total recognition time is increased, causing severe inconvenience to the user [39].

An identification system typically consists of 1) image data acquisition, 2) iris localization and segmentation and 3) pattern matching [40]. When the dimension of the input vectors is very large, some preprocessing technique is usually required to reduce the computational workload and also to improve the generalization abilities of the network [41]. The influence eyelash occlusion on iris recognition includes two aspects mainly. One is that it influences iris localization of inner and outer boundaries. The other is that it influences iris feature extraction [42]. Daniel Schonberg et al. [43], proposes EyeCerts, a biometric system for identification of people which achieves offline verification of certified, cryptographically secure documents. An EyeCert is a printed document with two components: arbitrary text and a bar code. Identification consists on returning the identity of the user providing a device or characteristic that represents him/her. On the other hand, verification consists on confirming the user identity comparing his/her biometric data with the one stored previously in the system [44]. The first step of iris recognition is to localize the pupil center representing the concentric point of the inner and outer boundaries [45].Hugo Proenc et al. [46], proposed in order to compensate for the variations in the pupil's size and in the imaging distances, it is usual to translate the segmented iris region into a fixed length and dimensionless polar coordinate system.

IV. ADVANTAGES

The iris of the eye has been described as the ideal part of the human body for biometric identification for several reasons:

1. It is an internal organ that is well protected against damage and wear by a highly transparent and sensitive membrane (the cornea). This distinguishes it from fingerprints, which can be difficult to recognize after years of certain types of manual labor.
2. The iris is mostly flat, and its geometric configuration is only controlled by two complementary muscles (the sphincter pupillae and dilator pupillae) that control the diameter of the pupil [14]. This makes the iris shape far more predictable than, for instance, that of the face.
3. The iris has a fine texture that—like fingerprints—is determined randomly during embryonic gestation. Like the fingerprint, it is very hard (if not impossible) to prove that the iris is unique. However, there are so many factors that go into the formation of these textures (the iris and fingerprint) that the chance of false matches for either is extremely low. Even genetically identical individuals have completely independent iris textures.
4. An iris scan is similar to taking a photograph and can be performed from about 10 cm to a few meters away. There is no need for the person being identified to touch any equipment that has recently been touched by a stranger, thereby eliminating an objection that has been raised in some cultures against fingerprint scanners, where a finger has to touch a surface, or retinal scanning, where the eye must be brought very close to an eyepiece (like looking into a microscope.

V. DISADVANTAGES

Many commercial iris scanners can be easily fooled by a high quality image of an iris or face in place of the real thing.

1. The scanners are often tough to adjust and can become bothersome for multiple people of different heights to use in succession.
2. The accuracy of scanners can be affected by changes in lighting.
3. Iris scanners are significantly more expensive than some other forms of biometrics, password or prox-card security systems
4. Iris scanning is a relatively new technology and is incompatible with the very substantial investment that the law enforcement and immigration authorities of some countries have already made into fingerprint recognition.
5. Iris recognition is very difficult to perform at a distance larger than a few meters and if the person to be identified is not cooperating by holding the head still and looking into the camera.
6. As with other photographic biometric technologies, iris recognition is susceptible to poor image quality, with associated failure to enroll rates. As with other identification infrastructure (national residents databases, ID cards, etc.), civil rights activists have voiced concerns that iris-recognition technology might help governments to track individuals beyond their will.

VI. CONCLUSION AND FUTURE SCOPE

In this review paper I show how a person can be identified by a number of ways but instead of carrying bunk of keys or remembering things as passwords we can use us as living password, which is called biometric recognition technology it uses physical characteristics or habits of any person for identification. In biometrics we have a number of characteristics which we are using in our recognition technology as fingerprint, palm print, signature, face, iris recognition, thumb impression and so on but among these irises recognition is best technology for identification of a person.

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