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Digital Attendance System using Face Recognition Technique

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Abstract: ***In this era of digitalization, everything is interlinked and are online. Maximum of things are using ML (Machine Learning), AI (Artificial Intelligent), IoT, Data Science etc. Making use of this, an automated attendance system can be built. So, this project is proposing "Digital Attendance System" using "Face Recognition Technique". Entering and keeping information in database and using algorithm to extract the face features, this way face recognition technique is achieved. And this technique is used to compare the captured image of source with that of database, resulting in Digital Attendance System which can be used to mark the attendance and so the motive is achieved.***
Keywords: Attendance system, Face Recognition Technique, dlib library, High resolution camera.

I. INTRODUCTION

In this modern era, where every person wants a robot, who work for them. There are many software and hardware technologies comes into picture and some of them are upgrading day by day, which plays a vital role in our life and can drastically change the life toward the digital one. Many systems have been completely changed to achieve more accurate results. Facial recognition systems is a typical example of this transition where a lot of progress has been made in this domain and have seen wider uses in recent times for law enforcement, security, identification and attendance purpose, though there is increasing interest in other areas of use.

A facial recognition system is a technology, generally used to identifying individual's human face (in photos, videos, or in real-time), matching with identity which stored in a data base (typically employed to authenticate users through ID verification services, works by pinpointing and measuring facial features from a given image.) and at end confirming with showing information of that person otherwise show error. Facial recognition is a category of biometric security. Other forms of biometric software include voice recognition, fingerprint recognition, and iris recognition. Although the accuracy of Face Recognition system as a biometric technology is lower than iris and fingerprint recognition, but it is widely adopted due to its contactless process because in Covid everybody wants contactless work.

In this era, the painstaking task for any organization(like school, colleges, coaching, also in company) is to keep the record of attendance, because manual labour involved in this process whenever the concerned person mark the attendance of their students or employees, it is time consuming and sometimes hectic to mark and keep the attendance. The manual intervention also inculcates human error and in result decreasing the efficiency and output of the work.

II. LITERATURE SURVEY

Traditional way of marking attendance is manual which involves human which is many times a hectic and time engrossing task and thus involves error. It often involves proxy attendances. It is very difficult to retrieve the old source of attendance as it is marked on paper on month wise so involves a lot of uncertainties.

After going through a number of research papers, got across more than a few solutions to this problem that proposes digital way of marking attendance.

Author in [1] & [2] has proposed Face Recognition based Attendance Management System & Class attendance management system using face recognition. It focuses on haar cascade classifier and LBPH algorithm to save the details and extract the features of the images. The system is taking many images to extract the features and train itself. The detected images are compared with that of saved images to get the output.

In [3], viola, the algorithms such as Viola-Jones, Histogram of Oriented Gradients(HOG) is used and Support Vector Machine(SVM) classifier helped in implementation of proposed system. The snaps of students are captured at a fixed interval of time, then pre-processed and before detecting face, converted into gray scale. It also uses Adaboost learning algorithm to get the chief features from prospective features. It has low false detection and high accuracy.

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In [4], Class attendance management system using face recognition is proposed. It has used discrete wavelet transform and discrete cosine transform for marking the attendance. It decomposes the multi-resolution analysis of images into scaling functions and wavelet coefficient. The classifying of facial objects are attained by applying RBF (Radial Basis Function). It has 82% of accuracy.
In [5], Face Recognition and RFID Verified Attendance System, face verification and RFID (Radio frequency Identification) technique is used by the authors. RFID card is used to identify the students and face recognition technique is used for detailed confirmation of them. It is deployed with Adaptive Neural Network Classifier (FANNC). To identify the human snaps, classifiers are instructed and tested and students are asked to take several face poses. It has accuracy of 98%.

III. PROPOSED METHODOLOGY

A digital attendance system is being built with the help of face recognition system. Initially, a database is created with the basic details of students and image of each individual is also captured and stored. In the proposed procedure, a high resolution camera is placed on the top of the blackboard as shown in Fig. 1.

