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Facial Recognition Based Attendance System

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Abstract - *Face recognition has taken a considerable change in today's world of, it has been widely spread throughout last few years in substantial way and has been improving continuously. The face is the identification of a person. The method to exploit this physical feature have seen a great change since the entry of image processing techniques. The attendance is taken in every institute, colleges and various organizations. Traditional approach for attendance is professor calls student's name & record's the attendance or an roll-call sheet would be passed in which he/she has to sign and mark their presence .These methods are not that efficient and can lead to duplicate signatures/proxies. Tracking a users presence is becoming one of the problems in today's world, so an attendance system based on facial recognition can act as a real world solution to this problem and add can great value of simplicity for tracking a users/students attendance. This system is based on real-time multiple-single face recognition to maintain the attendance record of students and this makes the process very simple compared to the traditional one. The execution is performed with the help of Local Binary Pattern Histogram algorithm for detecting the faces and manage the process very efficiently. The training data sets consists of different qualities of images of an user/student. This training data set is then used for recognition through various algorithms and thus making the attendance system work seamlessly and efficiently.*

Key Words: Face Detection; Face Recognition; Attendance System; Model Training; Datasets, LBPH.

1. INTRODUCTION

The present scenario of attendance is manual in schools as well as colleges which is leading to waste in efforts for faculties as well as the students and also is a tedious task. In today's world biometric systems are more widely used as their accuracy has since improved to such a great extent that nowadays biometric recognition systems are preferred over other process like Fingerprint Recognition, Iris Recognition, Facial Recognition, Voice Recognition etc. Face recognition provides tractable identification that is a person which is to be identified does not to need to take any action for its identity. There are two steps which are as follows- firstly it begins with gathering the data sets of the students in the class followed by training them with a good model and later recognize him/her by the trained image and end it by transferring them to an Excel file through CSV.

Our system uses face recognition as an alternative solution to reduce the insufficiency of existing system with the help of machine learning, it requires a good quality camera to capture the images of students, the detection process is done by Local Binary Pattern Histogram. The images captured by the WebCamera is sent to system for further analysis, the input image is then compared with a set of reference/trained images of each of the student and finally their face is detected and their attendance is marked.

In a face identification model, detection plays an important and crucial role when comparing them overall. There are variety of algorithm's like histogram of oriented gradients[HOG][1], Local binary pattern histogram, Fisher faces[2] ,eigenfaces[3]. Our project inculcates Local Binary Pattern Histogram [LBPH][4]. Because we found working with LBPH more efficient and performance was satisfactory. LBPH takes the histogram of the input image which is then compared with database histogram using the **classifier**.

2. LITERATURE REVIEW

In recent past, a number of facial recognition based attendance management system have been introduced in order to improve the traditional approach of the students in different institutes and as well as organizations.

Attendance Marking System Using Biometrics Authentication .Biometric are individuality of human being that can be used to recognize an individual or verify an individual's identity. Attendance is taken electronically with the help of a fingerprint device the record is stored in the database. Attendance is marked after student Identification[5]

[6] The author proposed to use near field communication technology (NFC) to get the attendance of students in various school and colleges. NFC tags are provided to every student when they get registered in their college. When students enter their designated classrooms ,they need to touch or move their tag on faculty's NFC enabled mobile phone, NFC readers program will read these tags, identify the students from their respective NFC tag and and inbuilt camera will capture the face of that particular student. The teacher's mobile app then sends all the data to college server and in server side validation program will check the data for validation, if valid data found then program will update the

database and mark attendance to that particular student. Each student getting a unique NFC tag makes these tags very important without which they may be marked as absent.

[7] The author suggests that the system takes the attendance through the system and recognition is obtained by continuous monitoring. Continuous monitoring helps in estimating and improving the execution of the attendance system. To obtain the attendance, different positions and face images of the students present in the class room are to be captured. Through continuous monitoring and recording through surveillance camera the system estimates seating posture and location of each student for attendance marking. The work is focused on the method to obtain the different of each focused seat according to its location. The efficacy of the picture is also being discussed to enable the faster recognition of the image.

[8] Many educational institutions/administrators are worried about student's irregular attendance. Truancies can affect student overall academic performance. The manual approach of taking attendance by calling names or signing on paper is very time consuming and insecure, hence inefficient. Radio Frequency Identification(RFID)tag based attendance system is one of the solutions to address this big problem. This system can be used to take attendance for student in school, college, and various other organizations too.

Related Work:

Local Binary Pattern's (LBP) is a recognizable descriptor style used in the classification of computer vision. LBP is the specific case of the 1990 proposed Texture Spectrum model. In 1994, LBP was represented for the first time. Since then, it has been found as a solid element for classifying texture. More specifically, once LBP is combined with the descriptor histogram of oriented gradients (HOG). It obviously improves the execution of identification on some datasets. Figure 1 illustrates the LBPH algorithm flowchart diagram.

