# AUTO-UPDATION OF ATTENDANCE via FACE RECOGNITION

**[1]Aishwarya Rajput, [2]Y.Supriya, [3]Dr. J Sasi Bhanu**

[1,2]Students of B.Tech, [3]Professor
Department of CSE, St. Martin's college, Hyderabad, 500100

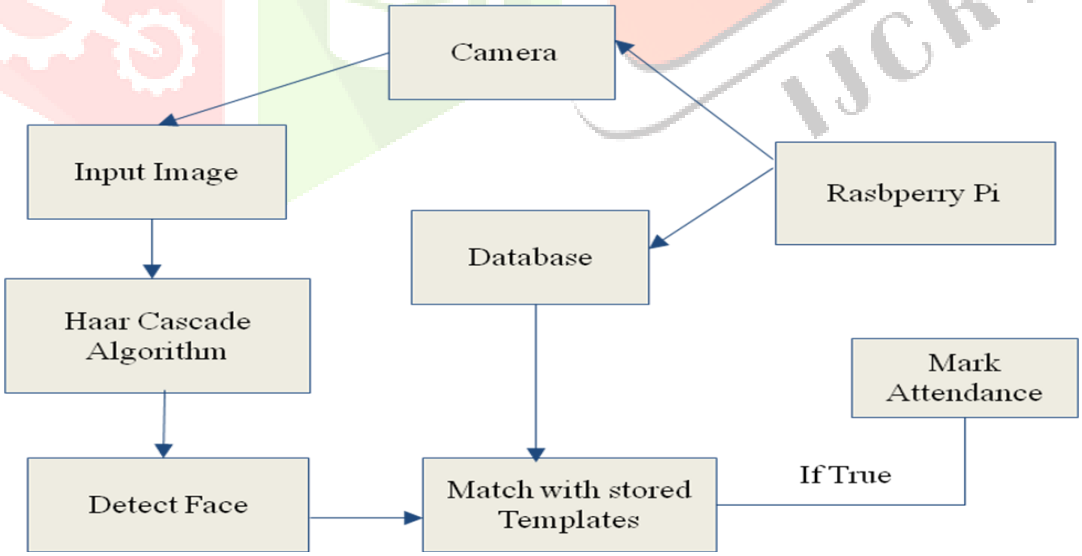
***Abstract*: No matter what way you look at it technology has been headed towards automation for a long time now. In fact the very basic principle of technology is to make our lives easier by leaving fewer things to be explicitly done by us. Whatever might be the effect we know that automation is the future of our technology.**
**IoT has become so vital in our daily life and it is going to create big impact in the near future for example it has ranged from simple home automation to complex projects.**
**In this project we are designing an attendance system for college using face recognition technology. Here Internet of Things is joined with computer vision in order to detect the faces of people. In this method the camera is fixed in the classroom and it will capture the image, the faces are detected and then it is recognized with the database and finally the attendance is marked.**

**Indexed Terms : Face recognition, Image processing, IoT, Attendance**

## I Introduction

Attendance is one of the most important as well as tedious job for any institution. There are various methods for the purpose of attendance. The conventional methods consume a lot of time. One of the conventional and most used method is taking the attendance manually with the help of attendance sheet. This consumes a lot of time and effort. This method can also lead to errors since the attendance is marked manually. Another problem with this system is the misplacement of the attendance sheet. To overcome this we switched to the biometric methods. One of them is the finger print identification. In this initially finger prints of each individual are collected and stored in the database. It is a one time process and is done for every new entry. Now the finger print of the individual are scanned and compared with the finger prints stored in database. If the match is found then the attendance is marked as present. But this is indeed a time consuming process since the students need to wait in queue for their turn Also if the finger is not placed properly, or is not recognized properly then the attendance will be marked as absent. So to make the system more efficient automated attendance system is designed which consumes less time n is more efficient.

## II Architecture




## III Modules

3.1.Hardware modules:

3.1.1. Webcam : input- image

Streams its image in real time to or through a computer to a computer network.