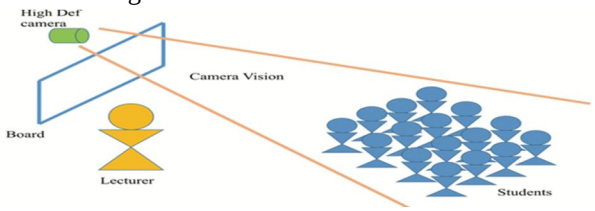


Fig. 1: Image Detection

The webcam will capture the images of students and compare it with that of images stored in database. If the detected image is matched with the database image, the attendance of that particular student is updated and marked as present.
The proposed methodology is basically divided into different parts as mentioned below:

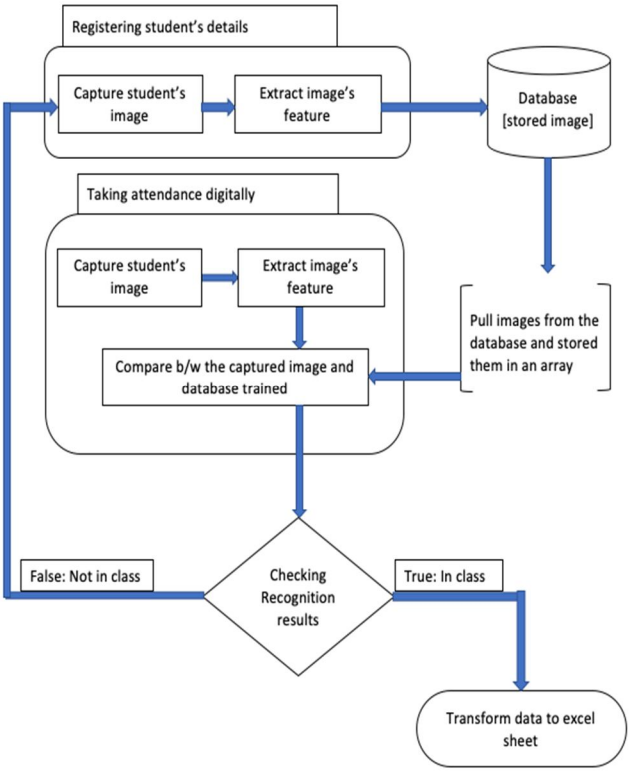


Fig. 2: Block Diagram

A. Storing Student's Details

The dataset is created by entering the basic details of all the students. The image of students is also captured individually. A single image per person is captured.

B. Feature Extraction

Single image is captured, stored in database and features are extracted from that single image as in this proposed method, dlib library is being used. The upper hand of using dlib library is that, it doesn't require a lot of images to train itself. It extracts the features from a single image only and thus minimises the storage of database. Even after using a single image, it's accuracy is about 99%.

C. Detection and Comparison

Once the database is created and features of images are extracted, our system is prepared. Now it can be used to mark the attendance digitally. For this purpose, the high resolution camera is mounted over the blackboard to captures the images of students.



Fig. 3: Comparison

The captured images are then compared against that of database's snaps. If the captured snap is found to be matched in database, the attendance is marked as present and updated.

D. Excel Sheet Updation

After marking the attendance, the excel sheet with the updated attendance will be generated.

IV. RESULT AND DISCUSSION

The result is divided into four main parts:

A. Database Creation

Database is created by entering basic details of students and teachers along with capturing their images. System is capturing a single image as dlib library is being used that minimises the need of a number of images for training.



Fig. 4: Database Creation

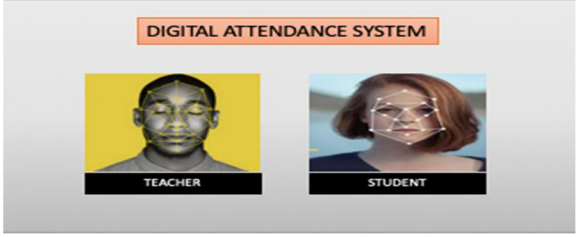


Fig. 5: Login Page[1]

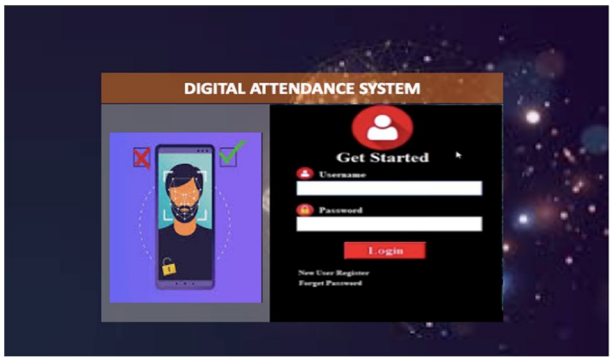


Fig. 6: Login Page[2]

B. Feature Extraction

The features of images are extracted using dlib library.

