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# Real Time Face Recognition Based Attendance Monitoring System

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***Abstract:*** ***The conventional method of taking attendance system is time taking and requires more efforts. The number of students expanding day-by-day, so it has become an impeachable task for the institutes or colleges to maintain the attendance record of the students. The chances of error and proxy in the traditional system of the attendance system are considerably high. The available automated system in the market is biometric-based which used fingerprints or Iris recognition. However, these automated attendance systems are not completely efficient and those which are efficient are not cost effective. To overcome these problems, we are presenting this paper for the real-time face recognition-based attendance monitoring system. We are using the biometric features like face recognition which includes several phases such as Image acquisition by the source camera, detection of the human face using Viola-Jones Algorithm, feature extraction using HOG features, and the classification of the face using KNN classifier, recognition of face and finally attendance marking.***
***Keywords: Histogram of Oriented Gradients(HOG); K-Nearest Neighbour (KNN); Face Recognition, Iris Recognition, Viola-Jones algorithm***

## I. INTRODUCTION

Face recognition is becoming apparent in the research field of the Computer vision automated system. It has been the motivation for the analysis around the world. Face recognition is used widely for the several purposes like Security, Authentication, Attendance marking. Analysing the performance of student and marking the attendance is a hectic job for the teachers in colleges and universities. Different colleges have adopted the different methods of attendance marking. The traditional methods of attendance marking are calling the name of students, passing the attendance sheet to the students. The popular automatic attendance marking system in use are Radio-Frequency Identification and Detection(RFID), Iris recognition and fingerprint recognition. Since Iris recognition and fingerprint recognition requires the making of queue thus it is more time taking and presumptuous in nature. These are very short distance biometrics-based attendance marking system, but our proposed system requires the person to be at a medium distance from the camera, which is fixed in the centre of the front wall facing all the students. The range of the camera covers all the students in the classroom. It carries the face recognition task through an image/video stream for the recording of attendance of lectures and maintaining the database.

## II. LITERATURE SURVEY

Face recognition has been initiated in the year 1960's with the marking of features on the photographs, the major features were eyes. nose, ears, lips and mouth. Then distances and the ratios were computed to a common referential point from these marks and comparison to reference data. Facial recognition is a biometric based recognition system.
There are several factors which are necessary for an advance face recognition system:

*A.* The time taken from the detection of face to the recognition of face should be admissible.
*B.* The precision and accuracy of the system should be significant in nature.
*C.* The system should be ready for the enlargement, i.e. the number of objects to be recognition can be increased and the system should be adaptable.

*D. Several face Recognition Methods Are*

*1)* Holistic matching approach: In this approach, the complete region of the face is taken as input data with complete face recognition. Eigenfaces, Principal Component Analysis, Independent Component Analysis, Linear Discriminant Analysis are the examples of the holistic matching method of face recognition.
*2)* Feature-based approach: In this approach features like mouth, nose, eyes, lips are extracted and their locations from the common reference point are fed to the structural classifier. Feature restoration is an immense challenge in this approach.

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*3)* Hybrid approach: This approach is the amalgamation of the holistic approach and feature-based approach. The hybrid approach uses three-dimensional images. The image of the human being is captured in three-dimension. It permits the system to capture the minute details such as curves near the eye, the shape of the chin, depth near the nose, the shape of the forehead and thickness of the lips. The three-dimensional hybrid approach of face recognition is a five-step process. These five-steps are Face Detection, Position of the face, Measurement of the features from the common reference point, Representation and at last the process of Matching.

Now these days, in institutes and colleges, the number of students is increasing significantly, and the conventional method of attendance marking is too much time taking. The conventional method of attendance marking includes maintaining the logs and registers by calling the names of students and passing the attendance sheet to the students. The automated attendance marking systems are Iris recognition, fingerprint recognition, and Radio-frequency Identification and Detection. RFID is the attendance marking system which is quite popular these days.