When "captured" by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as the internet, and emailed as an attachment.

3.1.2. Raspberry Pi 3 :

Credit size computer that consisting of a more efficient and fast processor
Processing speed: 1.2GHz
RAM: 1Gb
3.1.3. Adapter : It is a device that converts attributes of one electrical device or system to those of an otherwise incompatible device or system.
Input : 240 V AC
Output: 12V DC

**IV Methodologies**

Various methodologies are used for Face detection and Face recognition.

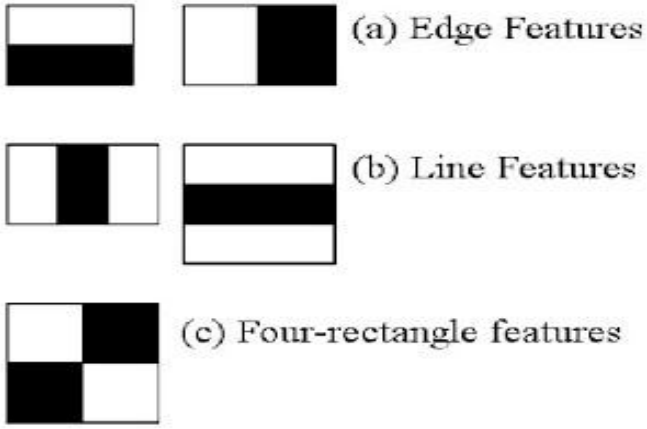
4.1. Haar Cascade Algorithm:

One of the commonly used algorithm for face detection is the Haar-Cascade algorithm.

Step 1: Obtain positive images (image with face) and negative images(images without faces) to train classifer

Step 2: Extract the features, for this Haar features are used

Haar features : Each feature is single value obtained by subtracting sum of pixels under white rectangle from sum of pixels under black




The face acknowledgment frameworks can work essentially in two modes:

- Verification or verification of a facial picture: it essentially contrasts the information facial picture and the facial picture identified with the client which is requiring the confirmation. It is essentially a 1x1 examination.
- Identification or facial acknowledgment: it essentially contrasts the information facial picture and every facial picture from a dataset with the mean to discover the client that matches that face. It is essentially a 1xN correlation

There are different types of face recognition algorithms, for example:

- Eigenfaces
- Local Binary Patterns Histograms (LBPH)
- Fisherfaces

**4.2.Local Binary Pattern Histogram(LBPH):**

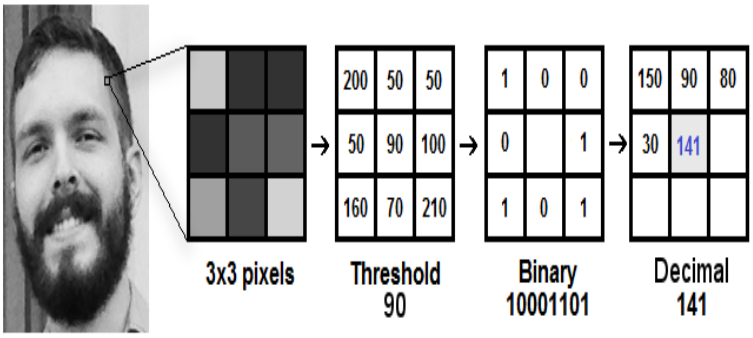
One of the most efficient face recognition technique.Using the LBP combined with histograms we can represent the face images with a simple data vector.

The various steps involved are:-

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

- Radius: the radius is used to build the circular local binary pattern and represents the radius around the central pixel. It is usually set to 1.
- Neighbors: the number of sample points to build the circular local binary pattern. Keep in mind: the more sample points you include, the higher the computational cost. It is usually set to 8.
- Grid X: the number of cells in the horizontal direction. The more cells, the finer the grid, the higher the dimensionality of the resulting feature vector. It is usually set to 8.
- Grid Y: the number of cells in the vertical direction. The more cells, the finer the grid, the higher the dimensionality of the resulting feature vector. It is usually set to 8.

