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Attendance System for Face Recognition using GSM module

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Abstract-The scenario of our Indian education system in our country has made compulsory for attendance to be recorded in the classroom .Today many Colleges of rural area are facing problem to have a record of attendance in the classroom and our education system in India arises a question to the department for their irresponsibility. Education department also seeks records of all the students which are very difficult to maintain. A keen idea to develop prototype development is to maintain the record of all the students. This led to the development of the project titled face recognition based attendance system using GSM Module exclusively caters to the need of Indian teachers. Face recognition is often referred; person's face image input through a camera. A face recognition system using the SIFT (Scale invariant feature transform) algorithm was implemented. The algorithm is based on Image features approach which represents a SIFT method in which a small set of significant features are used to describe the variation between face images. Face recognition consists of two steps, firstly at input side camera capture the image. Then match and it with stored database. In the second step if the image is matched then LCD displays the student 1 is present. After that gsm module send a sms to authorize mobile number. The serial communication is used to interface between the GUI in matlab and arduino it allows input data transmission from matlab to arduino Uno. This project is very useful like in military, school, sport, health, industry, security, animal, and other areas.

Keywords: face recognition, GSM module, SIFT algorithm, LCD display, Arduino.

I. INTRODUCTION

Face recognition is often referred; person's face image input through a camera. Student Attendance is taken manually by using the attendance sheet. The Current attendance of marking methods is monotonous & it is time consuming. Manually recorded attendance can be easily manipulated. To verify the students in very large classroom environment with distributed branches weather the authenticated students are responding or not, hence the paper is proposed to tackle all these issues. A face recognition system using the SIFT (Scale invariant feature transform) algorithm was implemented. The algorithm is based on Image features approach which represents a SIFT method in which a small set of significant features are used to describe the variation between face images.

The proposed system is development of maintain the record of all the students titled face recognition based attendance system with matlab and Attendance with the GSM Module.

II. LITERATURE SURVEY

In this paper [1] face recognition on convolutional neural network. Presents an approach where the face recognition is this proposes the modified convolutional neural network by adding two normalization operations two of the layers. This operation provided the batch normalization acceleration of the network. Face recognition performance which was proposed by Georgia tech database gave better result. Face recognition process is of three stages pre-processing states colour space conversion and resize of the images, continues extraction of face features and after that extracted feature is classified. Softmax classifier is to resize the final stage classification on the basis of the face features extracted from the CNN.CNNs category of neural network that have proven in very effective areas as image recognition and classification. CNN consists of filters or kernel's in which each filter will take some inputs and it performs convolution and optionally fully connected layer in which every filter in the previous layer will be connected to every filter in the next layer. The goal of this the layer is fully connected for the classification the image input for various dataset [2] This paper presents the three biometric characteristics are used i.e. fingerprint, face, iris at score level of fusion. For fingerprint images used two methods minutiae extraction and Gabor filter approach. For iris Gabor wavelet is used for feature selection. For face system P.C.A is used for feature selection. The fingerprint in which the image will scan and that will detects ridge and valleys which is converted as zero and one. The iris is circular part is between the sclera and white

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part. It's characteristics in the form of texture. [3] This paper presents the biomedical biometric student attendance system most of the biometric attendance are unimodal.to improve the recognition accuracy of automated attendance bimodal biometrics is used. Fingerprint and face is used to take the student attendance. Biometric attendance student's traits enrolled and stored in the database while taking attendance it can be retrieved. The aim of this paper by designing an application that captures the face image and finger print of all the students. [4] This paper presents the facial change with age is always a problem in facial features matching for photos of ID cards to solve this problem sift algorithm is proposed. Eyes, nose, and mouth are the main features of the face. [5] This paper is to automate the attendance system by integrating the face recognition technology Eigen face database and pca algorithm. Pca it reduces dimension of data the most effective low dimensional structure of facial features. A face contains certain set of important features and characteristics features. Pca is used to reduce the data too dimensionally of training dataset.

III. PROBLEM STATEMENT

Face recognition has become a popular area of research in computer vision, due to increasing security demands and its potential, commercial and law enforcement applications. It is a very challenging problem and up to date and there is no technique that provides a robust solution to all situations and different applications that face recognition may encounter. Hence, this dissertation focuses on developing a technique that provides a solution for an efficient high-speed face recognition system in different applications.