## III. PROPOSED METHODOLOGY

This is the archetype model of Real time face recognition-based attendance monitoring system. The camera and the system which is installed at the centre of the front facing of all the classrooms. The camera detects the multiple faces in a video-frame. Initially the captured faces are cropped later converted to the grey scale which results in reduction in the number of bits which is going to be used in image processing. Then, there is a comparison of these faces with the existing faces in the database, finally it starts counting the number of the present students in the class and marking of their attendance.

### *A. Creation of Students Database*

20-25 photographs of each student are captured in different angles with some modification and gestures. The images are in the form of RGBE which are further cropped and converted into grey scale and finally resize to 124*96 pixels for the reduction in the time of computation. All the images are put into the folder named “Student Database”, each folder is further divided into sub-folders, sub-folder is named on the name of the student. Sub-folder contains multiple images of each student.

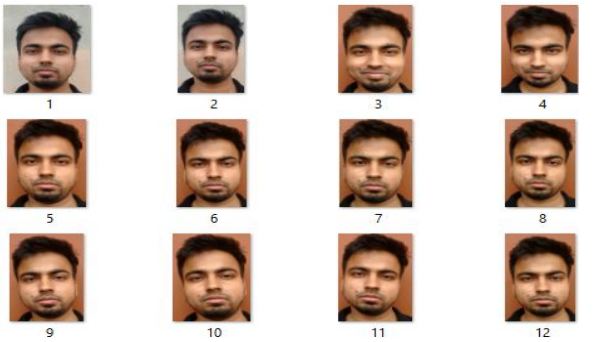



Fig.1 Multiple images of a single person in the database

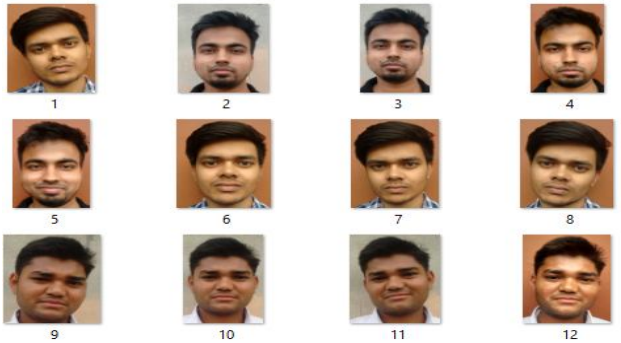



Fig. 1 Multiple Images of multiple persons in the database

### *B. Feature extraction using HOG features*

The histogram of oriented gradients (HOG) is a feature descriptor used in computer vision and image processing for object detection. The technique counts occurrences of gradient orientation in localized portions of an image.

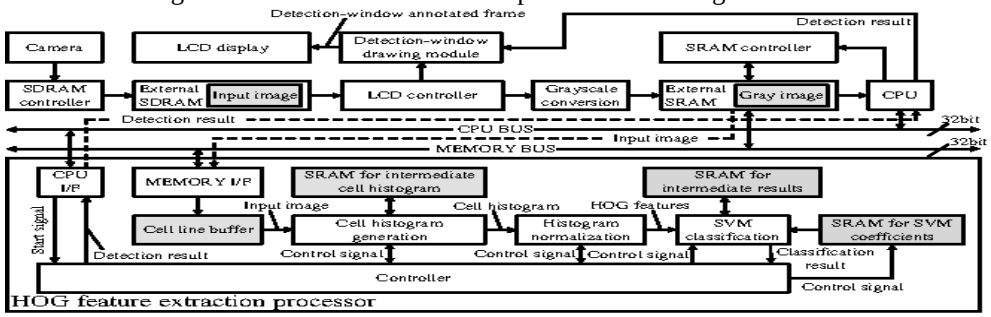



Fig.3 HOG Feature Extraction Architecture

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This approach is like edge introduction histogram, scale-invariant component change descriptor, shape settings. Notwithstanding, covering neighbourhood differentiate standardization is utilized and figured on a thick lattice of consistently separated cells with a specific end goal to enhance precision.

*C. Usage of the HOG descriptor calculation is as Follows*

1) The picture must be separated into cells shaped by isolating picture into little-associated districts and ascertain histogram of angle bearings or introduction of an edge inside the phone.
2) As per slope introduction discretise every cell into rakish canisters.
3) Each cell's pixel contributes weighted angle to its relating precise receptacle.
4) Blocks which are spatial districts are shaped by the gatherings of adjoining cells. The gathering of cells into a square is the reason for gathering and standardization of histograms.
5) Normalized gathering of histograms speaks to the square histogram. The arrangement of these piece histograms speaks to the descriptor.

