Real Time Automated Attendance Tracking System

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Abstract: The face is an important part of human body and can recognize a person by using faciaI features biometrically, the system can be used. The Intelligent Attendance System is a realworld solution that goes hand in hand with managing employees' daily activities. In order to overcome this problem and to work more easily, this process is used for students in classroom using some face recognition algorithms and OpenCV (Open Source Computer Vision). The model combines cameras that capture input images, algorithms that detect faces from input footage, encode and recognize the faces, and mark participation in classrooms. The results showed that smart attendance management improved its performance. Attendance is marked after the student ID. The system offers more solutions and more accurate results than the existing joins and leave management in the conversation with user.

Index Terms - OpenCV, Camera, LBPH, Attendance, Biometric, Face recognition.

I. INTRODUCTION

Attendance is one of the most vital metrics in any academic software. It regularly has a totally high correlation with the grades a student gets and additionally his overall involvement inside the classroom, which has a excessive impact on his future. Studies display that in many developing countries, low attendance is directly linked with higher dropout costs, which can be circuitously associated with the extent of unemployment, crime, and so forth. within the country[1]. Consequently correct strategies to mark the attendance of the students are paramount importance to any educational institution[2].

Biometric systems are widely used for personal identification, especially identification and verification. Biometrics is used as a form of identity management and access control. Therefore, using biometrics in student attendance management is a safe method. There are many types of biometric technologies such as fingerprint recognition, face recognition, voice recognition, iris recognition, palm recognition. We will be focusing on face recognition which uses computer vision.Computer vision is the field of artificial intelligence (AI) that enables computers and systems to extract useful information from digital images, videos and other visual materials.It uses two types of learning, a type of machine learning called deep learning, and a neural network (CNN).

Face identification has been taken into consideration as an exciting study area in the past few years as it performs a major biometric authentication role in numerous applications consisting of attendance control and access manage systems.Face recognition includes steps, in first step faces are detected within the photo and then these detected faces are compared with the database for verification[3].

II. LITERATURE SURVEY

In paper [6] The authors create a strategy for the working group to work. The core concept of facial recognition combined with frequency identification (RFID) to identify and count student authorization as they enter and leave the room. The information of all registered students is processed into the system. In addition, the system tracks all students in a particular class in the group's study information and provides the necessary information when necessary.

In study [7] The authors plan to have the system tag teams to work with Face ID. It captured the faces through the digital camera and recognized them. When found, it can be flagged together among students who identify and update the data.

In research [8] The Jones algorithm is used to search for images in frames. Initially, the image was created from the image by simply assigning numbers to the generated pixels by adding the numbers. Keep showing things in boxes. While millions of features are created, features like Haar are also created. Adaboost (development algorithm) is used to improve performance. The extracted features are passed through a trained face recognition algorithm that distinguishes the face from the objects..

III. IMAGE PROCESSING

➤ **Face Detection and Extraction:**

Face detection is important because the image captured by the camera is fed to the system, the face detection algorithm is adapted to recognize the face in this image, many images perform the introduced algorithms to identify the face in the image and capture the human face. face position.Mostly HOG method is used to identify faces in the given image.
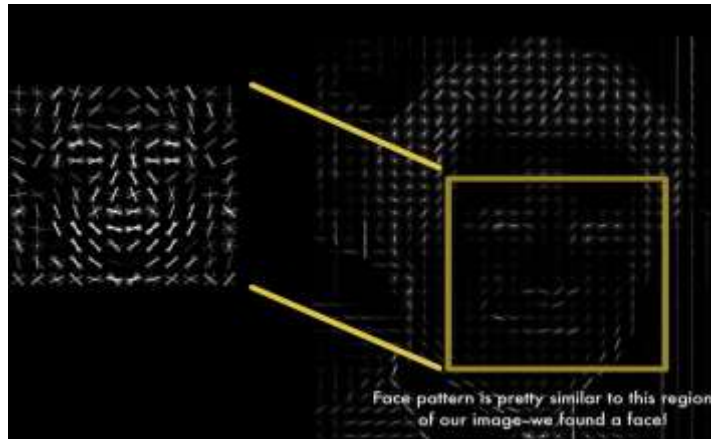

Fig : Histogram Of Gradients

➤ **Face Positioning :**

The human face has 68 unique points. So we can say 68 face landmarks. The main task of this step is to determine the landmarks of the face and find the image. A python script can detect facial features and find as many faces as possible without distorting the image.

➤ **Face Encoding:**

After detecting a face in an image, the next step is to extract facial features for each image. Basically, when we do face localization, we extract 128 face points for each input image, which is very accurate, and we store the 128-d face points in the file text for the face recognition.

