

# Attendance Using Face Recognition System

Pratham Lalwani

AU2040260

Daksh Suthar

AU2040167

**Abstract-** The attendance system is used to know whether the student is attending the lecture or not. There are various methods of taking attendance like paper-based, using biometrics, card based, face recognition based attendance etc. Among all of them, face recognition based attendance system is more secure and time-saving. Face Recognition is used to recognize the students' face by using face biometrics and take attendance. There are various algorithms of face recognition like LBPH, eigenfaces, fisherfaces, SURF etc. Among them, Local Binary Pattern Histogram (LBPH) algorithm is better. We are using Haar Cascade for face detection because of their robustness and LBPH algorithm for face recognition. It is robust against monotonic grayscale transformations [2].

**Keywords-** face detection, face recognition, attendance system, Haar cascade algorithm, LBPH algorithm

## I. INTRODUCTION

In recent years, technology has advanced rapidly and has provided various solutions to different problems. One of these problems is attendance management which is very important in many organizations, schools and universities. The traditional methods of taking attendance such as using paper and pen, are time-consuming and its complexity increases with increase of overall strength. To overcome these challenges, face recognition technology has been an efficient solution. To implement this technology, we are using algorithms, such as Haar Cascade and Local Binary Pattern Histograms (LBPH) to accurately identify and recognize faces. The attendance system using face recognition using Haar Cascade and LBPH algorithms provides a more efficient and reliable method for attendance management. This system is automated which eliminates the need for paper based attendance and reduces the rate of errors. Moreover, it can be used in taking attendance in real-time which is essential in organizations. Therefore, this attendance system using face recognition using Haar Cascade and LBPH algorithms is an innovative solution that can change attendance management in various industries.

## II. LITERATURE SURVEY

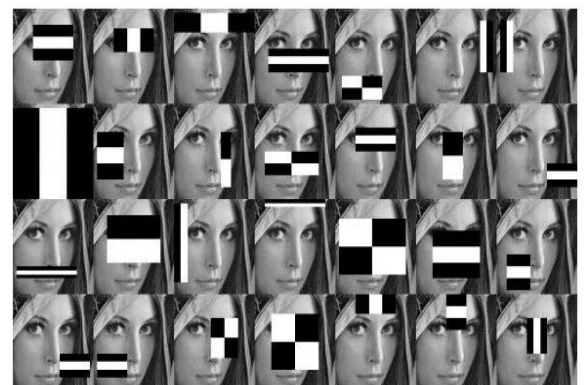
Face recognition technology attendance systems have become increasingly popular in recent years due to their accuracy and convenience. These systems work by analysing the unique facial features of individuals and matching them with a database of known faces. One of the commonly used algorithms in this field is the Local Binary Pattern Histogram (LBPH), which extracts the local features of an image and constructs a histogram to represent them. Another popular algorithm is the Haar Cascade, which uses a cascade of classifiers to detect faces based on their features, such as edges and lines.

These attendance systems eliminate the need for physical contact or the need to carry any identification card, making them more hygienic and less prone to fraud. They also provide real-time updates and easy tracking of attendance records. However, these systems also have some limitations, such as proper lighting and camera angles and the potential for false positives or negatives. Overall, face recognition attendance systems have shown great potential in improving attendance management in various sectors such as education, healthcare, and corporate environments.

## III. IMPLEMENTATION

So, basically there are two algorithms used in this project of attendance system using face recognition: Haar cascade algorithm and LBPH algorithm.

### 1. Haar Cascade Algorithm



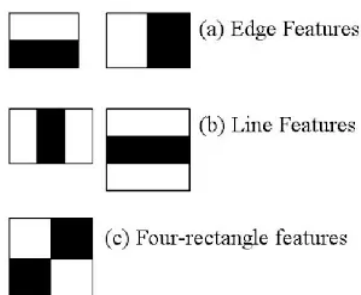
Source: [Haar Cascades, Explained. A brief introduction into Haar... | by Aditya Mittal | Analytics Vidhya | Medium](#)

Haar cascade Algorithm is used to detect the face of the person. Haar cascade uses the cascade function and cascading window. It tries to calculate features for every window and classify positive and negative. If the window could be a part of an object, then positive, else, negative [3]. The algorithm is divided into four stages:

- Calculating Haar Features
- Creating Integral Images
- Using Adaboost
- Implementing Cascading Classifiers

### i. Calculating Haar Features

The first step of Haar cascade algorithm is to collect Haar features. It requires calculations that are performed on adjacent rectangular regions at specific location in detection window [4]. Some examples of Haar features are given below:



Source: [Haar Cascades, Explained. A brief introduction into Haar... | by Aditya Mittal | Analytics Vidhya | Medium](#)

### ii. Creating Integral Images

Integral images essentially speed up the calculation of these Haar features. Instead of computing at every pixel, it instead creates sub-rectangles and creates array references for each of those sub-rectangles. These are then used to compute the Haar features[4].

