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Machine Learning Biometric System using Viola Jones Algorithm

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Abstract: ***A person's identity is revealed through their face. The method utilised to employ this physical attribute has undergone a major alteration since the introduction of image processing technologies.. Taking attendance is a crucial daily duty in many educational and professional settings. The professor calls the student's name and records the attendance in the conventional manner. It takes a lot of time to physically take attendance in a classroom, which is a very vital responsibility. It is frequently carried out manually by shouting out names or roll numbers. To expedite this process and improve time management, a Face identification-based attendance system is offered. This system will automate the time-consuming procedure by collecting student photographs, names, roll numbers, classes, and sections. A spreadsheet database that is updated hourly also contains the guide's name. Processing is performed using a web camera, and student photographs are extracted from Open CV. Using a pre-defined dataset and the Viola Jones technique, automatic attendance detection can be accomplished. The system keeps an Excel file with the most recent instructor data that is updated hourly.***

Keywords: Image processing, Biometric, face recognition, Viola jones Algorithm

I. INTRODUCTION

In numerous institutions, including colleges, universities, organisations, schools, and enterprises, taking attendance is an essential daily duty that is frequently completed manually using techniques like calling names or roll numbers. Without the involvement of the pupils, this technology marks attendance in the classroom by using face recognition. By using a camera installed in the classroom, which records images of the class, recognises students' faces in the images, compares the recognised faces to a database, and records the attendance. The device is deployed in classrooms and records information on each student, including their name, roll number, class, section, and Open CV-assisted photo analysis. It can take a while for students to record their attendance because they must stand in queue. During review sessions, traditional methods of student identification, such as calling names or verifying ID cards, may impede the learning process and aggravate pupils. Students must register their information in the database in order to be included in the system. This may be done quickly utilising the user-friendly interface.

II. LITERATURE REVIEW

Face recognition based Attendance marking system; in this proposed work, the attendance was determined utilising the location and facial descriptions given during class lectures. During the lecture in the classroom, they projected the presence of each student using facial detection. By using film and ongoing inspection, the system calculates each student's presence and whereabouts. The outcome of this experiment demonstrates that continuous inspection increased performance for attendance estimates.[1]

Regardless of their size, orientation, age, or ethnicity, detection of faces is a technique used to recognise and find all human faces that are present in an image or video. External elements like image or video content, lighting circumstances, or other variables shouldn't have an impact on the procedure. Accurately locating and identifying human faces within an image or video frame is the main objective of face detection.[2]

Student video system employing face validation was taken into consideration and put into practise. Student Attendance Recording System employing Face Recognition with GSM Based. It was examined using various facial photos. This concept is effective with various panels. Every window is independently and equally active. By controlling lighting and position, it is possible to further increase detection score and make appreciation a useful biometric for validation. Future advancements are more likely to depend on fully utilising 3D face models and effectively utilising video expertise. [3]

Face recognition is a challenging process that involves using photos to find and recognize faces in images or videos. [4]. The face is viewed as a 3D entity that can vary depending on the environment, including the lighting, position, and other elements.

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The face recognition algorithm must look for distinguishing characteristics in the converted, cropped, scaled, and processed grayscale image in order to accurately identify the individual in the image. It takes sophisticated algorithms and methods to complete this difficult task in visual pattern recognition with high degrees of accuracy.[5]

A regular attendance surveillance system, such as a face detection system for students, is a crucial tool for any institution. The majority of the current systems are time-consuming and need the instructor or pupils to complete semi-manual tasks. By including face detection into the process, this method seeks to clarify the problems. There is still tremendous space for improvement even though this system cannot yet recognise every student present in class. Since we use a modular strategy, we should improve each module until their detection and identification rates are acceptable. A procedure to protect users' privacy is another concern that needs to be taken into account. It must be impossible for someone to use an image when the data is stored on servers. [6]

The most widely used facial recognition algorithm [7]. The design of the algorithm consists of four essential parts. The Haar function, which is utilized to locate features in the image, is the first element. The second element is the integral picture, which enhances the performance of the algorithm by streamlining image processing. Adaboost, the third element, is employed to choose the most pertinent features for categorization. The cascade technique, which is the last element, improves the algorithm's effectiveness by minimizing the amount of image regions that must be processed. This method is incorporated into the face detection stage of our proposed face recognition system. [8].

