e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:04/April-2022 Impact Factor- 6.752 www.irjmets.com

FACE RECOGNITION ATTENDANCE SYSTEM

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ABSTRACT

Face recognition is among the foremost productive image processing applications and encompasses a pivotal role within the technical field. Recognition of the face could also be stuffed with a life issue for authentication purposes specifically within the context of attendance of scholars. the event of this method is aimed to accomplish digitization of the standard system of taking attendance by calling names and maintaining pen-paper records. Present strategies for taking attendance are tiring & dull. Attendance records are well manipulated by manual recording. This paper is therefore proposed to tackle these problems. After face recognition attendance reports are generated and stored in excel format. The system is tested under various conditions like illumination, head movements, and the variation of distance between the scholar and cameras.

Keywords: Machine Learning (ML), Linear Binary Pattern Histogram (LBPH).

I. INTRODUCTION

Attendance being an awfully necessary side of administration may normally become an onerous, unnecessary activity, pushing itself to incorrectness. the quality approach of making roll calls proves itself to be a statute of limitations because it's extremely difficult to call names and maintain its record especially when the ratio of students is high. Every organization takes attendance in its way. Some organizations use a document-oriented Approach et al. have implemented these digital methods like biometric fingerprinting techniques and card swapping techniques. however, these methods persuade be a statute of limitations because it subjects students to attend during a time-consuming queue. if the scholar fails to bring his id card then he won't be able to get attendance. evolving technologies have made many improvements within the changing world.

The system of intelligent attendance is typically implemented with biometrics help. Recognition of the face is one altogether the Biometric ways of improving this method. The framework proposed is meant to unravel the drawbacks of current systems. there are many advancements in face recognition but the vital steps are face detection, feature extraction, and face recognition.

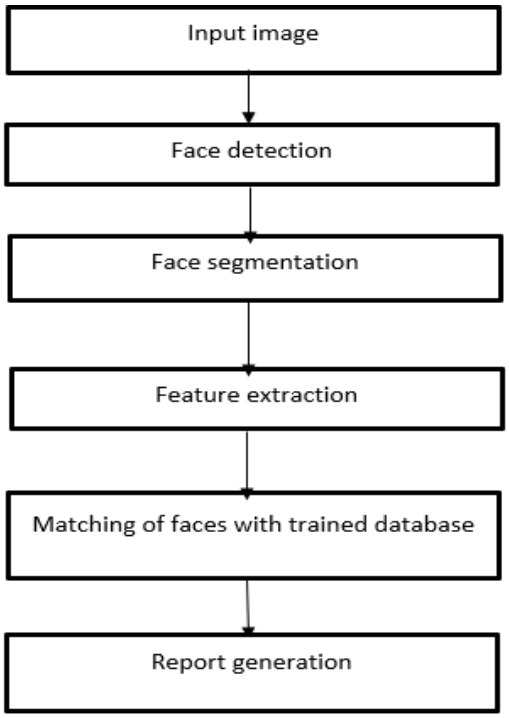

Figure 1: operating process of attendance system

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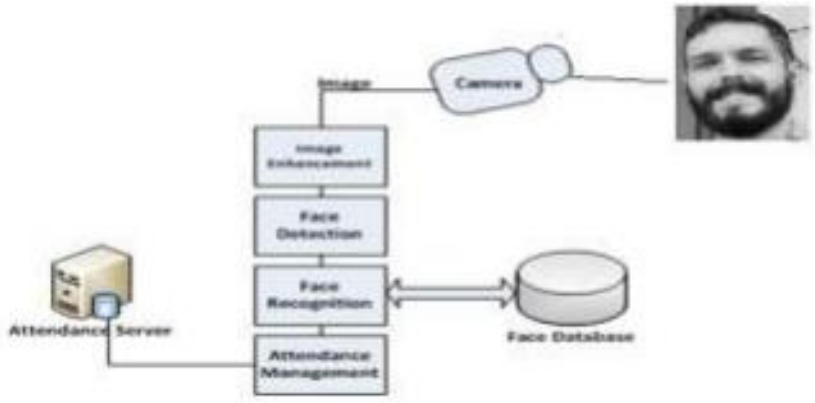
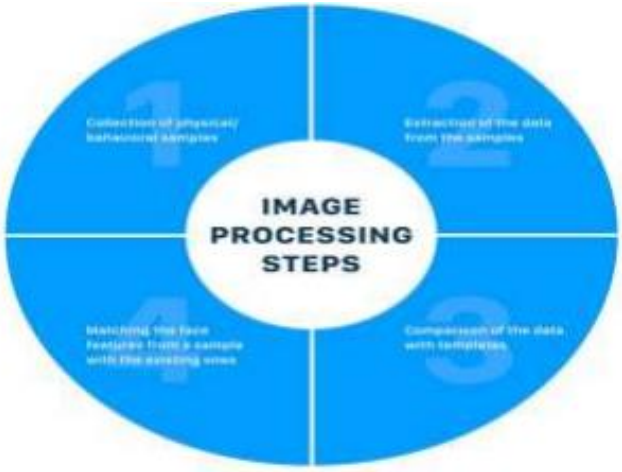
II. PROPOSED SYSTEM