*D. Face Detection and Eye Detection*

In the wake of introducing the camera in the classroom, it catches the edges containing the characteristics of all understudies sitting in the class. Viola-Jones calculation is connected on this edge, which identifies the appearances in the edge. To guarantee that the identified question is confront, each distinguished protest is edited and additionally handled for eye location and if eyes are recognized they are considered as faces else are rejected. All the edited appearances are put away in the organizer named as 'Test', which is utilized to contrast and the 'Database' envelope. Highlights of the considerable number of appearances in the test organizer are extricated utilizing HOG highlights.

*E. KNN (K- Nearest Neighbour) Classifier*

K Nearest neighbour is a straightforward calculation that stores every accessible case and groups new cases in light of a likeness measure (e.g., remove capacities). KNN has been utilized as a part of factual estimation and example acknowledgment as of now in the start of 1970's as a non-parametric procedure.

A case is characterized by the majority share vote of its neighbour’s, with the case being doled out to the class most normal among its K nearest neighbours estimated by a separation work. If K = 1, at that point the case is just allocated to the class of its nearest neighbour.

*F. Comparison / Recognition*

Extracted binary features of 'Test' faces are contrasted and the separated two-fold highlights of 'Database' faces, the face having the greatest measure of connection is perceived as the coordinated face and the comparing name of the face is removed from the database utilizing the classifier

*G. Attendance Marking*

After extracting the name of the matched face corresponding attendance is marked in the work sheet and the database containing all the attendance records will also be updated on the same.

## IV. IMPLEMENTATION

*A. GUI (Graphical User Interface)*

This is the graphical user interface of our Real time face recognition-based attendance monitoring system. It consists an area for the 2-dimensional image which is going to be either captured from the webcam or browsed from the local disk of the system.

Training, Start camera, Take photo, Browse image, Start Counting, Generate Attendance Report are the buttons of Real Time face recognition based attendance monitoring system.

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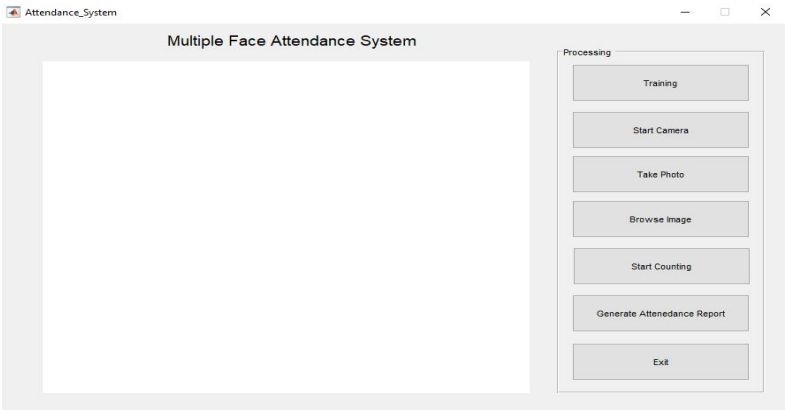



Fig.4 GUI of Real Time face recognition-based attendance monitoring system

*B. Browse Image*

The image is browsed from the local disk of the system. This image is a group image of all trained faces.