Automated Attendance System Implementation Using Face Recognition, Automated Presence The method has been effective in addressing the flaws in the manual attendance system. To computerise and create a system that will benefit the institute is the goal. The correct and effective approach of keeping track of attendance in an office setting that can replace the previous manual procedures. This method is workable, trustworthy, and sufficiently secure. The system can be installed in the office without the requirement for specialised hardware. A camera and computer can be used to create it. [9]

III. EXISTING SYSTEM

Accurate attendance records keeping is essential to any company or institution. In the past, manual attendance systems were used, but as technology advanced, smart attendance systems took over. However, these systems' dependability and security play a major role in how effective they are. The fingerprint-based system, which is utilized in a variety of settings including schools, universities, and workplaces, is one of the most well-liked smart attendance systems. The system uses a person's fingerprint to scan attendance by comparing it to a recorded fingerprint database. Although this strategy has shown to be effective, it is also susceptible to proxy attendance. Proxy attendance occurs when someone else impersonates another person by using their fingerprint.

To solve this issue, other smart attendance systems that use RFID cards and QR codes rather than the fingerprint-based approach are now available. RFID card-based systems work by scanning a card storing the user's information, as opposed to QR-based systems, which use a unique code that is scanned from the user's phone or ID card. These systems have the advantage of being impermeable and are able to detect instances of fake attendance. Recently, systems based on iris scanning and speech recognition have also been developed; both are even more secure than the preceding methods. Instead of analyzing a person's specific vocal patterns like speech recognition systems do, iris-based systems use a person's unique iris pattern to identify them. Because they are so safe and hard to forge, these methods are ideal for high-security settings.

IV. PROPOSED METHODOLOGY

The entire face detection process is based on the Viola Jones algorithm. It has been determined to be more effective and has a great detection rate when compared to other algorithms. Real-time face detection can benefit greatly from this technique. It requires more time to train the dataset, but it is more accurate than the KLT algorithm. When it comes to face detection, accuracy is the more crucial factor. The Viola Jones approach uses a 24 × 24 window to clip the facial region so that the features can be extracted later on during image processing. For face detection, the Viola Jones algorithm requires the following parameters.

To extract features from the input image, use Haar features. By estimating attributes that are employed in detection as quickly as feasible, integral pictures are typically used for identification and familiarisation of fresh images. Using the Ada boost learning algorithm, a simple and effective classifier is created that can be used to pick out a very small number of input features that are significantly dissimilar from one another and that can be used to quickly distinguish between two faces. The final step, which involves assembling all characteristics in a cascade fashion, is used to ignore non-facial parts. Students are captured on camera. Some operations will be performed on this image. For instance, grey to binary. Based on many attributes, this image is compared to database images. Further action will be taken if the image matches the database image. If the image matches, attendance is marked.

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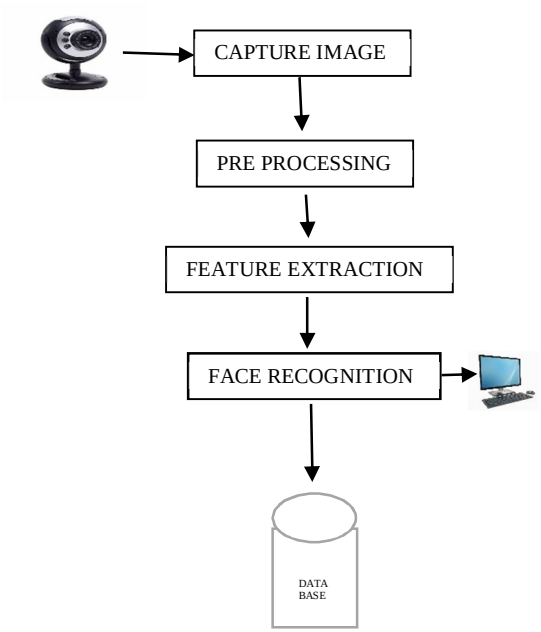


