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Comparative Study of RIS Recognition Methodologies

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Abstract: *RIS recognition, which s based on distinctive textural traits and characteristics, s an effective biometric technology for access management. RIS recognition can be considered a successful biometric technology when compared to other biometric methods like fingerprint, face, hand geometry, etc. The human RIS contains a lot of colour and texture information, which s why. Race and ethnic discrimination may also be aided by t. However, several issues remain unresolved and unattended to.*

Keywords: Biometric, fingerprint, hand-geometry, textual features.

I. INTRODUCTION

Systems for large-scale integration require a lot of labour. Due to IRIS characteristics' longevity, it is the most reliable and promising biometric system. [1] The IRIS recognition system has numerous uses, including access control, internet security, credit card verification, and defence security.[11] The structural components described below are present in all IRIS recognition systems.

1] Image of an eye captured
2] Removing the IRIS region

In order to determine the characteristic IRIS texture feature for individual recognition during the verification phase and compare it with the database established during the enrolment process, normalisation (radial to rectangular conversion) is done using the live captured IRIS image.[15]

According to the studies we read, there are standard processing stages that are used in constructing any IRIS recognition-based solution. [21] In IRIS is the most unique identification feature of the particular human being for identification. These steps are:

1. Localization of eye
2. Boundary segmentations of IRIS and pupil
3. IRIS Normalization
4. Feature extractions
5. Training
6. Matching. [14]

1.1Concept of IRIS Features Extraction and Recognition:

The biometric IRIS recognition work has been conducted on two different IRIS picture types: i] Near IRIS images ii] IRIS images at a distance.

From dataset to dataset, IRIS recognitions vary in algorithm complexity and accuracy. Less texture information is revealed if the dataset is taken in natural light from a distance, whereas the close IRIS dataset's evident texture information helps the system maintain accuracy. This is depicted in Figures 1 and 2. [19]

As can be observed in Figure 1, the capturing circumstances result in a sufficient amount of noise from lighting, intensity variations, and the potential loss of IRIS characteristics. Figure 2's dataset is close to the IRIS type; as can be observed, it includes numerous textural features that can aid in achieving high accuracy. [19]

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Fig.1 Far or distant IRIS images

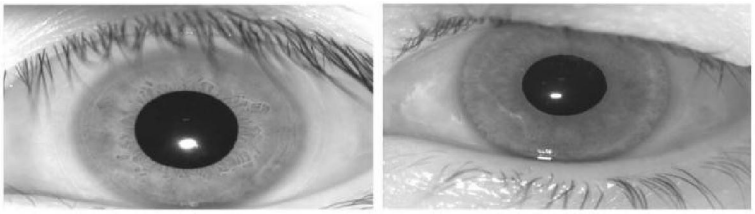

Fig. 2 Near distance IRIS images

The typical architectural flow which is found in all IRIS recognition systems is shown in fig3.

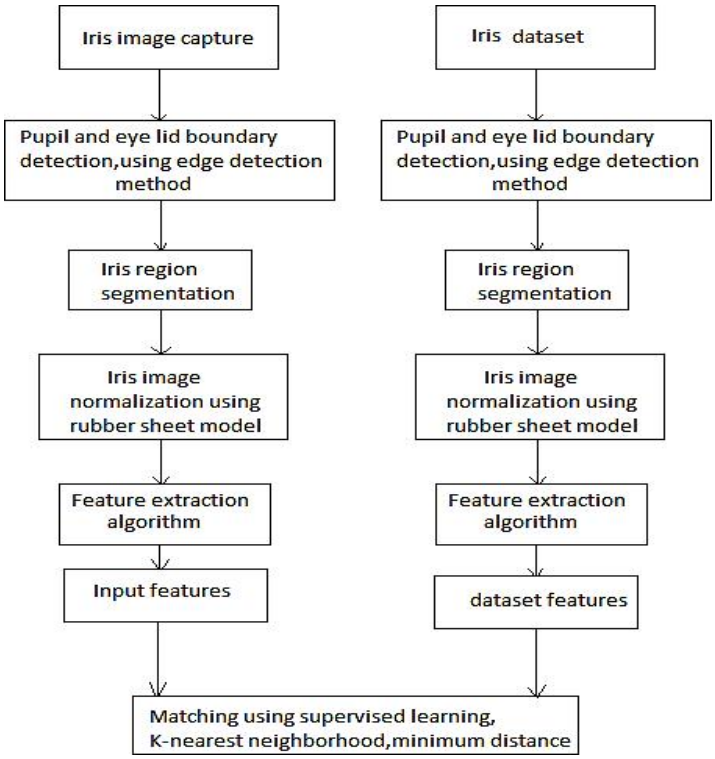

Fig. 3 Basic structure of IRIS Recognition System

1.2Need of Research in this field:

1. No novel method is available to overcome the factors adversely affecting the iris recognition accuracy.
2. Scope in the field of low constraints iris recognition.
3. Previous iris recognition methods such as DCT, Wavelet, Dual Tree Complex Wavelet, Hierarchical visual classification is not giving the accuracy on the near distance iris images and far distance iris images.
4. Scope for iris recognition in the distantly captured iris images. [2, 4, 5]

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II. LITERATURE SURVEY

According to M. Pradhan, maintaining an individual's identity is important in today's interconnected society. Concerns over security have grown as a result of the requirement for trustworthy user authentication methods as well as the quickening pace of networking, communication, and mobility. [1]

Accurate iris recognition from remotely recorded face or eye photos necessitates the development of efficient strategies that can take into account for sizable differences in the segmented iris image quality, according to Chun-Wei Tan et al. [2]

