

AUTOMATIC ATTENDANCE BASED ON AI

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Abstract:-

The attendance is always crucial for a student, whether he/she is in school or college. The attendance, in a way, affects the overall academic performance of a student. The conventional methods of taking attendance is a very time consuming process as well as difficult in case of large number of students. So, to reduce the effort, computer based attendance management system is proposed to record the attendance automatically. Our project “Automated Attendance Based on Facial Recognition” serves the same purpose. The application includes face identification, which eliminates the chances of proxy attendance and saves time as well. This system is designed using MATLAB and uses supervised learning, i.e., the system is trained then is tested with unknown faces. The algorithm compares the training and test image by calculating its statistical data and subtracts their features and determines the presence of the student.

Key words: - Attendance system, Face recognition, MATLAB.

1. Introduction:-

In today's world, biometric identification is used for various applications. Our paper, describes one of the biometric verification methods, the face recognition. This method is used for taking attendance of students without much of the human effort.

The system will extract the face image of the student when he/she enters the class and mark the attendance. The algorithm uses various facial features like color, size & shape of the eyes, nose and jaw. The features are then used to search for other images with matching features. The system is firstly, trained with images/photos of student and it is considered as a class and similarly is trained with other images and are classified in different classes. The features and the labels of the faces are saved in the database. The test image can be the face of any person. The test image features are also extracted and then are compared with training image database. Based on the closeness measures (distance), the test image is considered to exist in a predefined class and then the attendance of that student is taken automatically. If the person is an outsider, then the system shows that the student is not registered.

The facial recognition, on the other hand, is mainly used in security systems. It can be applied for a wide variety of problems like image and film processing, human-computer interaction, criminal identification etc., too.

2. Review of literature

Mathew Turk and Alex Pentland [1], in 1991, proposed a paper “Eigen Faces for recognition”. In this, they developed a near-real time computer system that firstly detects a subject's head and then compares the characteristics of the face with the known individuals. The system treats the face image as a two-dimensional geometry. The future scope of this project was to determine the gender of the subject.

Arun Vyas and Rajbala Tokas [2] presented a paper in November 2014 named “Fast Face recognition using eigen faces” which uses Principal Component Analysis (PCA) for facial recognition. The face images are faced onto a space that encodes the best differences among the known face images. The test image will be categorized as known or unknown after comparing the features with the existing database. The result showed that about 10% eigen faces with highest eigenvalues can be taken for recognition. It also made clear that the recognition rate increases with number of training images.

The paper “Face recognition using eigen face approach” by **Vinay Hiremath and Ashiwani Mayakar [3]**, in August 2010 was a step towards facial recognition using static images. The system can be modified to work with the dynamic images by converting them into static images and then applying the same procedure as that for static image recognition. The method is based on Information theory approach that decomposes the face images into eigen faces. The test image is then compared with the position in the face space with the position of the known individual. This approach of eigen face makes the system more reliable as the output is easily obtained.

In 2010, **Mayank Agarwal, Nikunj Jain, Mr. Manish Kumar and Himanshu Agrawal [4]** presented a paper on “ Face recognition using eigen faces and artificial neural networks” whose face recognition methodology was based on the information theory approach of coding and decoding. Firstly, the features were extracted with the use of Principal Component Analysis (PCA) and then the recognition using feed forward back propagation neural network. The test results gave recognition rate of 97.018%.

3. Research Methodology

Here we are trying to develop a system to mark attendance automatically by using image processing technique. The system is designed using MATLAB platform. The proposed system uses supervised learning in which first we train our system then test with unknown face. This algorithm compares the test image and training image by calculating its mean and standard deviation and compares the images by subtracting the features of trained images and test images and determines students who are present and absent.

MATLAB

MATLAB (matrix laboratory) deals mainly with matrices, plotting of functions and data and creating different user interfaces. The basic structure in MATLAB is array. The images have different ratios of RGB colors which are in the form of three-dimensional arrays. So this makes working with image as similar to working with some matrix data.