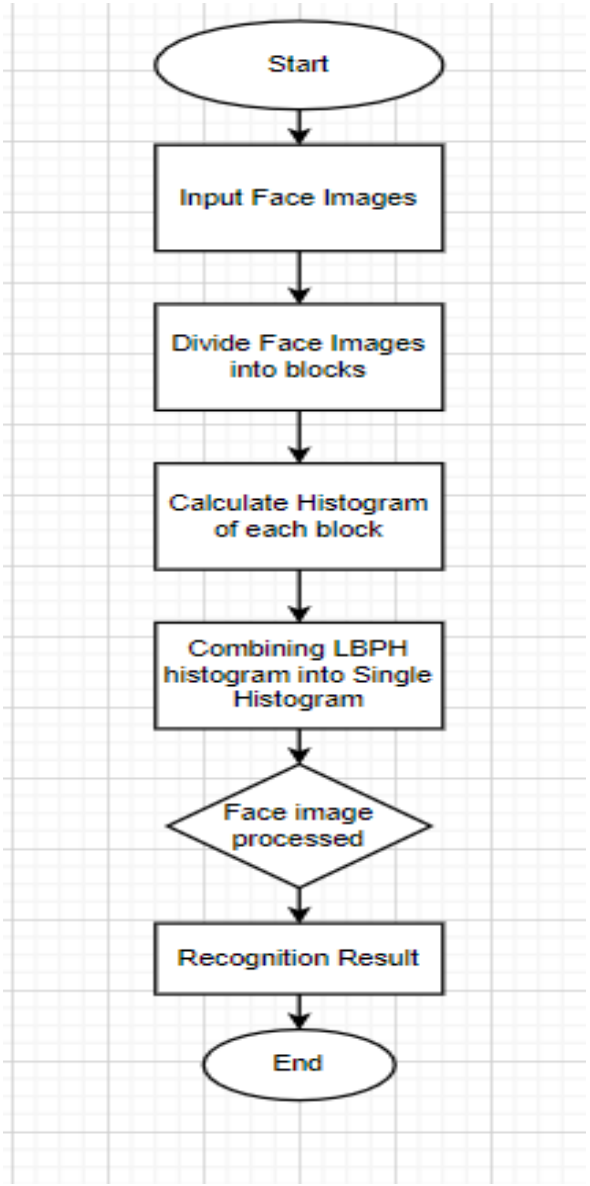


Fig1:LBPH Algorithm Flowchart

The image is divided into cells for the encoding of features. It is contrasted by using a clockwise or counter-clockwise bearing of surrounding pixel values. The value of each neighbor's intensity is compared to the central pixel. The location is assigned a 1 or a 0 depending on the difference whether it is higher or lower than 0. The result gives a single cell an 8-bit value. Figure 2 shows the matrix calculation comparing the value of the middle element of the matrix withthe neighboring elements.[9]

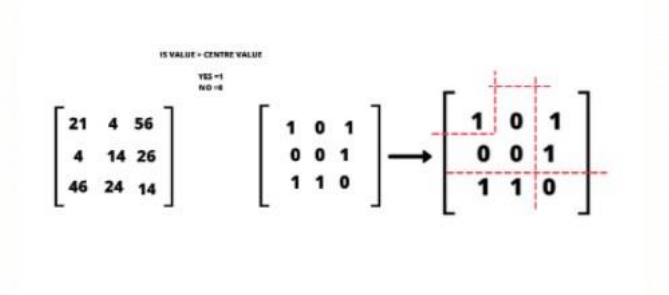


Fig2: Creating an 8bit number -LBPH

Euclidean Distance

Euclidean distance is one of the widely used distance metrics. It is computed using Hermann's Distance formula by setting p's value to 2. Thus, the distance 'd' formula is shown below:

$$d(\mathbf{p},\mathbf{q}) = \sqrt{\sum_{i=1}^{n}(q_i - p_i)^2}$$

Fig 3: Distance Formula

Euclidean distance formula, which looks similar to the "Pythagoras Theorem", can be used to calculate the distance between two data points in a plane.