The proposed this paper to mark the attendance [10] using automatic face recognition technology. As shown in figure the system records video feeds from the camera and detects the faces in image format. The detected faces are compared with the code database and marked attendance within the Excel File. [11] Using these Excel sheets we will generate a graph that shows the attendance of the entire class/Individual student. The project has two main phases

1. Development of automatic face recognition technology
2. Development of Attendance System



The Facial Recognition Technique can be achieved by using the following four image processing steps:



2.1 Collection of Physical/Behavioural Samples

It involves the gathering of a sample using the equipment. These collected samples are also an image/footage during the registration/enrolment of the scholar.

2.2 Extraction of information from Samples

Unique data is extracted from the sample and a template is made. There are different types of face recognition algorithms like Eigenfaces, Local Binary Pattern Histograms (LBPH), Fisher faces, Scale Invariant Feature Transform (SIFT), Speed Up Robust Features (SUFR). during this project, we are using LBPH Algorithm because it's one of the simpler face recognition algorithms and everybody can realize it with no difficulties.

2.2.1 Local Binary Pattern Histogram (LBPH)

It was first described in 1994 (LBP) and has since been found to be a strong feature for texture classification. Using the LBP combined with histograms we'll represent the face images with a straightforward data vector. As LBP is a visual descriptor it can even be used for face recognition tasks, as is commonly seen within the subsequent step-by-step explanation. [12]

1. **Parameters: the LBPH uses 4 parameters:**

Radius: is the circular binary pattern that represents the radius around the central pixel. that will be 0 or 1.

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Neighbours: it is the full number of sample points that are employed to form the circular binary pattern. If the quantity of sample points increases, the computational cost also increases so it's usually set to eight.

Grid X: It is the entire number of cells in an exceedingly very horizontal direction. If the number of cells increases the grid **is** better, and also the dimensionality of the resulting vector also will increases it is also usually set to eight.

Grid Y: It is the overall number of cells in an exceedingly vertical direction. If the number of cells increases the grid **is** better, and also the dimensionality of the resulting vector will increases it is also usually set to eight.

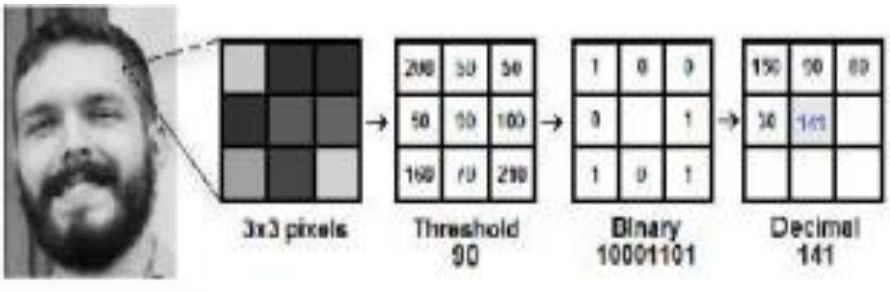
2. Training the Algorithm:

To train the algorithm we'd like to get all the facial images of all the scholars we would like to recognize. therewith we also need a singular identification number or a reputation for every image, so we will use these identification numbers to acknowledge a replacement image. All images of the same student should have the same identification number.[13]

3. Applying the algorithm:

There are several computational steps of the LBPH algorithm to make an intermediate image. The intermediate image will describe the initial image in a very better format by highlighting several characteristics. To get the characters of the face the algorithm uses an idea called a sliding window, which supported the parameters, radius, and neighbours.