Viola Jones Algorithm

The algorithm is used for object detection or in this case, for face detection. For this, it requires the full view of the face, i.e., the face should be frontal upright. The algorithm distinguishes between the faces and other parts in the image and only selects the face part in a rectangular frame.

Vision.cascade object detector

The system detects the objects using Viola-Jones algorithm. In this, the objects having approximately constant aspect ratio, like faces are detected.

Graphical User Interface (GUI)

The GUI is a human-computer interactive system which allows user to interact with the electronic devices through graphical icons in a simple manner.

A. Training

The system is trained with sets of face images of different person. Here, we have taken 3 images of an individual. The facial features like the color, texture etc. and the statistical data like mean and standard deviation of the face is calculated. Before saving the features, each individual is given a specific class. The class, here, is the name of that person. After that the information is saved in the database for testing.

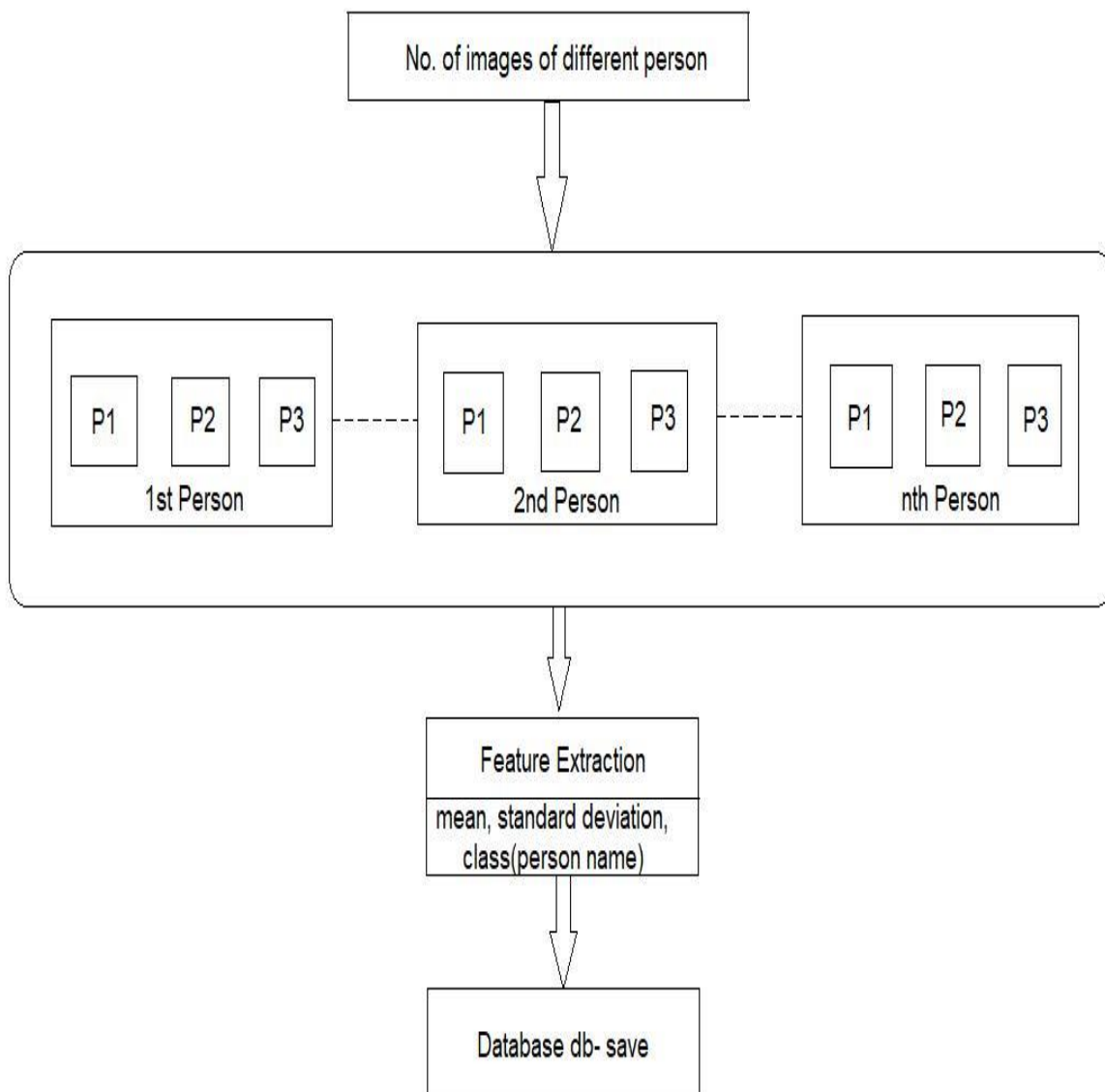


Fig. 3(A) Training of the system

B. Testing

For testing, any known or unknown face is taken from the camera. The image is converted into gray scale. With the help of Viola-Jones algorithm, the face image is detected and captured and is saved. The features of this face are also extracted and the features are saved in the database. Now, the data of the trained image as well as the test image are compared. The comparison gives a measure of closeness, the distance. The values for distance differ from image to image. If the distance is least for the image, the test image belongs to that particular class. This will determine that the particular student is present. If any unknown face is detected, the distance calculated will differ abnormally. So, the system will show that the person is not registered.