According to Vishwanath G. Garagad and Nalini C. Iyer, a biometric human identification method based on an individual's iris is well suited for providing authentication features for any system that requires a high level of security. [3]

To encrypt the texture primitives of iris images, Zhen et al. presented a novel texture encoding technique called Hierarchical Visual Codebook (HVC). Vocabulary Tree (VT) and Locality-constrained Linear Coding, two current Bag-of-Words models, are combined in their proposed HVC technique (LLC). [4]

According to Samarth S. Mabrukar, Nitin S. Sonawane, and Jasmine A. Bagban, the iris is a unique body part that doesn't change over time. Every person also has a different and unique iris pattern in each of their two eyes. This aids in accurately identifying a person. Prior to the pre-processing stage, any noises must first be removed using a filter. We begin by locating the pupil-iris boundary. [5]

According to Sowmya. B et al, studying iris patterns with a high degree of stability and distinctiveness is an effective way for determining a person's identity. Automated personal identification based on biometrics has received a lot of attention over the past 10 years due to the increased focus on security. [6]

Ajay Kumar et al were inspired by the iris characteristics' sparse representation. Their study draws inspiration from the ease of radon transform calculation and radon transform-based local information. They created a local radon transform (LRT) dictionary in order to compute the spatial characteristics at various orientations. [7]

To increase the accuracy and speed of the iris identification system, Amol D. and Raghunath H. used fused post classifiers and orthogonal triplet half band filter banks. Their strategy relies on extracting scale- and rotation-invariant features from a filter bank. It addresses occlusion, eyelid-induced shadow, and feature loss during segmentation. [8]

An effective biometric technique for iris recognition that makes use of moments and the Fast Fourier Transform is presented by B. Jain et al. Biometric technology offers automatic identification of a person based on a distinctive quality or trait that person possesses. The Fast Fourier Transform filters noise in the image and transfers images from the spatial domain to the frequency domain, providing more precise information. [9]

According to J. Trader (2012)'s research, biometrics is the science of identifying someone based on their physical characteristics or behavioural characteristics. Secure solutions for personal identification and verification must include biometric technologies. [10]

III. METHODOLOGY

1. For making the RIS recognition more accurate, a partial RIS segmentation technique for noisy RIS mages s proposed.
2. Zernike moment-based approach for extracting the features of partial RIS will be implemented. [21]

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The proposed method s based on segmenting the RIS mage using generalized thresholding method and normalizing t. [13] The implementation of biometriciris recognition, necessary to have less constraint on making environment so that illumination requirements should be relaxed. Therefore, there is a need s to develop robust ris recognition techniques that can simultaneously operate on iris mages acquired under visible or near infrared illumination. [12]

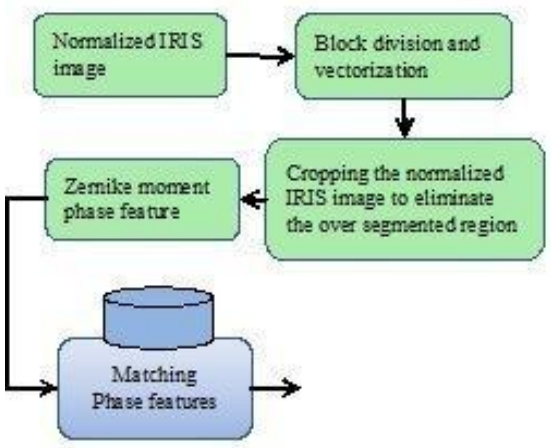

Fig. 4 Proposed Methodology of RIS Recognition System

In the proposed method the Far Distance RIS mage dataset s taken which standard dataset s such as CASIA and UBIRIS. For these mages segmentation s applied which results nnner and outer borders of RIS mages. [9]
Then the non-IRIS part s removed from the RIS mage using reduced radius of pupil to RIS boundary. After that calculate the Zernike features on partial segmented area. Let this value s to be X. [22]
Then the query mage which s to be matched s taken then t s again segmented and removed the non-IRIS part from RIS mage and ts Zernike features are calculated note this value as Y. Now the X value and Y value are to be matched using Support Vector Machine algorithm. [18]

IV. RESULT AND DISCUSSION

Table 1. Equal Error Rate Calculations for various methods

Method	EER
Sparse	0.1822
DCT	0.1567
LoGGabor	0.3245
Proposedmethod	0.1134

We tested our approach on some of the well-known datasets. We used EER for benchmarking the accuracy on standard datasets such as UBIRIS_v2 with number of subjects=100. Above table summarizes the accuracy summary of the results we obtained. From table we can compare various methods such as Sparse, DCT, LoG Gabor and our proposed method. Equal Error Rate of the proposed method s 0.1134 which less as compare to the other methods.

V. CONCLUSION

In order to recognise them, this research discussed the use of the Zernike moments area and under segmentedris pictures. The fundamental RIS recognition system includes the extraction of visual features as well as preprocessing,

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segmentation, and normalisation. We have covered the accuracy attained using the suggested approach n table 1. For achieving results, the current approach can be simply expanded to other datasets as CASIA and ITD. RIS categorization and recognition s still a mostly unexplored field in which nothing has been accomplished. By combining Zernike moments phase information with SVM or neural networks, the accuracy can still be improved.

VI. FUTURE SCOPE

There is still room for improvement in the future. based on race, according to RIS. RIS recognition on remotely recorded RIS mages still needs a lot of study and experimenting. [16] Additionally, there is a dearth of datasets taken n settings with few restrictions. These are some open areas that include live RIS detection in addition to recognition. Another interesting area for advancement s far-reaching RIS recognition, whose precision hinges on how well an algorithm extracts minute details from photos taken n low-cost circumstances. [17]

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REFERENCES

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