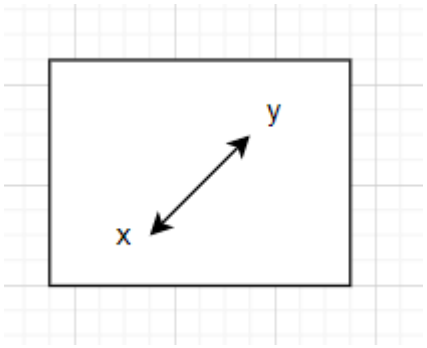


Fig 4:EuclideanDistance

It is shown in Figure, by using this formula of distance, Euclidean space becomes a metric space. The Euclidean distance between points x and y is the length of the line segment connecting them [xy]. In Cartesian coordinates, if x = (x1, x2, … , xn) and y = (y1, y2, … , yn) are two points in Euclidean n-space, then the distance from x to y, or from y to x is given by: *d* (x, y).

3. METHODOLOGY

The proposed system is to develop a face recognition-based attendance system with satisfactory rate of recognition for the entire classroom. First and the most important step in proposed system is to collect database of classroom students. Database collection is to be done using Haar cascade classifiers to find face when webcam is turned on to collect database (images of face) of a student

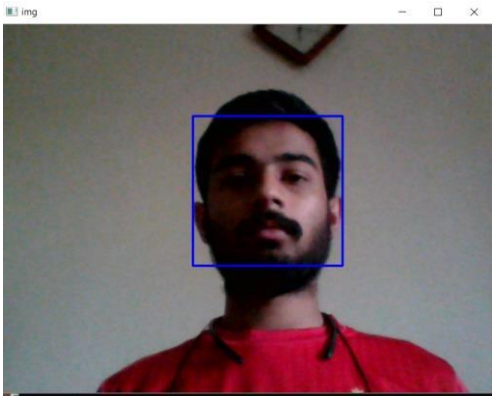


Fig5:Detecting Faces

The above image is the result of Haar Cascade, where face is detected with the help of webcam and depending upon the value of n where (n= 81), represented in the program, the number of snap shots is taken and stored as datasets. The captured images are stored in the respective folder with the name of the student.

At the third step, Web Camera is turned on to capture the classroom. Faces are to be detected using Local Binary Pattern Histogram[LBPH]method. Detected faces' encodings are extracted in real time and are to be compared with those stored previously i.e trained images with appropriate student names. If the image has been matched with the existing dataset, respective name is identified and marked in an attendance report. The names which has been recognized are then stored in a CSV file with student's roll no, name, date, registration time.

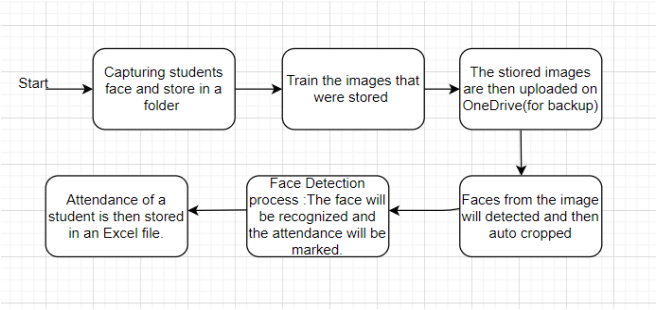


Fig 6: Block diagram of the system.

3.1 Feature Extraction:

Split up face images into R local regions to extract LBPH histograms. The LBP histograms selected from each sub-region are used for calculation and combined into a single histogram with spatial advanced features defined as[10]

$$H_{i,j} = \sum_{x,y} I\{f_l(x,y) = i\}\, I\{(x,y) \in R_j\}, i = 0,\ldots,n-1, j = 0,\ldots,m-1.$$

A histogram formula of the LBP image[16]

Fig 7: Histogram formula for LBPH images

Where **n:** is the number of different labelscreated by the LBP operator.

m: is the number of sub-regions.

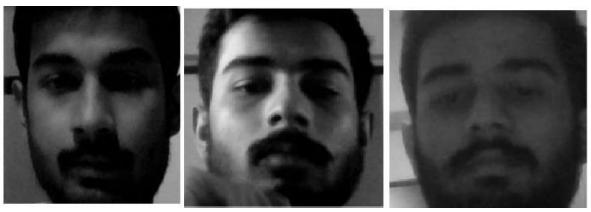
3.2 Stepwise Procedure

The user will have to open the executable file to start with theprocess and enter the required details as mentioned in the GUI.(student_id,student_name)

Create dataset: Faces of students will be captured through Web Camera and stored in a designated folder. The image quality of the photos may result in inconsistent accuracy percentage, hence recommendable that photos captured must be of high resolution as well as stable

Fig 8 :Capturing Live Photos through WebCam

Train dataset: The faces captured through the Web Camera will be trained in an folder and will be created in the same directory. We are capturing multiple images for each student thereby increasing the percentage of accuracy and recognition.