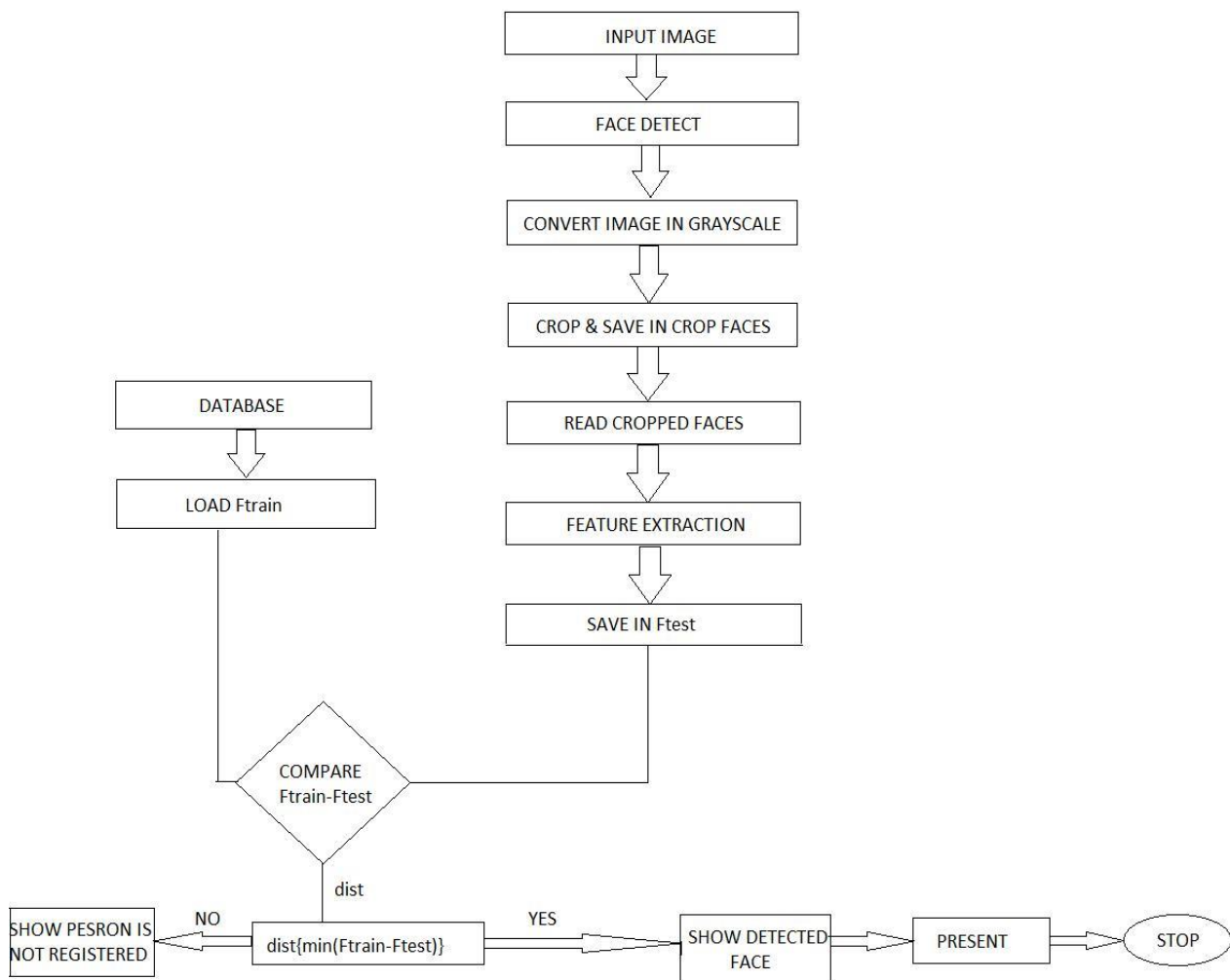


Fig. 3(B) Testing of the system