➤ **Face Matching:**

This is the final step in the facial recognition process. We use deep learning, which is one of the best learning methods, which provides high accuracy and arrives at base-truth-value vectors. Our system suggests faces, creating 128 size embeds (recommended) for each person. The internal compare_faces function is used to calculate the Euclidean distance between faces in the image and all faces in the dataset. If the current image matches the 60% threshold of the available data, it will be moved to the attendance Marking[5]
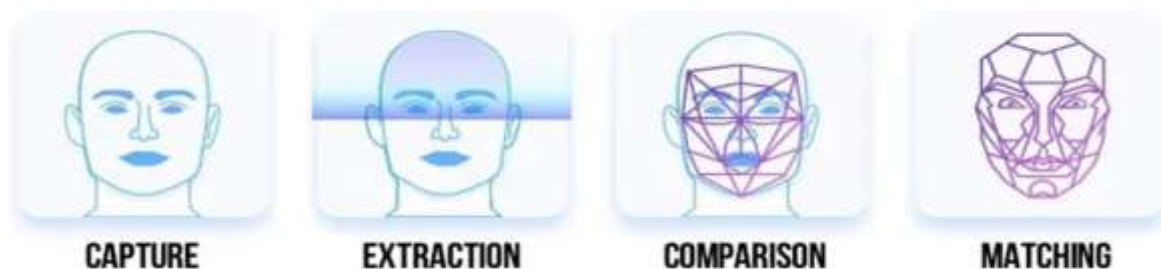

Fig:Image Processing

IV. ALGORITHMS

There are many algorithms used for face recognition. Some of these are:

1. Eigen faces
2. Fisher faces
3. Local binary patterns histograms

1.Eigen faces:

This method is a statistical method. Features that affect the image are derived from this algorithm. The exact certification process will depend on the training database to be provided. Images belonging to two different classes are not processed separately[1]. The idea of the eigenfaces method consists in subtracting facial features and represents that face as a linear combination of so-called "eigenfaces" obtained from feature subtraction[9].

2. Fisher Faces

The Fisher face algorithm follows the same approach as the Eigen face. This method is a modification of eigenfaces, so it uses the same Component analysis principle. The main change is that the fisher face determines the classes. As mentioned earlier, eigenfaces do not distinguish between two images from two different classes during training. The overall average affects each image.The Fisher feature uses the Linear discrimination Analysis to distinguish between different classes of images[1]. Compared to Eigen's facial method, we achieve a higher accuracy of facial expressions. Additionally, Fisherface removes the first three principal components, which are responsible for different light intensity changes and have different parameters for light usage[10].

3. Local Binary Patterns Histograms

The LBPH (Local Binary Patterns Histograms) algorithm is a popular computer vision algorithm that can be used for facial recognition and attendance signs in smart attendance[1]. The LBPH algorithm is a combination of Local Binary Pattern (LBP) and Histogram Oriented Gradints (HOG),is used to modify the performance of facial recognition results to Recognize the face more accurately[11].The LBPH algorithm works by identifying local texture patterns in an image. It first splits the face image into a grid of cells and calculates a local binary histogram for each cell. A local binary model is a binary code that describes the texture of a pixel relative to its neighboring pixels. The binary numbers are then combined into a histogram that represents the overall texture of the face image[1].
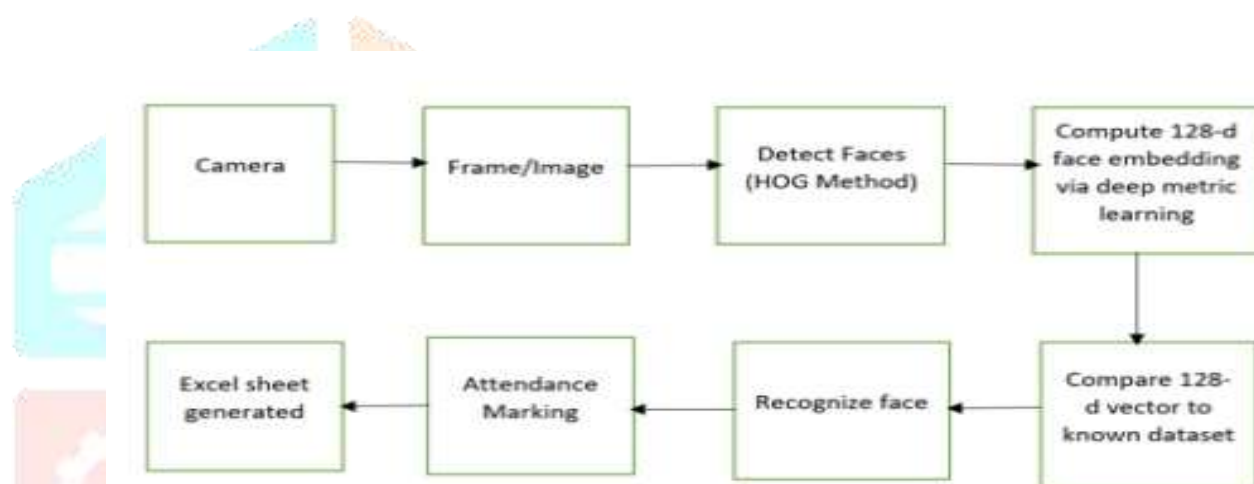

Fig:Block diagram

V. ADVANTAGES

There are many advantages of using computer vision for smart attendance:

➢ **Time-Saving :** Attendance can be quickly checked and determined through computer vision, saving time for teachers and students.