The below fig shows this procedure



To understand the above picture, let's break the procedure into various steps:

a. Consider we will get an image in grayscale.
b. The images are divided into 3x3 pixels to get a part of it.
c. It should even be represented as a 3x3 matrix each pixel containing the intensity that lies between 0-255.
d. The central value is visiting be considered as a threshold value.
e. Considering this approach value we can set a new binary value for each neighbour. If the neighbour's value is equal or quite the approach value it will set the binary value to 1 else it'll be set to 0.
f. Now the new matrix is going to be a binary matrix except for the brink value. Now we are going to concentrate on each binary value by its position in the matrix line by line. as an example considering the above image, the binary number will be 10001101. Some authors may use a clockwise or anti-clockwise approach but in the end, the result is the same.
g. Now we'll convert this binary number into a decimal number (i.e. the decimal value for 141 is 10001101). Then we set this decimal value to the central value that's a pixel of the image.
h. At the top of this procedure we are going to have a brand new image that may define better characteristics of it.

4. Extracting the histograms:

Now using this new image, we are using the parameters Grid X and Grid Y to divide the image into [14] several grids because it is shown in figure Fig.

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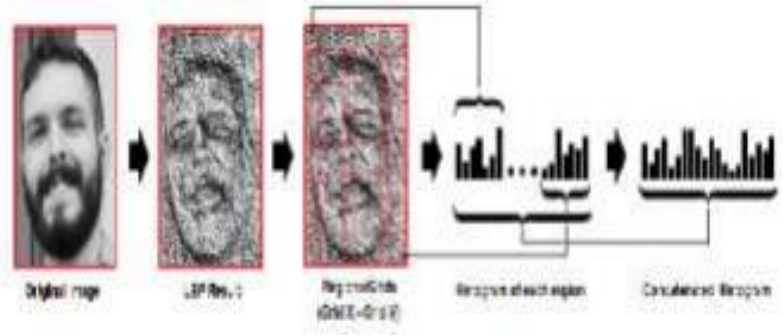

Now the histogram of each image can be extracted by following steps:

a. Now each histogram of every grid will contain only 256 positions (i.e. 0-255) that may represent the occurrences of every pixel's intensity.

b. Now we'll create a brand new histogram that can be the bigger histogram. Consider we've 8x8 grids then we will have 8x8x256i.e.16,384 positions. This is the final histogram that may represent the characteristics of an artless image.

4.1 Comparison of knowledge from Templates

Now we've created the histogram for every image. Now, these histograms are used to represent each image of the training dataset. Now we'll provide a new input image and we will follow the steps again to form a histogram for this input image.

- Now we are going to compare this histogram of the latest image with all the histograms of the dataset images.
- We've many various approaches to check the histograms [15] (i.e. to match the difference between two histograms), for example, definite quantity, Chi-square value, etc.

4.2 Match the Face Features from samples with the prevailing ones

Now it implicates making a judicial decision that whether or not the template corresponds with the entry which is already within the database.

II. LITERATURE SURVEY

There are some ways to pander to differences between the images and so the variations within the environment [1] of the images and these approaches were implemented to detect the object. These systems may additionally be utilized within the systems that detect the characteristics of the face.[2] The foremost reason for using the grey-scale representation instead of using the colored image is that it simplifies the algorithm, and reduces the complexity, implementation time, and computational time. the colored image may provide excessive and more information which is not sensible and it will also increase the computational time and results in the low performance of the organization.[3] These proposed systems assumed the shape of the objects or illumination conditions. These assumptions were made for the generic object recognitions so there for these aren't sufficient for face recognition systems. The second approach could be a foothold map of an image, a useful object representation feature no matter the environmental changes. [4] This approach is additionally used for identity verification and also has similar accuracy because of the grey-scale approach. The edge map approach includes a plus of the feature-based approach, like invariance to illumination (i.e. darkness or brightness), [5]and low storage structure. It combines the facial information (i.e. dimensions of the face) with structural information by grouping the face Edge map into line segments.[6] After reducing the sting map, a polygonal line fitting process is applied to urge the sting map face. there's another approach to handling the variations of environmental conditions in a very picture is by creating several models of several images. These images are visiting be captured of the same person but within various environmental conditions. These conditions are additionally brightness, color, distance, etc. [7] These images captured could even be used as several independent models or are additionally used as a combined model to recognize the faces. [8] The same reasonable approach is utilized during this technique where 30-40 images are visiting be captured of the same student and these images are captured altogether under the environmental conditions.[9]

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III. RESULTS

Fig: Capturing the Images.