**4.2.2.Training the Algorithm**: In the first place, we have to prepare the calculation. To do as such, we have to utilize a dataset with the facial pictures of the general population we need to perceive. We have to likewise set an ID (it might be a number or the name of the individual) for each picture, so the calculation will utilize this data to perceive an info picture and give you a yield. Pictures of a similar individual must have a similar ID. With the preparation set as of now built, how about we see the LBPH computational advances.




**4.2.3Applying the LBP activity:** The principal computational advance of the LBPH is to make a transitional picture that depicts the first picture betterly, by featuring the facial attributes. To do as such, the calculation utilizes an idea of a sliding window, in view of the parameters sweep and neighbors.

**4.2.4 Removing the Histograms:** Now, utilizing the picture created in the last advance, we can utilize the Grid X and Grid Y parameters to isolate the picture into various networks

**4.25. Performing the face recognition**: In this progression, the calculation is now prepared. Every histogram made is utilized to speak to each picture from the preparation dataset. Along these lines, given an info picture, we play out the means again for this new picture and makes a histogram which speaks to the picture.

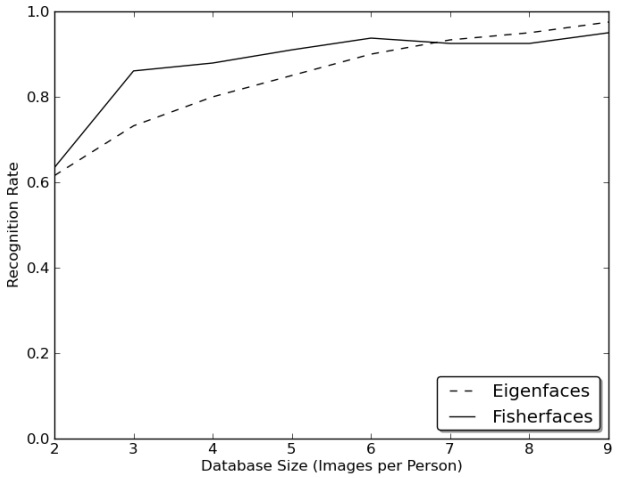
So to discover the picture that matches the info picture we simply need to think about two histograms and restore the picture with the nearest histogram.

•We can utilize different ways to deal with analyze the histograms (compute the separation between two histograms), for instance: euclidean separation, chi-square, total esteem, and so forth. We can utilize the Euclidean separation (which is very known) in light of the accompanying equation:

$$D = \sqrt{\sum_{i=1}^{n}(hist1_i - hist2_i)^2}$$

•So the calculation yield is the ID from the picture with the nearest histogram. The calculation ought to likewise restore the computed separate, which can be utilized as a 'certainty' estimation. Note bring down confidences are better since it implies the separation between the two histograms is nearer.

•We would then be able to utilize a limit and the 'confidence' to consequently assess if the calculation has accurately perceived the picture. We can expect that the calculation has effectively perceived if the certainty is lower than the limit characterized.




**V Algorithm:**

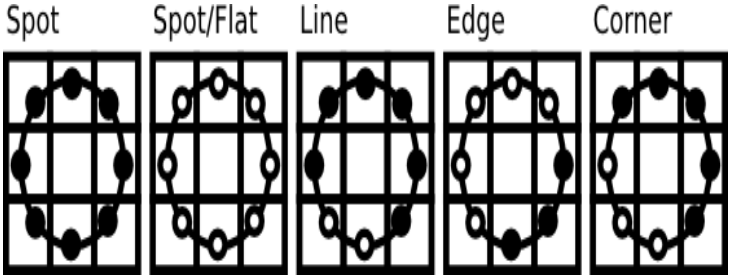
A more formal description of the LBP operator can be given as:

$$LBP(x_c, y_c) = \sum_{p=0}^{P-1} 2^p s(i_p - i_c)$$

with $(x_c, y_c)$ as central pixel with intensity $i_c$; and $i_n$ being the intensity of the the neighbor pixel. $s$ is the sign function defined as:

$$s(x) = \begin{cases} 1 & \text{if } x \geq 0 \\ 0 & \text{else} \end{cases} \qquad (1)$$