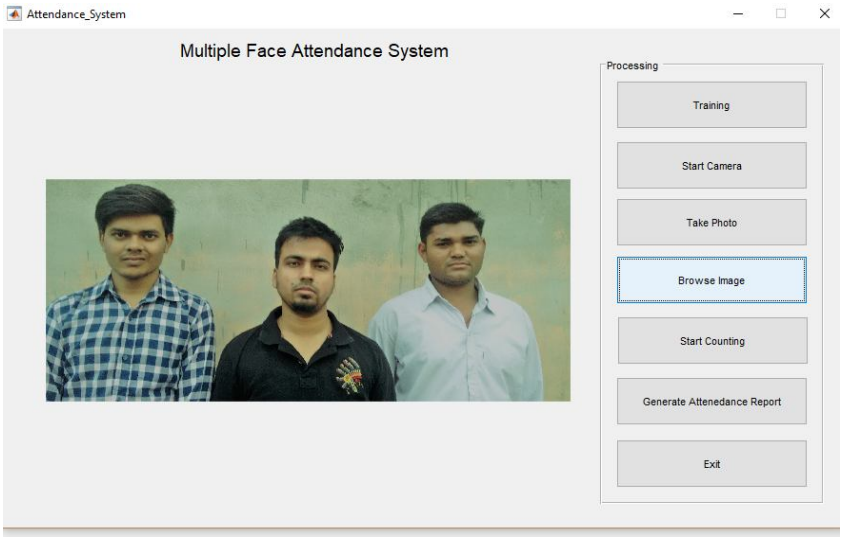



Fig.5 Group photo of trained faces

*C. Start Counting and Generate Attendance Report*

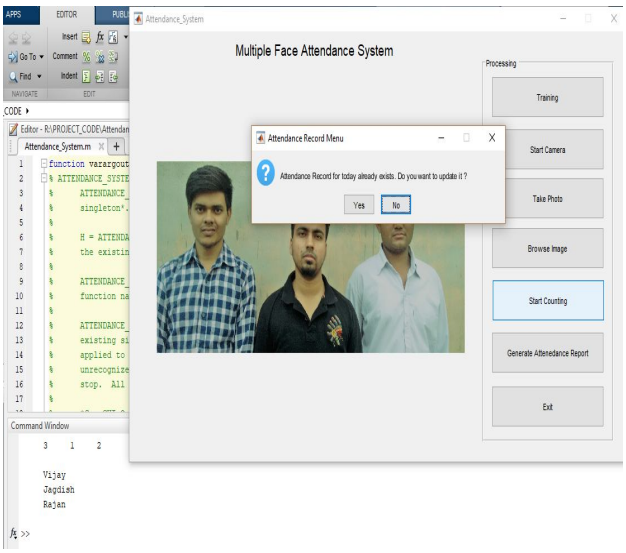



Fig.6 Attendance is being counted

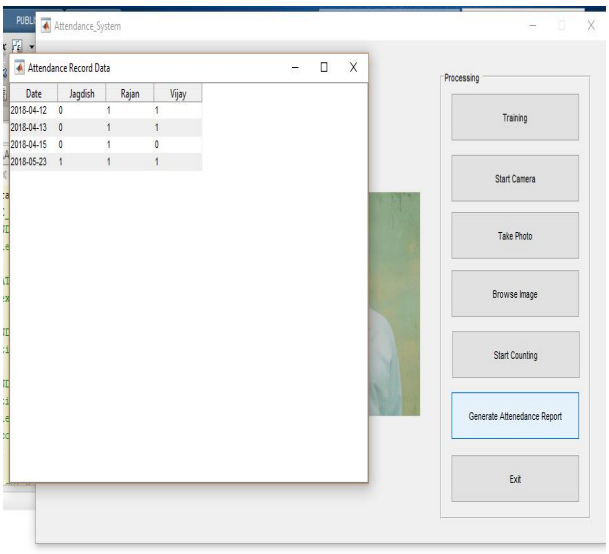



Fig.7 Attendance report is generated

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## V. FUTURE SCOPE

Altogether the cheats of ATM it is prescribed to set up the database of all the ATM clients with the banks and organization of high resolutions camera and face acknowledgment programming by any stretch of the imagination.

To maintain a strategic distance from the copy voters, a database of all voters of all bodies electorate is prescribed to be ready. At that point at the season of voting determination camera and the face acknowledgment supplies at the voting site could help in distinguishing pieces of proof of the voters. In barrier service and all other imperative places, the face acknowledgment innovation can be sent for better security.