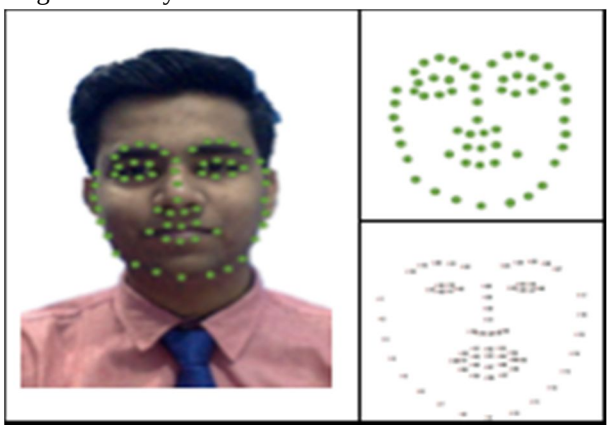


Fig. 7: Feature Extraction

The features of images are extracted and later on used while comparison with detected image.

C. Face Detection & Comparison

The face is detected using facetime HD webcam. After detecting the face, image is captured and compared with that of images stored in database.

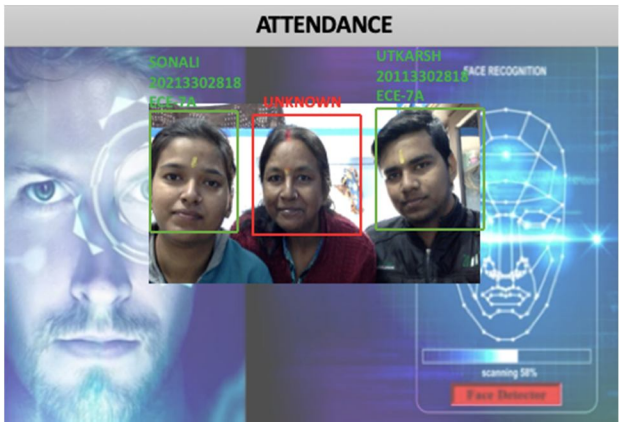


Fig. 8: Detection & Comparison

If the comparison result comes out to be true, that means the student's details are already present in the database, otherwise the webcam has detected a new face.

D. Updation of Excel sheet

In the fourth and end part, after detecting and comparing the images, updation of attendance takes place. If comparison result is successful, the attendance is marked as present and at the end, excel sheet is updated with the correctly recognised students.

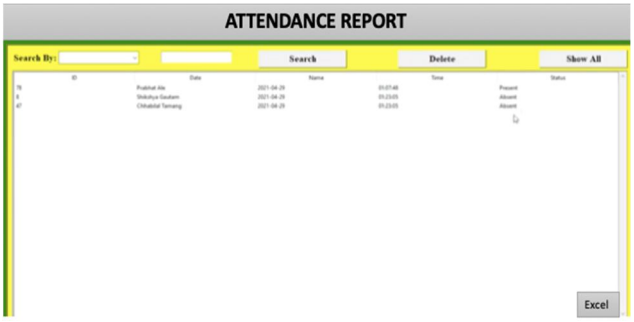


Fig. 9: Attendance

	A	B	C	D	E	F
Name Box		Email	Enrollment Number	Contact no.	31/12/21	
2	Sonali	Sonali@gmail.com	20213302818	8946372898	P	
3	Utkarsh	Utkarsh@gmail.com	20113302818	9762389468	P	
4	Saurabh	Saurabh@gmail.com	20013302818	6292791001	A	
5						