IV. PROPOSED METHODOLOGY

The design for the Face Recognition System using the sift algorithm technique. Most of the attendance systems that are being used in universities still are written a piece of paper. For classes, tutorial and laboratory session the student still have to sign the signature on the attendance sheet. This method is not flexible because the risk of losing the attendance data is very high. If the attendance sheet is missing, the attendance data will be lost. Other than that, unethical problem may be occurring such as cheating in signature. For example, a student does not attend his class but his attendance form has been signed by other student. This system is proposed to overcome these problems. Besides that, since the proposed system also record the time, the lecturer can monitor the punctuality of the students too.

"FACE ATTENDANCE SYSTEM" will take an attendance by using matlab, camera capture the face, then match with the database. There were a lot of problems when using the paper as student attendance. This project can help lecturer to reduce the problem like by design automatic attendance using matlab. And sms sent to the authorized mobile number.

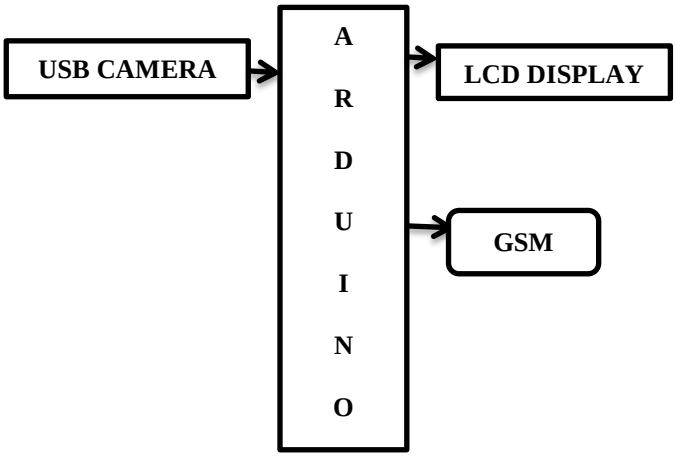

Figure 1 shows the block diagram of face recognition system

The above figure shows the overview of the system here we are implementing the face recognition based attendance system using matlab. At input side camera capture the image. Then match it with stored database. If matched then LCD displays the student 1 is present. After that gsm module send a sms on particular mobile number. This uses the regulated 5V, and 500mA power supply. Three terminal voltages 7805 are used for voltage regulation. To rectify the ac output full wave rectifier is used of 230/12v step down transformer.

The SIFT method technology is used for the face recognition system.

SIFT (Scale Invariant Feature Transform) ALGORITHM:

This approach has been named the Scale Invariant Feature Transform (SIFT), as it transforms image data into scale-invariant coordinates relative to local features. An important aspect of this approach is that it generates large numbers of features that densely cover the image over the full range of scales and locations. A typical image of size 500x500 pixels will give rise to about 2000 stable features (although this number depends on both image content and choices for various parameters). The quantity of features is particularly important for object recognition, where the ability to detect small objects in cluttered backgrounds requires that at least 3 features be correctly matched from each object for reliable identification. For image matching and recognition, SIFT features are first extracted from a set of reference images and stored in a database. A new image

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is matched by individually comparing each feature from the new image to this previous database and finding candidate matching features based on Euclidean distance of their feature vectors. The nearest-neighbor algorithms that can be perform this computation rapidly against large databases. The key point descriptors are highly distinctive, which allows a single feature to find its correct match with good probability in a large database of features. However, in a cluttered image, many features from the background will not have any correct match in the database, giving rise to many false matches in addition to the correct ones. The correct matches can be filtered from the full set of matches by identifying subsets of key points that agree on the object and its location, scale, and orientation in the new image.

Image matching is a fundamental aspect of many problems in computer vision, including object or scene recognition. For image matching and recognition, SIFT features are extracted from a set of reference images and stored in a database. The features are invariant to image scaling and rotation. The major stages of computation used to generate the set of image features are as follows:

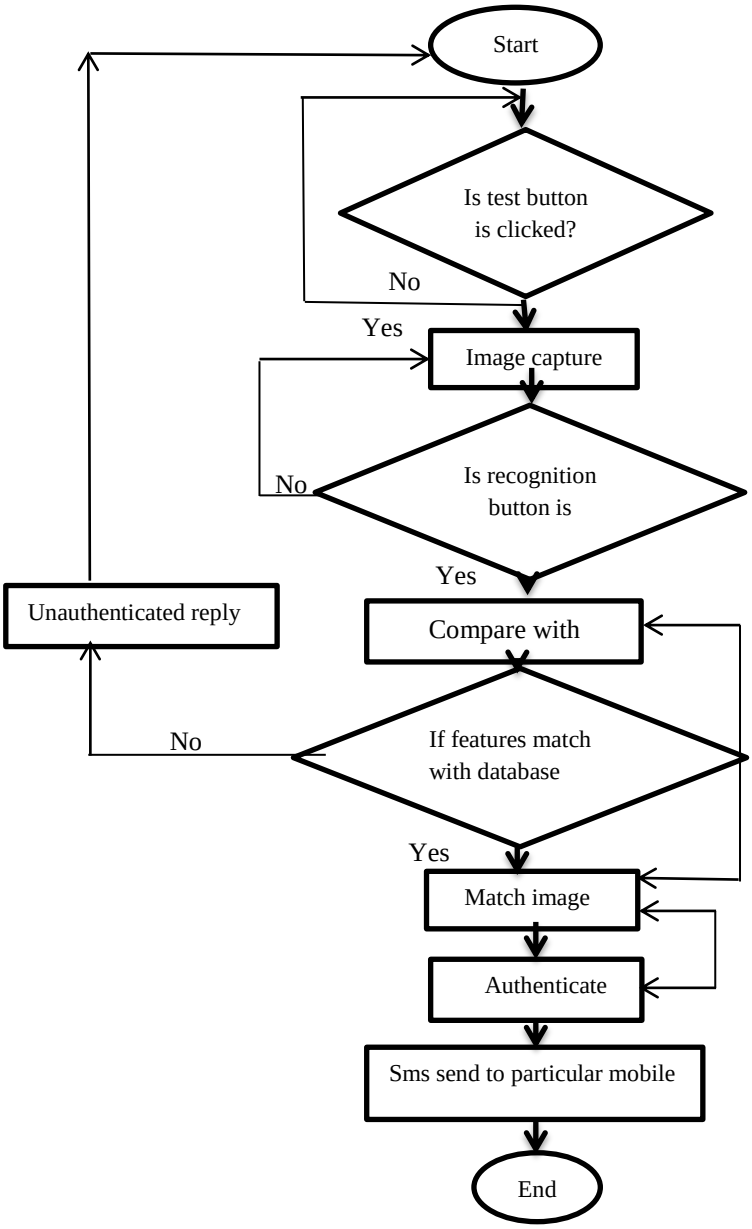
Scale-space extreme detection: The first stage of computation searches over all scales and image locations. It is implemented efficiently by using a difference-of-Gaussian function to identify potential interest points that are invariant to scale and orientation.

Key point localization: At each candidate location, a detailed model is fit to determine location and scale. Key points are selected based on measures of their stability.

Orientation assignment: One or more orientations are assigned to each key point location based on local image gradient directions. All future operations are performed on image data that has been transformed relative to the assigned orientation, scale, and location for each feature, thereby providing invariance to these transformations.

Key point descriptor: The local image gradients are measured at the selected scale in the region around each key point. These are transformed into a representation that allows for significant levels of local shape distortion and change in illumination.

The figure 2 shows the flowchart of face recognition.



Here camera is use to capture an image then. Features of that image calculate and that feature store in database. These feature calculate from SIFT algorithm. Here we create student databases. For recognition a person camera use to capture an image then find feature of that image that feature compare with database features. If features is match then that person is authenticate otherwise that person is unauthenticated. If the person is match then attendance of that person sends to authorised mobile. Here GSM module uses to send message.

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The steps taken for face recognition:

- Image acquisition: the input image is captured via webcam. Once the image is extracted the information is extracted. The image acquisition is to seek and extract contains only the face.
- Pre-processing: the image is resized to a specific size and resolution. Reduction is done by compression the original features destroying the information from the image.
- Feature extraction: this will encode the entire face in higher image space. It extracts features of the data and creates new features on the transformation or the original data.
- Classification: Euclidean distance is used as the classifier. Used for decision making rule. Calculating the distance between the test image and training image in the database.

V. EXPERIMENTAL RESULTS

The face detection module passes the frame captured by the camera and the coordinates the detected faces to the face recognition function. As soon as the face is recognized by the system, the LED on the arduino board starts blinking, thus signalling that the face has been correctly recognized.