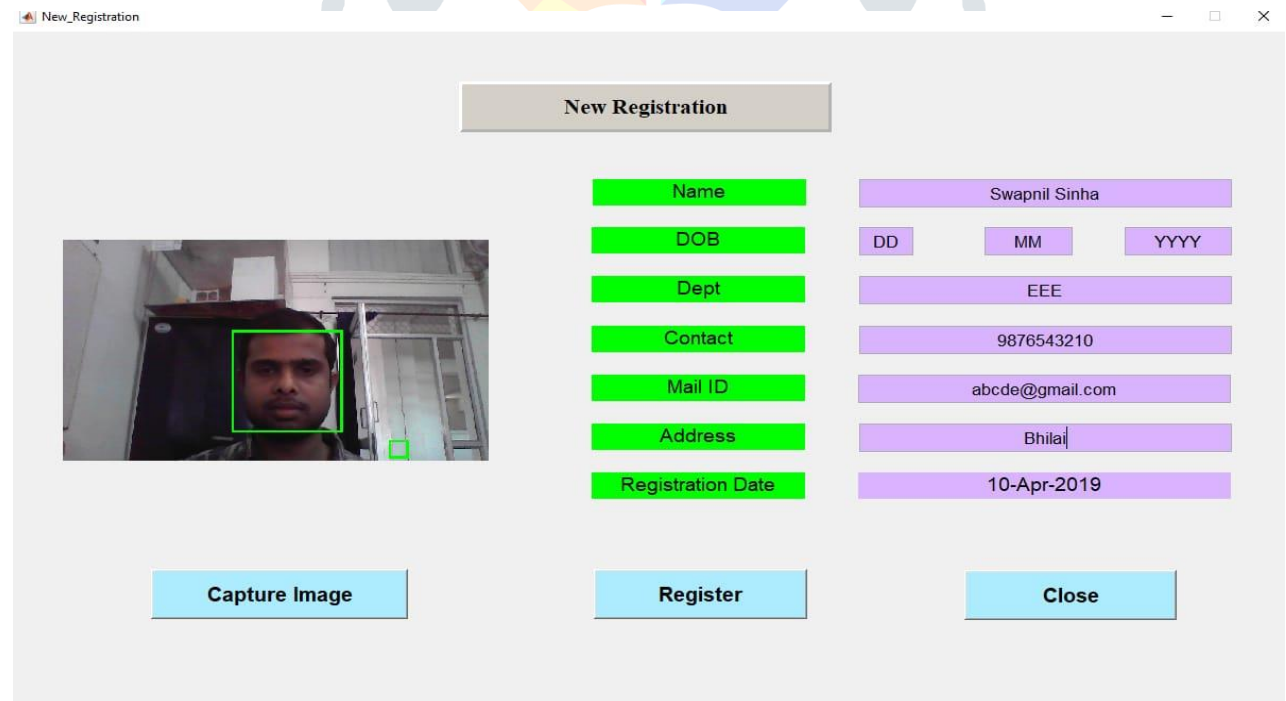