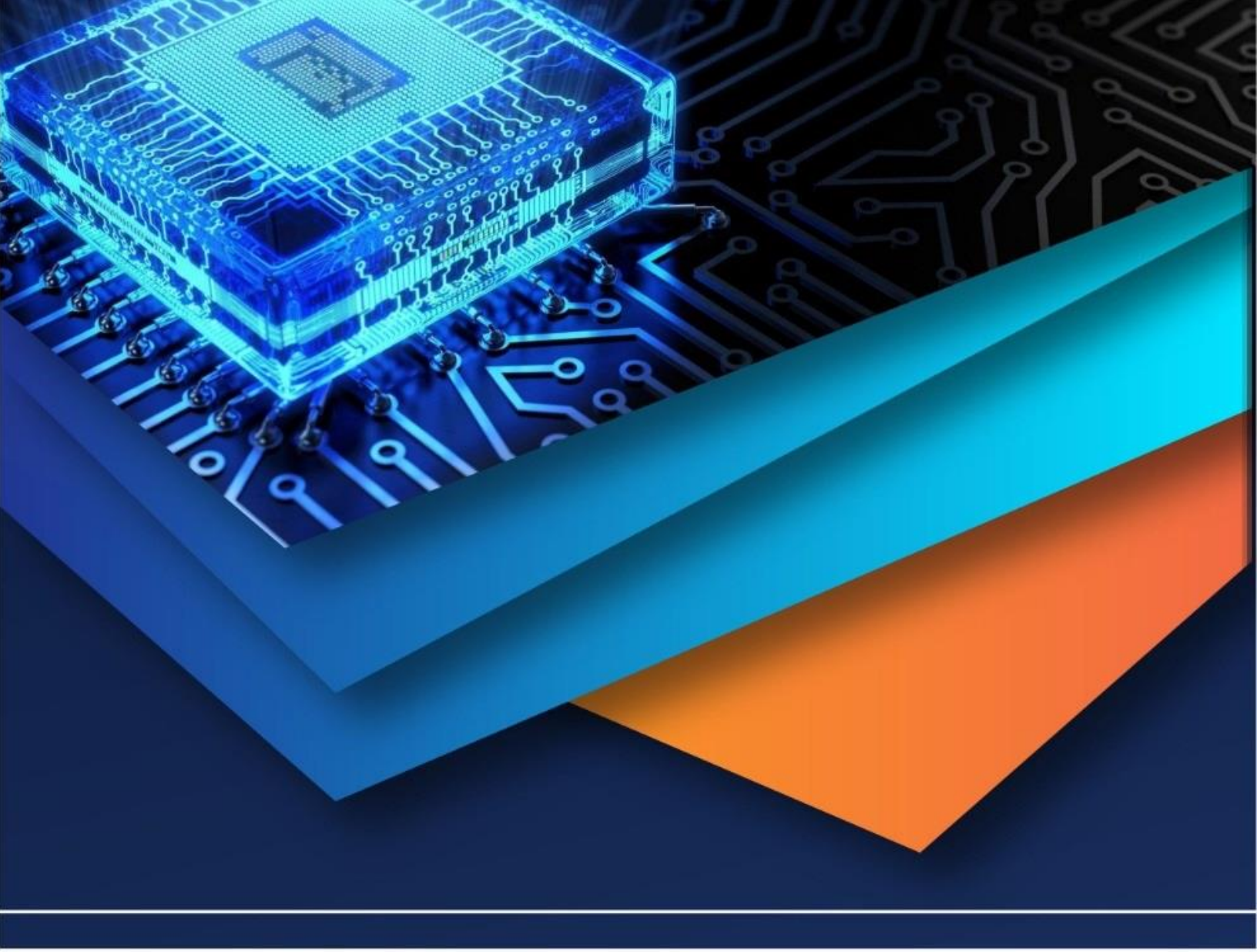
Fig. 10: Excel Sheet

V. CONCLUSION

This paper deals with the technique and process involved to prepare Digital Attendance System deployed with face recognition technique. It records the attendance digitally without human intervention via face Id, which is captured through camera, mounted on a black board. Images are stored in a database and image storage is minimized with the help of dlib library. It involves the dlib library to extract the feature of images. Images are compared against the database's image.

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