Iris Based Attendance Monitoring System

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Abstract- *A monitoring system for attendance records the employee's working hours. Paper time sheets, spreadsheets, punch cards, or company-specific inline attendance software can all be used to record employee hours. As opposed to other biometric qualities, there is a development in collecting attendance utilising some of the recognition that has superior accuracy, reliability, and simplicity. Due to these characteristics, iris and fingerprint recognition are more effective and hold great promise as security measures in modern society. By recognising the person's iris, the biometric-based attendance system may automatically record their attendance. Due to the inner features of the iris, such as uniqueness, immovability, and time invariance, it is considered one of the most trustworthy, accurate, and effective biometric identification systems. The project's goal is to create and put into use an iris-based attendance monitoring system that can accurately track and record attendance. There are two components to this project: software and hardcore. The software component is in charge of accusing, processing, iris localising, adjusting, matching, and storing the results while the hardcore part is in charge of taking pictures and executing the necessary programmes. The most effective and accurate iris recognition technology is thought to be Daugman's approach. The integro-differential operator is used in Daugman's technique to determine the contour of the iris and pupil.In this paper, Iris based Attendance monitoring system has been implemented using Daugman's Algorithm and compared on CASIA iris image database.*

Keywords- Biometrics, Iris Recognition.

I. INTRODUCTION

The issue of identities is one of several that people in the modern world deal with on a daily basis. Identity fraud also includes the use of false names, ID cards, forged or falsified documents, and lying about one's own age in an effort to conceal the user's genuine identity. When our society transitioned to the digital age, biometric technologies gained popularity. In addition, ID card recognition is being used at work. There is a potential of fraud in this process as well. Iris and fingerprint recognition lessen the amount of fraud cases (Iris recognition is the one of the most efficient biometric based attendance monitoring systems). Fingerprint identification is suggested for use in an automatic attendance monitoring system based on biometrics. The iris pattern of each individual is distinct and does not change over time. The iris is a suitable bodily part for biometric authentication since it is highly protected from injury by the cornea and is also covered by it. The Daugman's Algorithm is the algorithm utilised in iris recognition. Actually, it may be used to find any circular objects on a background with suitable contrast.

The location of the pupil is found first, then the iris and the eyelids are found. To solely remove the iris portion, the eyelids and eyelashes that are extraneous are excluded. To qualify the image, this is then separated into blocks and transformed into feature values. The feature data that was previously extracted using the same procedures is then matched. The eye is first captured on camera. With the use of an iris scanner, an extremely high-resolution image of the eye is obtained. The acquired eye mage's contrast and brightness are taken into account. Using Daugman's integrodifferential equation, the borders of the iris and pupil are removed. Iris localization is the process of mapping out the iris' margins and separating it from other regions of the eye. Normalization is the next phase of the segmentation process. An algorithm develops a template of the iris pattern of the eye when the image of the eye is taken and stores it in a database. When identifying, a photograph of the eye is captured, and an iris template that has been developed is compared with an existing template that is recorded in the database to see if they match. The person is not recognised since it does not match.

In this paper, the Daugman's Algorithm is the algorithm utilised in iris recognition. Actually, it may be used to find any circular objects on a background with suitable contrast. An algorithm develops a template of the iris pattern of the eye when the image of the eye is taken and stores it in a database. When identifying, a photograph of the eye is captured, and an iris template that has been developed is compared with an existing template that is recorded in the database to see if they match. The person is not recognized since it does not match.The second section gives the literature review followed by the theory of the method. The fourth section gives simulation environment, experimental results, and performance metrics. The fifth section proceeds with the conclusion followed by the future enhancement.

II. RELATED WORK

Amena Khatun, et al [1] proposed that it includes two parts, hardware and software. The hardware component is in charge of taking pictures and starting the necessary programmes, while the software component is in charge of accusation, processing, iris localising, adjusting, matching, and storing data as well as sending the attendance report to a predetermined email address. Lastly, the system executes the MATLAB programme to detect, compute, store, and send the results.