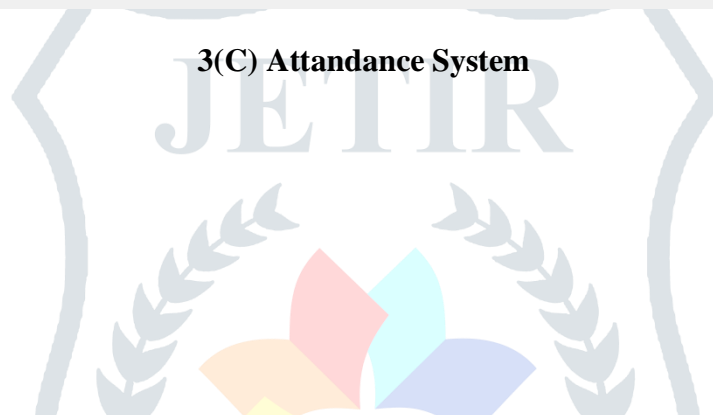
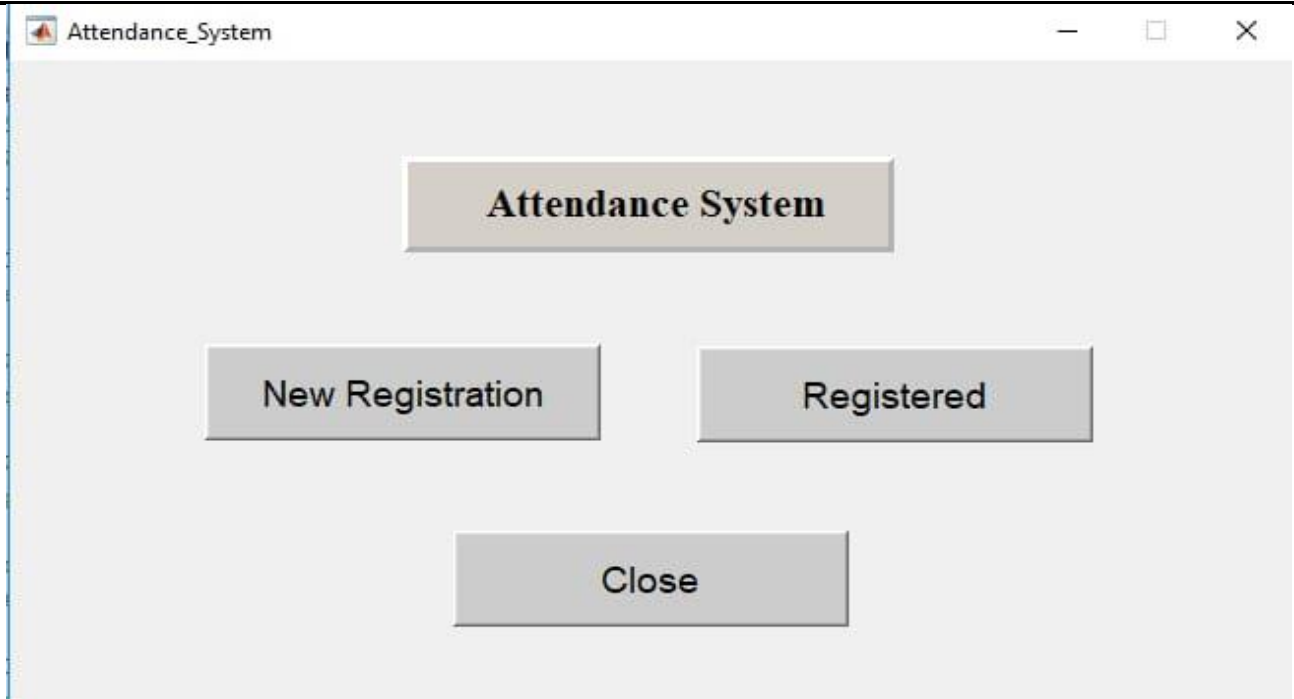