### iii. Adaboost Training

Adaboost essentially chooses the best features and trains the classifiers to use them. It uses a combination of “weak classifiers” to create a “strong classifier” that the algorithm can use to detect objects.[4]

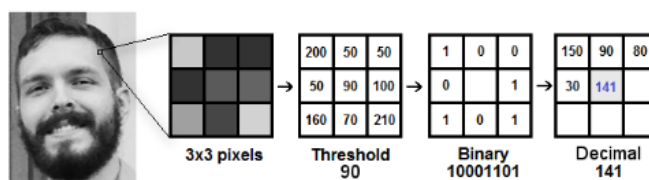
### iv. Implementing cascading classifiers

The cascade classifier is made up of a series of stages, where each stage is a collection of weak learners. Weak learners are trained using boosting, which allows for a highly

accurate classifier from the mean prediction of all weak learners [4].

## 2. Local Binary Patterns Histograms(LBPH)

This is a face recognition algorithm which is used to recognize the face of the person from both front face and side face. This algorithm is based on LBP approach. The main idea behind LBP is to describe the neighborhood of image elements using binary codes. This method is usually used to study their local properties and identify the characteristics of individual parts of the image [5].

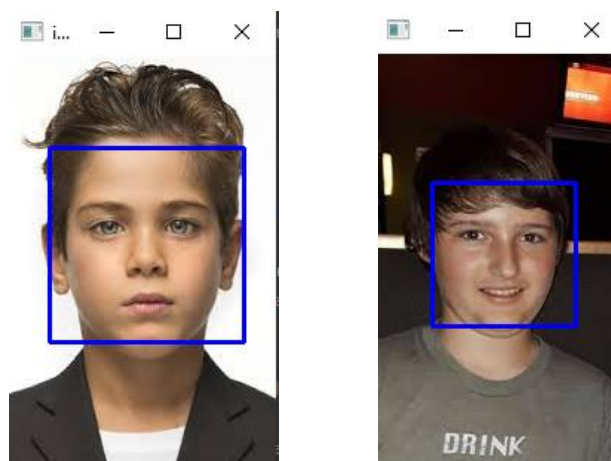


Source: [Understanding Face Recognition using LBPH algorithm - Analytics Vidhya](#)

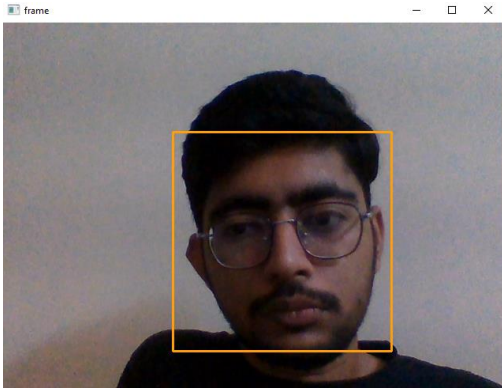
This algorithm is robust when it comes to lightning. The value of pixels will increase when a flashlight is put on the image. Higher the values the brighter the image and when values are lower darker the image will be[6]. For this reason, this algorithm has good results in light and dark images because when the image becomes lighter or darker, all the pixels in the neighbourhood here will be changed[6].

## IV. RESULTS

So we have started to learn Haar cascade algorithm for face detection by using random image and also by taking image from webcam. We are able to detect the face properly. Below are the results for implementation of Haar cascade algorithm:



Using random image from google



Using webcam

## V. CONCLUSION

In conclusion, a student attendance management system has been implemented using facial recognition techniques, with Haar cascade and LBPH being a prominent technique. To improve the system's accuracy, there is a need to build a better dataset and synthesize new training examples to enhance the recognition rate of unknown persons. The system reduces the time and effort required for attendance management, making it especially useful for large classes. It has been implemented using Python programming language, and the attendance records collected can be used for exam-related purposes, such as identifying exam attendees. The system could enhance attendance management efficiency and accuracy in educational institutions.

## VI. REFERENCES

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