The results obtained in matlab are shown below:

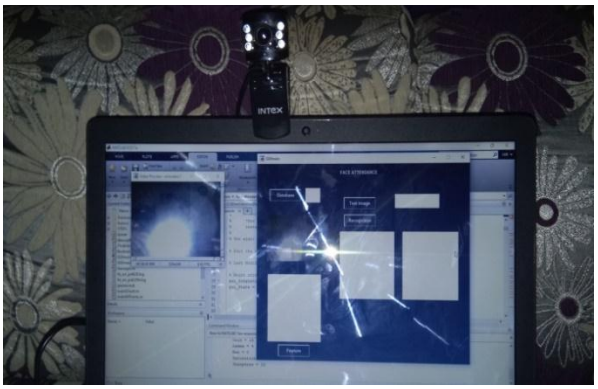

Figure 3 creating GUI

After creating the GUI have to give the input database. Can give any number of inputs to the database

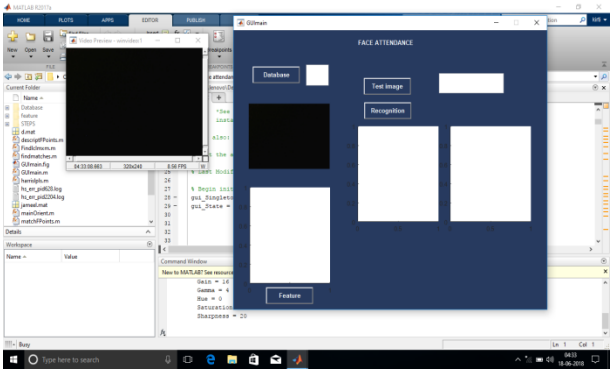

Figure 4 input database

As the database image is taken and stored in database folder then test image is taken for recognition purpose.

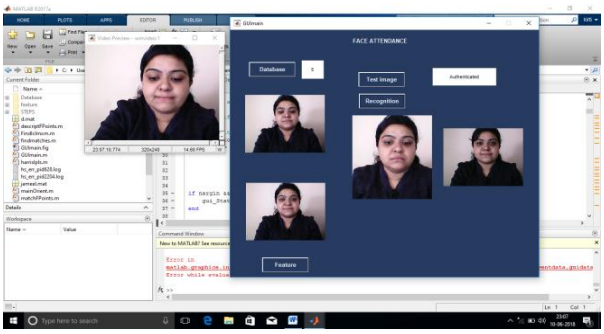

Figure 5 Identification

Once the image features are recognized then we get output message as “Authenticated” otherwise “Unauthenticated”.

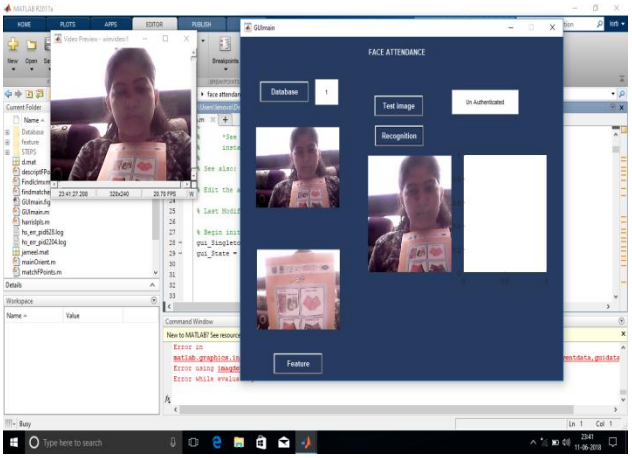

Figure 6 Identification

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The above image shows the output image as Unauthenticated.

Recognition accuracy (%)-Using the 15 images taken from the webcam connected to the computer. The face recognition system is able to achieve 80% recognition rate for the real time system and for standalone systems 90%.the system proof of the proposed face recognition system, for further improvement and research. When a person image is taken then image featured is matched, system will give the output as "Authenticated". If the image is not matched the output is "Unauthenticated ". The time taken for the recognition is 10 seconds.

VI. CONCLUSION & FUTURESCOPE

The most efficient application of our project is in schools and colleges for which particularly the project is made. The same thing can be applied in schools where there is also the problem attendance. Similarly such kind of system can employ in offices where there is no time for attendance of employees. All kinds of institutions or organization where attendance is an important issues our project can be used. Other than this the system is having some allied applications listed below which can also be where such kind of a system can easily use:-Vehicle identification; Personnel identification; Access control; Building security; Asset management; Warehouse. Management; Mines; Production and Process Control; Inventory Tracking and Hospitals.

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