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IMPLEMENTATION OF ATTENDENCE SYSTEM USING COMPUTER VISION TECHNIQUES

A.Geetha[1] ,T.Muthuselvi[2],J.Roseline[2],P.Sweety[2]
[1]Associate Professor, [2] UG Student,
Department of Kamaraj College of Engineering and Technology
Kamaraj college of Engineering and Technology

Abstract-Student's attendance in the classroom is very important task and if taken manually, there is a waste of time. There are many automatic methods available for this purpose i.e. biometric attendance. All these methods also waste their time because students have to make a queue to touch their thumb on the scanning device. This work describes an efficient algorithm that automatically displays the attendance without human intervention. This attendance is recorded by using a camera attached in front of classroom that is continuously capturing video of students and converted into frames; detect the faces in the frames. By using an efficient algorithm, we are extracting the edge feature of the faces and stored it in a vector format. Then compare the edge features of the detected faces every time with the feature vector stored already and display the attendance. The paper review the related work in the field of attendance system then describes the system architecture, software algorithm and results.

Index Terms- Face Recognition, Enhanced Local Directional Pattern, k-NN classifier.

I .Introduction

Maintaining the attendance is very important in all the institutes for checking the performance of students. Every institute has its own method in this regard. Some are taking attendance manually using the old paper or file based approach and some have adopted methods of automatic attendance using some biometric techniques[4]. But in these methods students have to wait for long time in making a queue at time they enter the classroom. Many biometric systems are available but the key authentication is same is all the techniques. Every biometric system consists of enrolment process in which unique features of a person is stored in the database and then there are processes of identification and verification[7]. These two processes compare the biometric feature of a person with previously stored template captured at the time of enrollment. Biometric templates can be of many types like Fingerprints, Eye Iris, Face, Hand Geometry, Signature, Gait and voice[4]. Our system uses the face recognition approach for the automatic attendance of students in the classroom environment without student's intervention[2]. Face recognition consists of two steps, in first step faces are detected in the image and then these detected faces are compared with the dataset for verification.

II.Methodology

A.Collecting Dataset

First step in every biometric system is collection of face images and their unique biometric vector features as templates. The steps involved in collecting dataset is shown in the Figure 1

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Fig.1 **Flowdiagram for collecting dataset**

Image is captured from the camera and then it is enhanced using histogram equalization. In the second step face is detected in the image and vector features are extracted from it. These unique vector features are then stored in the face dataset.

B. System Description

The system consists of a camera that captures the video of the classroom and converted into frames. Using Bounding Box Algorithm, the faces are detected from the frames. The detectedimages are converted into gray scale images. These images areresized andenhanced. Use Kirsch compass masks to obtain the Eight directional edge features and stored as a 1D vector format. Apply Enldp algorithm to the edge featured images. Fig.2

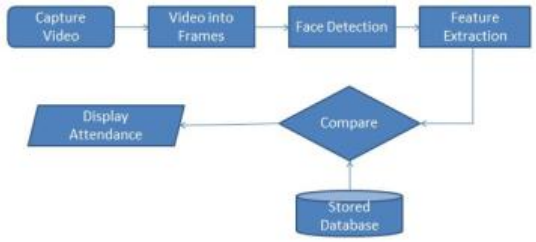

Fig.2 **Overall flow diagram**

Compare the feature vectors of these images with the feature vectors of the images in the dataset using Knn classifier. This classifier calculates the nearest neighbour of the feature vector and displays the attendance. This isshown in the experimental setup in Figure2. In this way a lot of time is saved and this is highly secure process no one can mark the attendance of other.

C.KCM (Kirsch compass masks)

Kirsch compass masks are to compute the Edge responses. It is used to find edges in all the eight directions of a compass. All the Eight directional numbers of each pixel is assigned as an associated 8-bit binary code. If the directional number of its edge image is positive, we set the value of respective bit to 1.otherwise we set the value of respective bit to 0.With the help of Kirsch compass masks we can find edges in the following eight directions.East,North East,North,North West,West,South West,South,South East. This is the standard masks which follows all the properties of a derivative masks and then rotated to form masks in all other directions is shown in Fig.3.