Kennedy O. Okokpuji , et al[2] proposed that the system was created to automatically take attendance by taking a picture of each student's eye, identifying their iris, and looking for a match in the built-in database. Also, the designed prototype is web-based. This essay suggests a different, accurate, spoof-proof, and reasonably priced approach to taking attendance.

M.Kasiselvanathan, et al[3] proposed Eigen Faces is the algorithm employed in this system. Under various circumstances, the system is able to distinguish between faces and the separation of facial features. The suggested approach outperforms the current methods with a success rate of 99% for face identification and 93% to 95% for face recognition.

Oad Percy Ahmad Waqas, et al[4] proposed According to prior studies, Daugman's approach for iris recognition is the most effective and accurate iris recognition system. This publication goes into great length about this technique.

Monika Agrawal , et al[6] proposed When students and teachers enter the classroom, their iris patterns will automatically match, and the Iris recognition system will record their presence. This can be utilised to create a student management system.

N. M. Ara, N. S. Simul and M. S. Islam, et al[7] proposed in their study, they covered the technological advances in the fields of face detection, normalisation, face recognition, and neural networks. The authors also presented the methodology, which consists of face alignment using face landmark estimation, face identification using History of Oriented Gradients, feature extraction using Convolutional Neural Networks, and embedding generation.

Aditi Purohit, et al [8] proposed the creation of an attendance monitoring system and a finger print identification system were the main objectives of this research. In terms of saving instructors' and students' valuable time, paper, and delivering reports on time, attendance management is quite helpful. An online and automated framework for managing attendance was demonstrated in this project.

Liew, K. N, et al[9] proposes that this technique lessens the workload of individuals when compared to the current system's traditional attendance marking system. The suggested system will be implemented in 4 steps, including image capture, group image segmentation, face detection, face comparison, and recognition, as well as database attendance updating.

III. THEORY

In the traditional technique, pupils' attendance is recorded by calling their names or signing a paper. Information from ID cards is manually entered at work. An ID card-based attendance system keeps a daily log of each employee's arrival and departure times from work. A facial recognition system is used in various locations. To take attendance, a facial recognition system is employed. When a user logs in or registers, biometric security systems use facial recognition to individually identify each user and to bolster user authentication. Face analysis technology is also frequently used in mobile and personal devices to ensure device security. The time required to take attendance by calling names or signing papers is very time consuming. The ID card identification system is excessively laborious and complicated. There are serious consequences when an ID card is copied or loused. An ID system must take biometric failure into account. Biometric systems occasionally are unable to identify an individual's biometric. This might occur as a result of problems like fingerprint fading. The effectiveness of facial recognition technology is not always as good as it may be. Due to obstructed camera angles, the data may not match the subject's nodal points; this results in an error when matching faceprints cannot be validated in the database. A biometric-based attendance system that can automatically record employees' attendance by detecting their iris is one way to solve this issue.

A 1. Research Methodology

The attendance of students are taken by calling the people names or signing on paper which is extremely time overwhelming. To eliminate this problem one of the solutions is a biometric-based attendance system that can automatically capture attendance by recognizing their iris. Because Iris recognition is regarded as one of the most reliable, accurate and efficient biometric identification system due to the inner characteristics of iris, such as uniqueness, immovability and time invariance. This proposes that the system detects,

calculates, stores, and transmits the results by performing the MATLAB program. Iris recognition algorithm says that Iris recognition system consists of four main stages which are segmentation, normalization, feature extraction and matching.

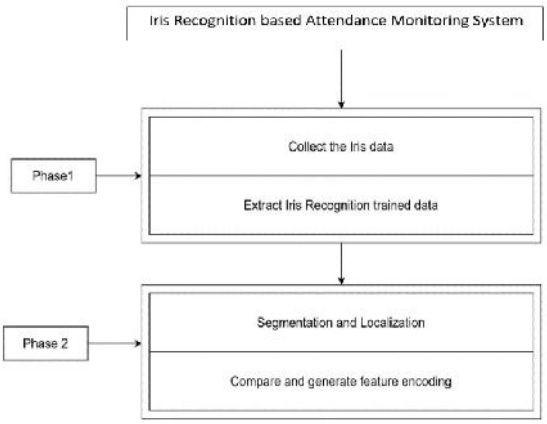

Figure.1 Research Methodology

A 2. Algorithm Implementation

The Daugman algorithm is a widely used method for iris recognition, and it involves the use of mathematical techniques to extract features from iris images. Here's an overview of how the Daugman algorithm can be implemented for iris recognition:

Image acquisition: The first step in implementing the Daugman algorithm for iris recognition is to acquire high-quality images of the iris. This can be done using a specialized camera or a smartphone camera with a high-resolution lens.