Fig. 3(D) New Registration

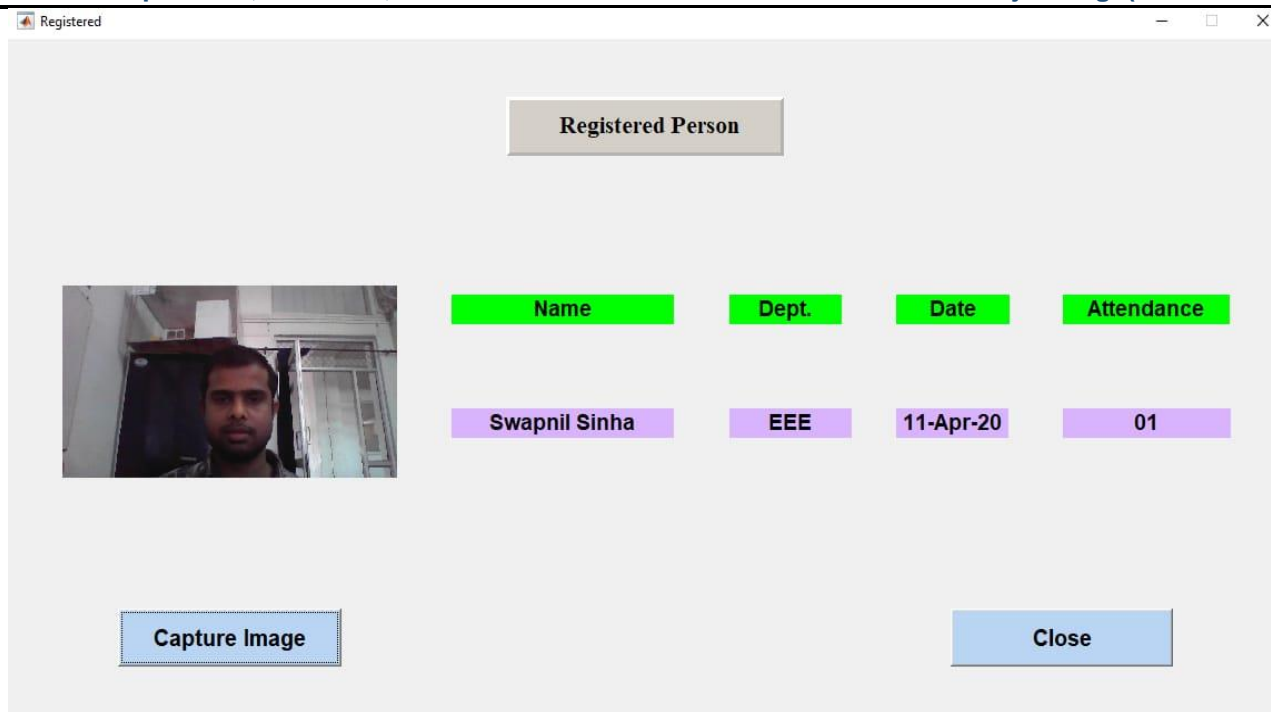


Fig. 3(E) Registered Person

4. RESULT:-

The proposed system for taking attendance using face recognition technique is very fast as compared to the traditional methods. The system uses supervised learning and so uses the features extracted while training the system to match the test image to the training image and then gives the desired output. The trained image's statistical data is compared to that of the test image and the distance is calculated. The image giving minimum distance is the trained image of the test subject and so the attendance for that student is taken.