➢ **Cost-effective:** Computer- vision based attendance processes reduce the costs associated with paper systems by eliminating the need for physical attendance records or cards.

➢ **Non-invasive:** Computer vision based attendance systems are non-intrusive and do not require physical contact and are therefore cleaner and hygenic than traditional methods.

➢ **Realtime monitoring:** Computerized time tracking and attendance systems can provide real-time monitoring of attendance, allowing for immediate response in case of violations or absenteeism.

➢ **Additional security:** Real-time computer vision and attendance systems can be integrated with other security systems to provide an additional layer of protection against unauthorized access or access.

VI. APPLICATIONS

➢ **Schools and Colleges**: A computer attendance system can help track student attendance, reduce errors and fraud, and improve record keeping.

➢ **Office space:** Attendance intelligence can help businesses track attendance, eliminate time-consuming processes and improve accuracy.

➢ **Medical Centers**: Computerized time tracking and attendance systems can help physicians track staff attendance and ensure the right people are present at the right time.

➢ **Events and Meetings:** Smart attendance systems can help organizations manage attendance at events and meetings, track visitors, and control time.

VII. FUTURE SCOPE

Facial recognition has become an essential part of our lives. It is important for security. It is such tools that software companies use technology to help users access, helping low-level law enforcement detect criminals[2].This system can be deployed for authentication and attendance tracking in various government offices and companies. It can also be installed in bank lockers and vaults to verify access control and identify authentic users. The police can also use the system to identify criminals.A facial recognition system is a computer application for automatically identifying or verifying a person from a digital image or video frame from a video source. One way to do this is by comparing selected facial features from an image and a facial database.

A few future works that can be taken into consideration are the subsequent:
1. tracking the attendance of college students during the course of the entire module and examine the correlation between student's attendance and their academic overall performance, can be vital to tell guidelines.

2. The gadget can be prolonged to detect and understand temper/expression to investigate awareness of college students in the course of the classroom, and correlate them with the very last outcomes[4].

This system lays the foundations for future projects based on seeing and knowing the face. The system also offers web development and data management through a user-friendly user interface. Using this system, all companies, schools and organizations can change the way they manage employee engagement and also create data available for them at the full moon.
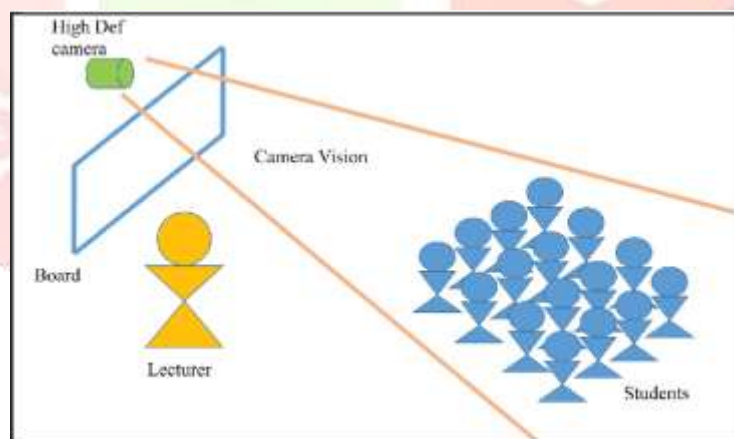

Fig:Visual Representation Of Smart Attendance System

VIII. CONCLUSION

The smart attendance system is designed to solve the problem of existing manual systems. We used the concept of facial recognition to mark student attendance and improve the system. The system works satisfactorily in different positions and variants.This system presents the most effective Open CV facial recognition methods available for attendance management. The system is mostly implemented using the LBPH algorithm. LBPH outperforms other algorithms with a confidence interval of 2-5 and low noise. Using smart time to get together explains that there is an agreement between acceptable value and threshold. That's why LBPH is the most accurate and effective face recognition algorithm in Open CV to identify students at the university and register enough to attend while avoiding the name[1].

Cost and time savings are even greater because the data obtained from the facial recognition attendance system is accurate in real time. Since the entire process is automated, human intervention is limited.It also reduces the time required to write details and other modules. All details about students, teachers and their other tasks can be seen only by verified users.

IX. REFERENCES

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