Image preprocessing: Once the iris images have been acquired, they need to be preprocessed to enhance the contrast, remove noise, and normalize the image size. This step is important to ensure that the features extracted from the iris are accurate and reliable.

Iris localization: The next step is to localize the iris within the image. This is done by identifying the boundary between the iris and the sclera, which is the white part of the eye. The Daugman algorithm uses a circular boundary to define the iris region.

Feature extraction: With the iris region localized, the next step is to extract features from the iris. The Daugman algorithm uses a technique called wavelet transform to extract features from the iris. This involves decomposing the iris image into multiple scales and orientations and analyzing the texture and pattern of the iris.

Template generation: Once the features have been extracted, the Daugman algorithm generates a template that represents the unique characteristics of the iris. This template is a mathematical representation of the iris features and can be stored in a database for future recognition tasks.

Matching: The final step is to compare the iris template with the templates in the database to find a match. The matching process involves computing the similarity between the two templates using mathematical techniques such as correlation or Hamming distance.

Overall, the Daugman algorithm provides a reliable and accurate method for iris recognition, and the implementation steps outlined above can help you to get started with this process..

IV. EXPERIMENTS AND RESULTS

A 1. Simulation Environment

PyCharm is an Integrated Development Environment (IDE) for Python, which provides a range of features that make the development process more efficient and productive. PyCharm provides several advantages that make it a suitable choice for iris recognition:

Ease of use: PyCharm has a user-friendly interface that makes it easy to write, test, and debug Python code. It provides a range of tools and features, such as code completion, syntax highlighting, and auto-indentation, which can save time and effort.

Integration with popular libraries: PyCharm integrates with several popular Python libraries, including OpenCV, NumPy, and SciPy, which are widely used for image processing and machine learning tasks, including iris recognition.

Debugging tools: PyCharm provides a range of debugging tools that allow developers to identify and fix errors quickly. This can be particularly useful when developing complex iris recognition algorithms.

Version control: PyCharm integrates with popular version control systems, such as Git, SVN, and Mercurial, which can help developers manage and track changes to their code.
Overall, PyCharm is a suitable choice for iris recognition due to its ease of use, integration with popular libraries, debugging tools, and version control support.

A 2. Architecture diagram

Capture the iris image: Use a camera or webcam to capture an image of the individual's iris. The image should be clear and in focus.

Image Pre-processing: Pre-processing involves filtering the image to remove noise, enhancing the contrast, and adjusting the brightness to improve the quality of the iris image.
Segment the iris region: Use image segmentation techniques to extract the iris region from the image.

Extract features: Use feature extraction techniques to extract the unique patterns in the iris, such as the shape, texture, and color.

Compare features: Compare the extracted features with the features in the database to identify the individual.