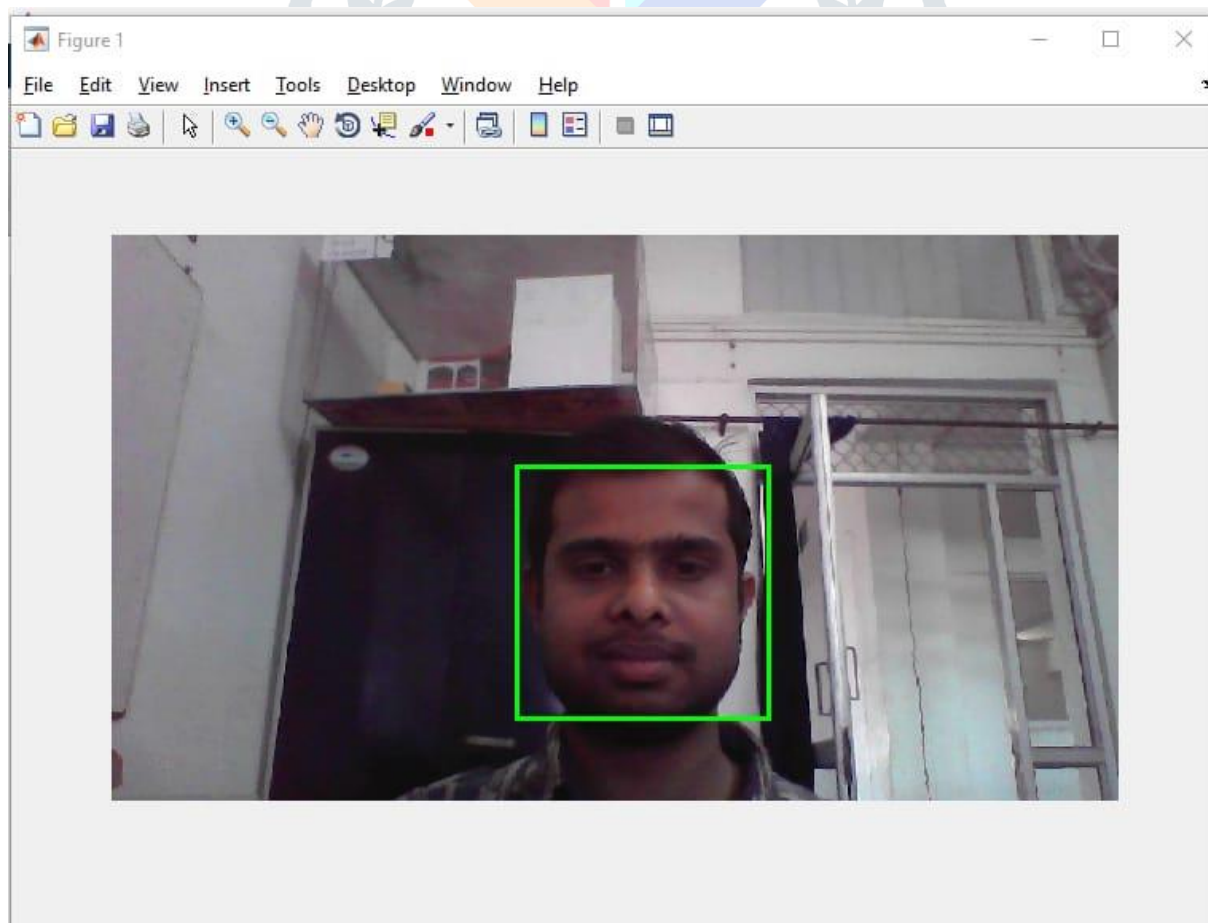


Fig. 4(A) Face detection

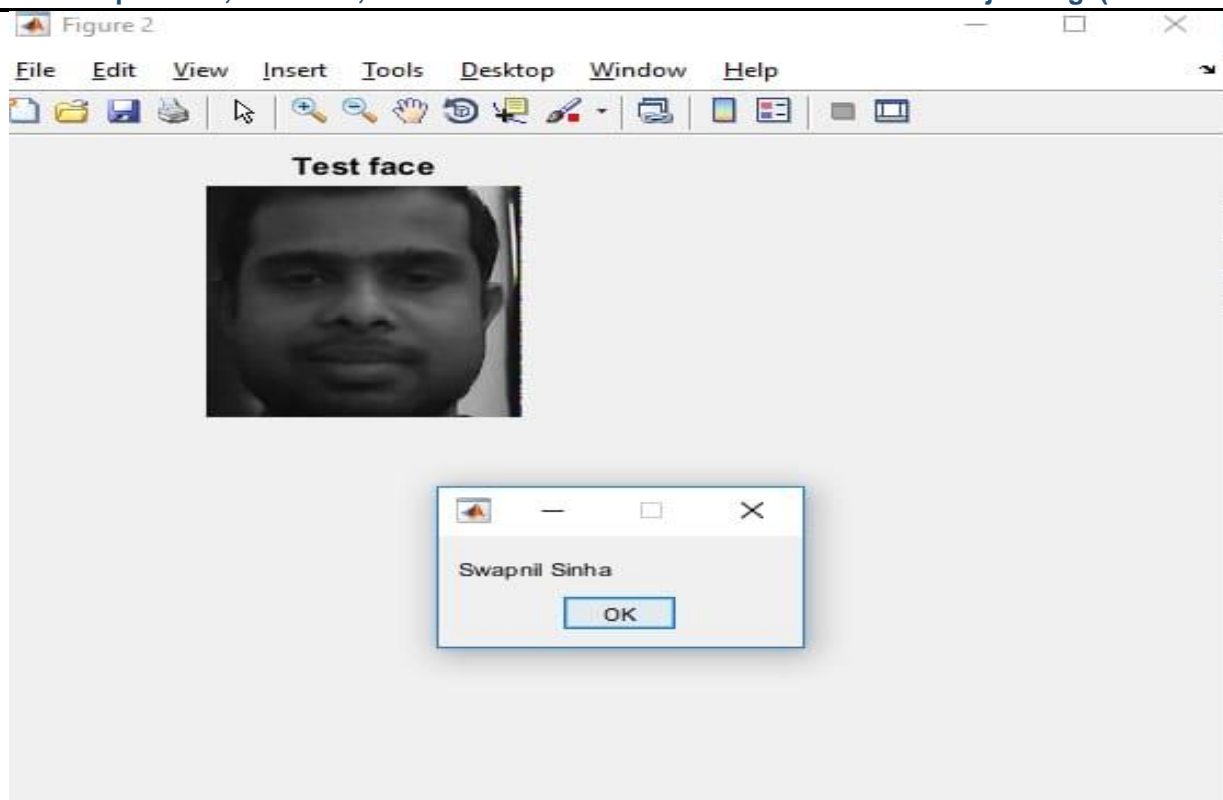


Fig 4.5(B) Tested image

5. Conclusion and Future Works:-

In this system we have implemented an attendance system for a lecture, section or laboratory by which lecturer or teaching assistant can record students' attendance. It saves time and effort and reduces the drawbacks of the traditional (manual) system. This attendance system demonstrates the use of image processing techniques in classroom. In order to obtain the attendance of individual student, this paper proposes the automatic attendance system based on face recognition technique using vision cascade object detector algorithm. The system will record the student attendance when he/she enters and exit the classroom automatically and also provide additional information to faculty by maintaining a log report for entry and exit time. Comparing to manual attendance system this provides more reliable solution.

In future, in addition to only taking the attendance, we can create an online database of the attendance and automatic updating of the attendance into it keeping in mind the growing popularity of Internet of Things. This can be done by creating a standalone module which can be installed in the classroom having access to internet, preferably a wireless system. Using simple mail transfer protocol, student's attendance can be sent to their parents through mail.

6. Reference:-

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