1.1 1.2 1.3

Fig 9 :Dataset images for recogniton

Test dataset: Pictures of the classroom or the individual face's of the students will be taken and uploaded on OneDrive (preferred) or any other cloud storage platforms.This can be done by faculty or admin whenever they get time which can be considered as a backup of our data.

Face Recognition: For this, Local Binary Pattern Histogram is applied cropped faces will be recognized in this step. Images will be recognized if it passes the given threshold and attendance of those students will be marked in the Excel File.

Fig 10: Recognized Face

A	B	C	D	E
Employee_ID	Name	Date	Registration Time	
1	swati	06-04-2021	19:44:02	
2	Sid	06-04-2021	19:45:50	
33	dfdfsf	06-04-2021	20:27:01	
22	sdd	07-04-2021	10:23:23	
22	sdfdsfsdf	07-04-2021	16:55:39	
12	23	08-04-2021	18:22:39	
23123re	ere	08-04-2021	18:34:58	
23123re	ere	08-04-2021	18:35:12	
23123re	ere	08-04-2021	18:35:20	

Fig 11: Excel File of the students marked present.

3.3 Advantages of the Approach:

This system will help in achieving efficient result in minimal amount of time.

Paperless way of marking attendance which reduces wastage of paper and time and also very seamless incounting the students present overall.

Prevents marking of proxy /duplicates and reduces human error.

Easy to fetch attendance anytime and anywhere from the excel file which is the uploaded in any Cloud and can be easily accessed whenever required as a backup.

This system does not need any external hardware component for the time being.

Does not require much storage space.

4. FUTURE SCOPE

Many academic institutions require attendance record of students and maintaining attendance manually can be tedious as well as time consuming task. Hence maintaining attendance automatically with the help of face recognition will be very helpful and less prone to errors as compared to manual process. This will also reduce manipulation of attendance record done by students and it will save time as well. The future scope of the proposed work can be a surveillance CCTV camera placed in a corner of a classroom and capture students face's periodically and update the system with the student's details. This process can be done for every single lecture and thereby updating the system and storing it in database. This can also be further configured toa large hall consisting many students and capture the faces of students and mark the attendance of those students.

5. CONCLUSION

This paper introduces the efficient method of attendance management system in the classroom environment that can replace the old manual methods. This method is secure enough, reliable, accurate and efficient. The whole procedure is divided into three major components, i.e. detection of faces, facial feature extraction, and classification of the image. The Face detection process describes the face of a person in input image. In feature extraction, facial landmarks are extracted and to make an LBPH histogram that gives the completely unique result and then in recognition process the histogram of the input image is compared with database histogram with the classifier. There is 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. Therefore, this 'Facial Recognition based Attendance Management System' will help save time, energy, efforts of a person due to minimum human intervention, and will also reduce human errors and other errors in computation and various other challenges.

REFERENCES

[1] J. HU Liqiao, QIU Runhe. Face recognition based on adaptive weighted HOG. Computer Engineering and Applications, 2017, 53(3): 164-168.

[2] Mustamin Anggo1* and La Arapu1 Face Recognition Using Fisherface Method

[3] Fares Jalled, Moscow Institute of Physics & Technology, Department of Radio Engineering & Cybernetics- Face Recognition Machine Vision System Using Eigenfaces

[4] Md. Abdur Rahim, Md. Najmul Hossain, T. Wahid, Md.Shafiull Azam, "Face recognition using Local Binary Patterns (LBPH)", Global Journal of Computer Science and Technology Graphics &Vision,, Global Journals Inc. (USA), Volume 13 Issue 4 Version 1.0 Year 2013 (face recognition)

[5] Shrilakshmi Prasad,Arpitha D STUDENT ATTENDANCE TRACKING SYSTEM USING BIOMETRICS

[6] Prof. Krishna Tripathi , Bijoy Kunnappilil , Rohit Meshram ,Vicky Bhoir NFC-Based Attendance System

[7] Assistant Professor. Rupali Satpute, Shankar Sontakke, Bhautik Gondaliya, Tapsi Sonawane, Kuldeep Suryawanshi ATTENDANCE MANAGEMENT SYSTEM USING FACE RECOGNITION

[8] Ravishankar Yadav, Sumita Nainan Design of RFID Based Student Attendance System with Notification to Parents Using GSM

[9] Abhishek Pratap Singh, SunilKumar S Manvi, Pratik Nimbal, Gopal Krishna Shyam - Face Recognition System Based on LBPH Algorithm

[10] Zahraddeen Sufyanu1 , Fatma Susilawati Mohamad2 , Abdulganiyu Abdu Yusuf3 , Abdulbasit Nuhu Musa4 and Rabi'u Abdulkadir5 - FEATURE EXTRACTION METHODS FOR FACE RECOGNITION