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Fig: Detecting Faces

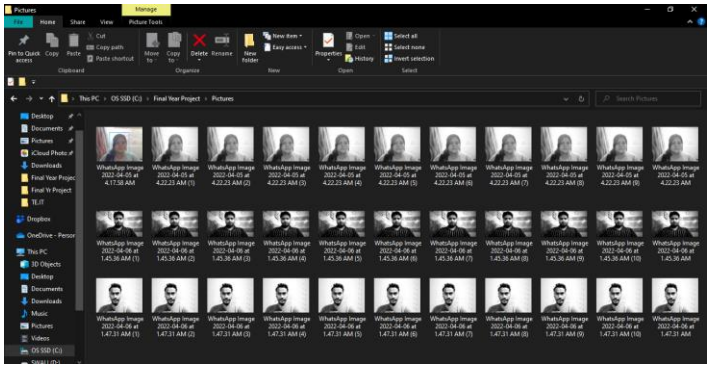

Fig: Captured Images Database.

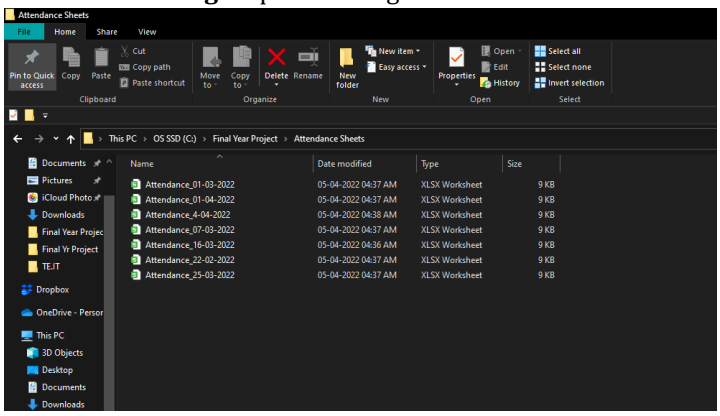

Fig: Excel Sheet of Attendance

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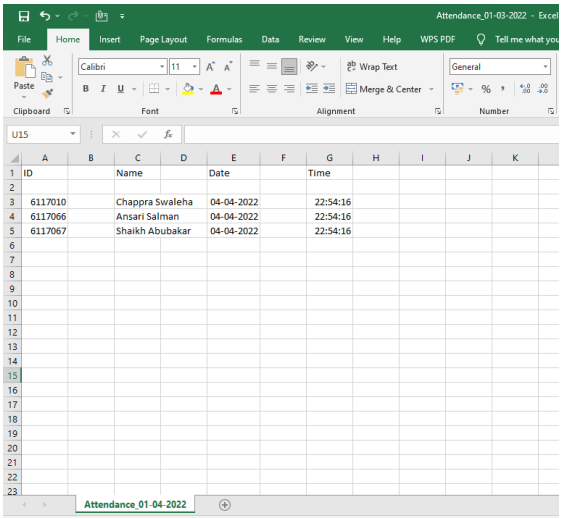

Fig: Attendance List

IV. CONCLUSION

The purpose of implementing this technique is to cut back the manpower and extend the category duration. This system shows the higher usage of the algorithm and exhibits the robustness towards recognition of the users with accuracy. The result shows the capacity of the system to address the change in posing and projection of faces and therefore the distance. From face recognition with machine learning, it's been determined that in face detection, the matter of change in environment is solved because the original image is turned into a HOG representation that captures the foremost features of the image no matter image brightness. In the face recognition method, local facial marks are considered for further processing. After which faces are cracked which generates 128 measurements of the captured face and also the optimal face recognition is finished by finding the person's name from the encoding. The result is then generated into an excel sheet. The face recognition attendance system will enforce the classes to be digitalized and might be implemented In the IoT application also.

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