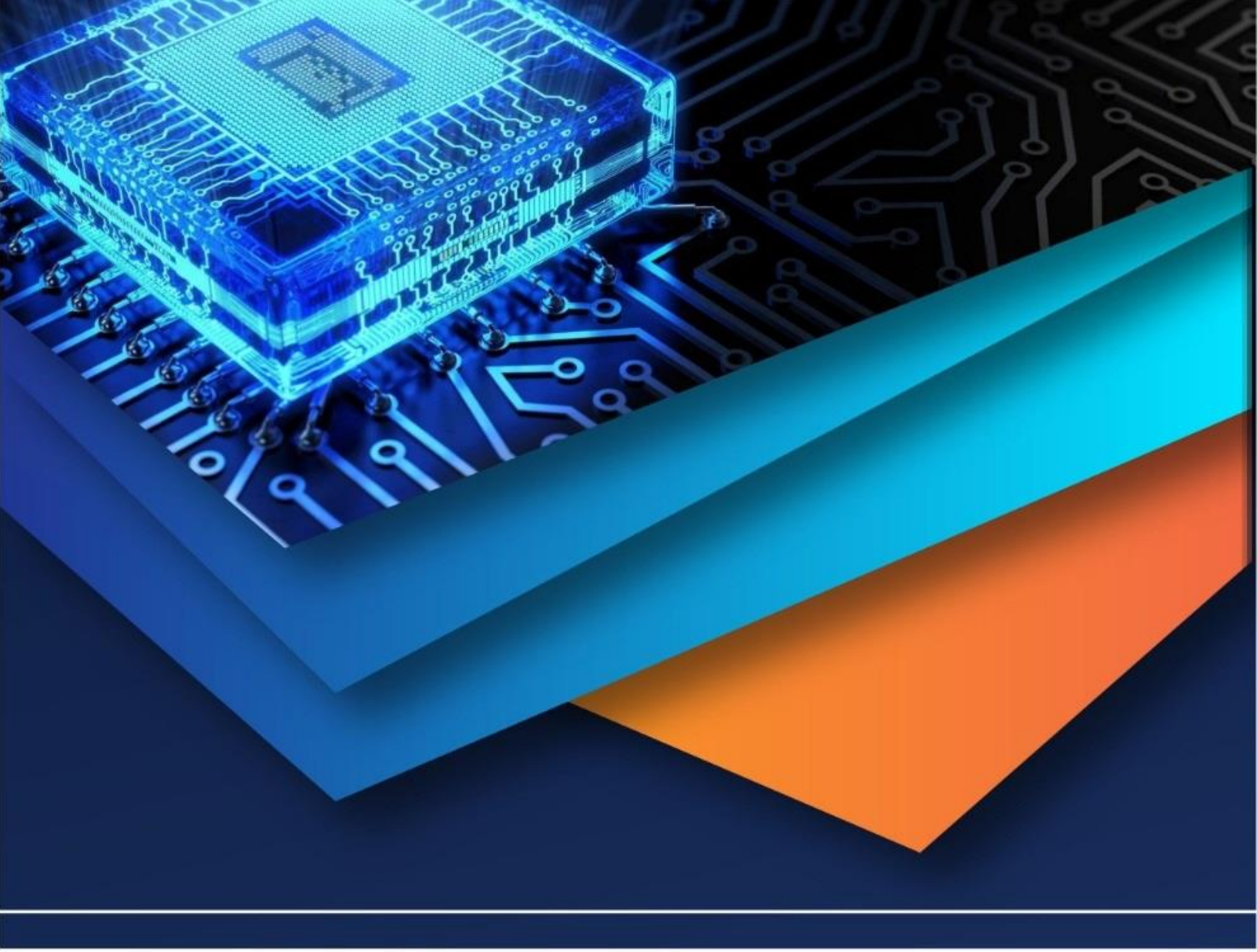
Fig 1: Block Diagram of the Proposed Methodology

V. CONCLUSION

This study describes a facial recognition system for automating student and staff attendance tracking in a variety of environments, including businesses, institutions, and schools. The technology still needs human oversight to operate correctly, though. Continuous incremental learning can be implemented at all levels to make sure the system is current and capable of producing inventive and satisfying solutions. The project can develop in the future to provide more services and include the entire system into an embedded system, enabling it to be installed anywhere. Our solution is usable in public spaces equipped with CCTV cameras. Along with bus and train stops, busy areas, and reducing crime. With the use of an Adhaar card, we are able to save each person's data in a database. As a result, human identification is made simple. The cops can benefit from our system. In addition, this technology can be used to replace hall passes and QR codes for online exam verification.

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