## VI. CONCLUSION

This Real Time face recognition-based attendance monitoring system can record the attendance of students in a classroom or the attendance of the employees in an organization. It takes only 2-3 minutes for recording and updating the attendance. This is very easy and convenient method of attendance marking. If this is implemented in colleges and institutes, then it will save a lot of time of teachers and the students. This method is very cost efficient as it requires Camera, Laptop and local network. This system is more secure and trustworthy in compare to the conventional methods of attendance marking

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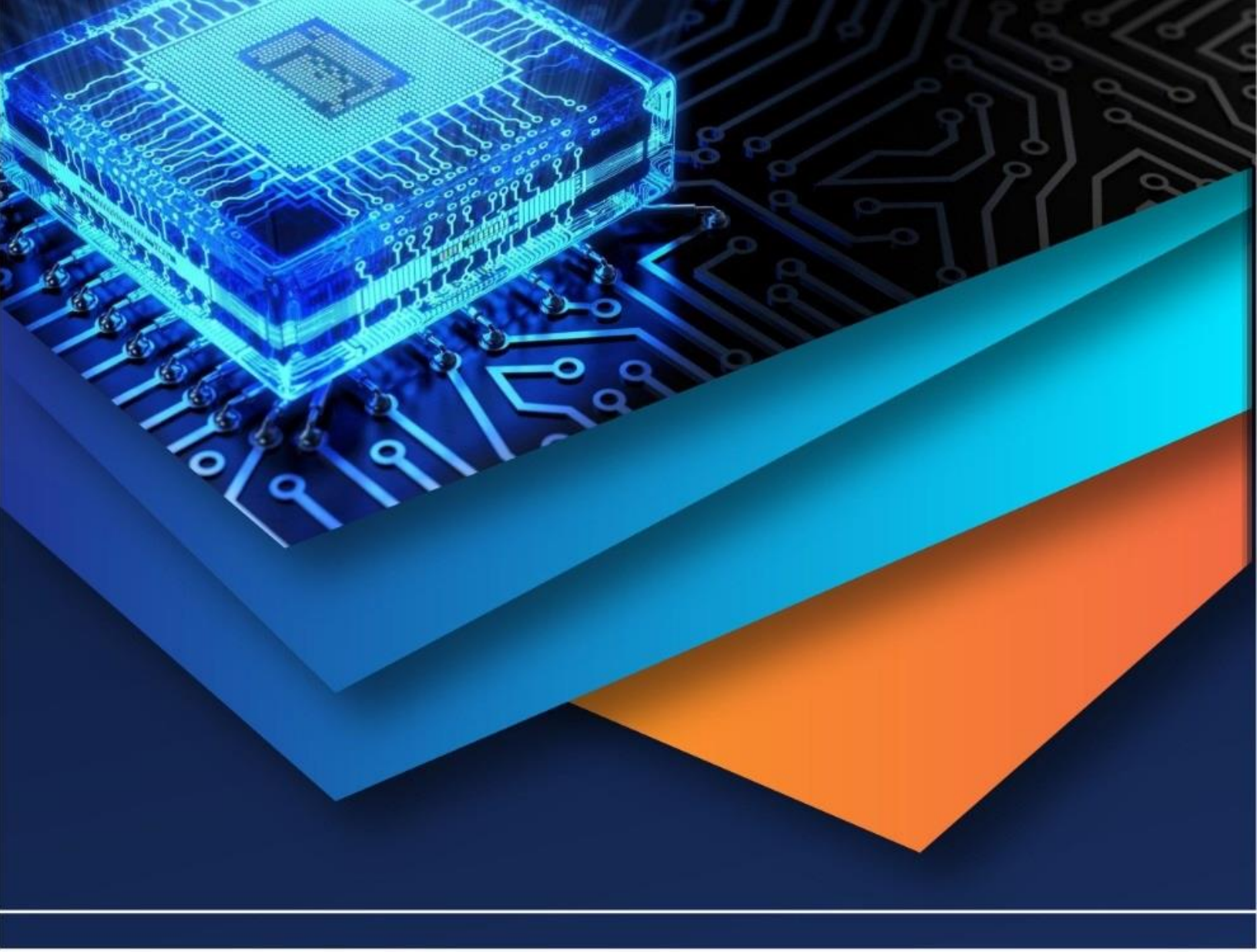
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