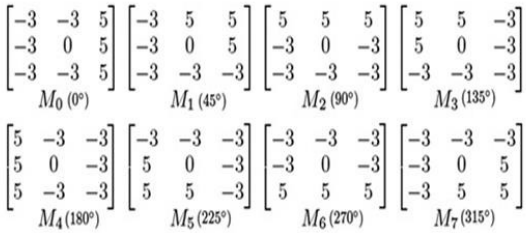

Fig.3 **KCM in all directions**

We apply the KCM on gray scale image with the directions of North and North East in Fig.4

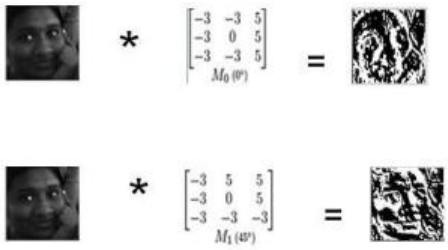

Fig.4 **KCM in North and North East directions**

The Edge Featured image is computed by convolving the original image with each masks in all Eight directions.

D.Enhanced Local Directional Patterns

EnLDP considers a 6-bit binary code so that the first 3 bits code the *position of the top positive directional number* and the next 3bits *code the position of the second top positive directional*

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number.Fig.5 show the Enldp applied image. The value of the Enldp image is 000001.The top most positive directional number is 322 and its assigned value is 0.So the first 3 bits represent as 000.The second top most positive directional number is 239 and its assigned value is 1.So the second 3 bits represent as 001.

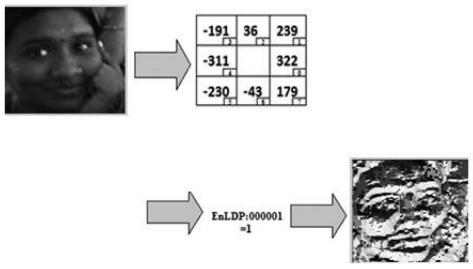

Fig.5 Enldp **for an image**

E.Knn classifier

It is a parametric method for classification and regression. The output depends on whether k-NN is used for classification or regression In k-NN classification, the output is a class membership. Christo Ananth et al. [9] proposed a system, in which a predicate is defined for measuring the evidence for a boundary between two regions using Geodesic Graph-based representation of the image. The algorithm is applied to image segmentation using two different kinds of local neighborhoods in constructing the graph. Liver and hepatic tumor segmentation can be automatically processed by the Geodesic graph-cut based method. This system has concentrated on finding a fast and interactive segmentation method for liver and tumor segmentation. In the preprocessing stage, the CT image process is carried over with mean shift filter and statistical thresholding method for reducing processing area with improving detections rate. Second stage is liver segmentation; the liver region has been segmented using the algorithm of the proposed method. The next stage tumor segmentation also followed the same steps.

F.Histogram

Camera is placed in front of the classroom. It takes the video continuously and that video is converted into frames. Theframe sometime has brightness or darkness in it which should be removed for good results. The RGB image is first converted into gray scale image for enhancement. The histogram applied frame is shown in Fig.6

Fig.6 Input frame

III.RESULTS ON FACE DATABASE

After performing the histogram equalization technique, the faces are detected using bounding box technique. In this frame there are 12 students. Students with various poses like occlusion, illumination, slightly turned are also detected. In our frame all the 12 students are detected which is shown in Fig.7

Fig.7 Detected faces in an input frame

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CROPPED FACES

The detected faces are cropped using bounding box technique and these cropped images are converted into 1D feature vector format and these feature vector are compared with the feature vector of dataset images. The cropped images as shown below

Fig.8 **Cropped faces**

After comparing with Knn classifier, calculate the nearest neighbour and display the names of the students who are present. This procedure is repeated for all the frames and the attendance is displayed.

Table I – Analysis of results

DATASET	DETECTEDFACES	RECOGNIZED FACES
14	12	8

IV.Conclusions

This paper introduces the efficient and accurate method of attendance in the classroom environment that can replace the old manual methods. This method is secure enough, reliable and available for use. No need for specialized hardware for installing the system in the classroom. It can be constructed using a camera and computer. There is a need to use some algorithms that can recognize the faces in veil to improve the system performance.

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