This depiction empowers you to catch fine grained subtle elements in pictures. Actually the creators could contend with best in class comes about for surface order. Not long after the administrator was distributed it was noticed, that a settled neighborhood neglects to encode points of interest contrasting in scale. So the administrator was reached out to utilize a variable neighborhood in [AHP04]. The thought is to adjust an arbitrary number of neighbors on a hover with a variable span, which empowers to catch the accompanying neighborhoods




For a given Point $(x_c, y_c)$ the position of the neighbor $(x_p, y_p), p \in P$ can be calculated by:

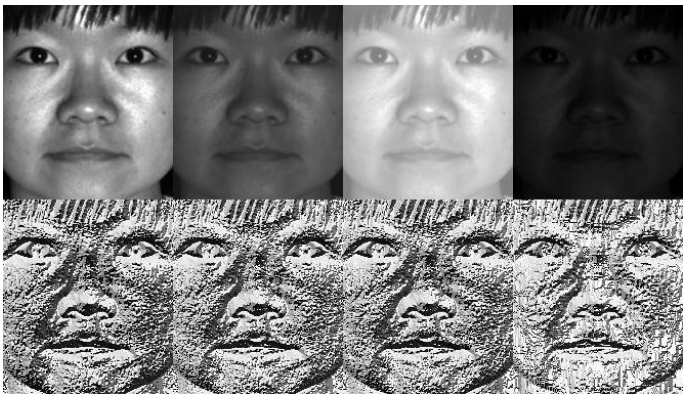
$$x_p = x_c + R\cos(\frac{2\pi p}{P})$$

$$y_p = y_c - R\sin(\frac{2\pi p}{P})$$

Where $R$ is the radius of the circle and $P$ is the number of sample points.
The operator is an extension to the original LBP codes, so it's sometimes called *Extended LBP* (also referred to as *Circular LBP*) . If a points coordinate on the circle doesn't correspond to image coordinates, the point get's interpolated. Computer science has a bunch of clever interpolation schemes, the OpenCV implementation does a bilinear interpolation:

$$f(x,y) \approx \begin{bmatrix} 1-x & x \end{bmatrix} \begin{bmatrix} f(0,0) & f(0,1) \\ f(1,0) & f(1,1) \end{bmatrix} \begin{bmatrix} 1-y \\ y \end{bmatrix}.$$

By definition the LBP operator is robust against monotonic gray scale transformations. We can easily verify this by looking at the LBP image of an artificially modified image



So what's left to do is how to incorporate the spatial information in the face recognition model. The representation proposed by Ahonen et. al [AHP04] is to divide the LBP image into $m$ local regions and extract a histogram from each. The spatially

enhanced feature vector is then obtained by concatenating the local histograms **(**not merging them). These histograms are called *Local Binary Patterns Histograms*.

**VI Result and Conclusion:**

In order to overcome the drawbacks of existing systems we've proposed this system. This is more efficient and time saving process in comparison to the existing methods. In this system the face is captured and is compared with the training set present in the databas. If there is a match then the attendance is updated as present if not the attendance is marked as absent. Every period the scanning is done and the attendance is updated.

**VII Conclusion**

In this system we have implemented an attendance system for lecture, section or a laboratory by which lecturer or the teaching assistant can record students attendance. It saves time and effort, especially if it is a lecture with huge number of students. Here we are able to accomplish the task of marking the attendance in the classroom automatically and output obtained in the excel sheet as desired in real time. These systems perform satisfactorily with different facial expressions, lighting and pose of the person. There is room for improvement since these systems sometimes fail to recognize every face student present in the class room. The speed at which the face recognition is done is a problem. The privacy of the students whose images are stored in the databases must be considered so that it is accessible only to authorized people.

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