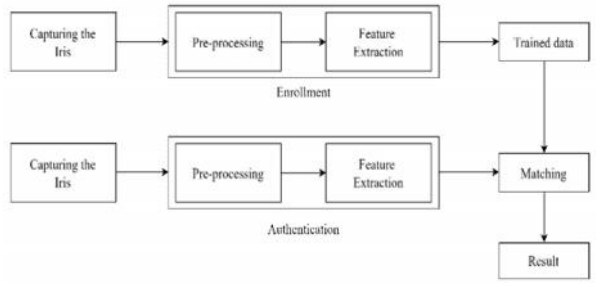

Figure 2 Architecture Diagram

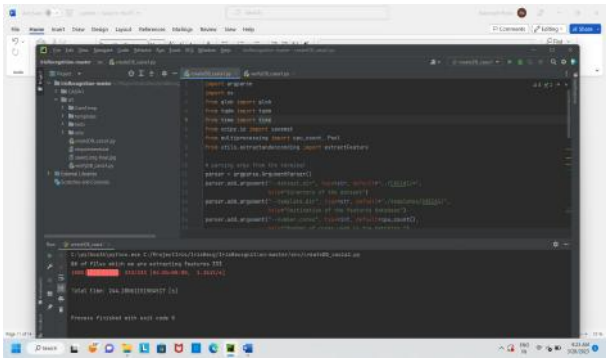

Figure 3 Create Database

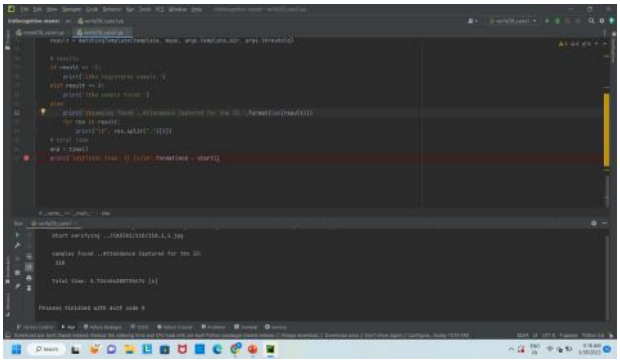

Figure 4 Verify database if sample is found, Attendance will be captured

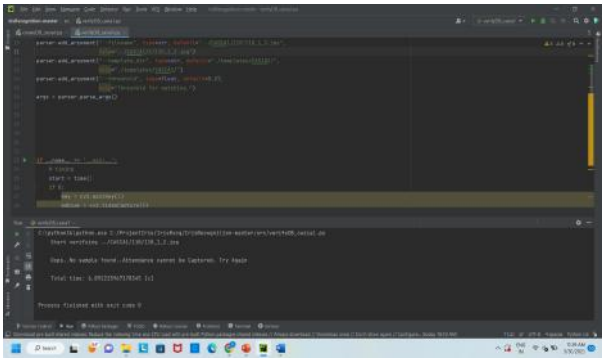

Figure 5 Verify database if sample is not found, Attendance will not be captured

A 3. Performance Metrics

There can be some of the algorithms implemented based on Iris Code. The Algorithms can be implemented in MATLAB 6.5. These algorithms have been tested on CASIA Iris image database as this is the only database available in public domain. The table below shows that the Daugman's Algorithm maximum accuracy

ALGORITHMS	ACCURACY
Avila	97.89
Tissie	98.00
Daugman	99.90

Figure 6. Accuracy of Algorithms

VI. DISCUSSION AND CONCLUSION

An iris-based attendance monitoring system is a highly efficient and accurate way to track employee attendance. It offers numerous advantages over traditional attendance systems, including improved security, reduced fraud, and faster processing times.By using advanced iris recognition technology, the system can quickly and accurately identify employees and record their attendance. It can also be integrated with other HR systems to provide real-time reporting and analysis of attendance data.Furthermore, the use of iris recognition technology for attendance monitoring is a

non-invasive and contactless method that eliminates the need for physical touch and reduces the risk of contamination. It is also highly reliable, as iris patterns are unique and cannot be easily duplicated. I intend to create an automatic attendance tracking system based on iris recognition devices in the future. In addition to updating the attendance record, the systems will lessen manual effort and offer other features including information retrieval and alerts and notifications.

VII. FUTURE SCOPE

According to Iris ID, iris technology is a "natural fit" for the physical, information security, and wireless industries. In the future, we see iris recognition technology being used to prevent fraud, guarantee non-repudiation of purchases, authenticate cash transfers, verify signatures, approve credit cards, grant authorised access to medical information and intellectual property, among many other things. The combination of this expanding need, Iris ID's expertise in iris technology, core interests in IT and wireless, and both of these factors provide the impetus for design efforts for the future, making Iris ID the company to watch for new developments in identity management in the future and beyond.

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