

# Real Time Smart Automated Attendance System through Face detection Method and LBPH Algorithm

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**Abstract** - Every working area whether it's professional, industrial, or educational requires an attendance report. Conventionally, this report is maintained manually through physical means i.e., pen-paper. So if the amount of concerned attendants increases, then, withholding to such attendance procedure will be a tedious job and might result in over-consumption of time. These methods often constitute of human errors resulting in non-verified attendance marking. In recent years, after the advancement of automated environments, many perceptions with different technologies were proposed for instance, biometrics via fingerprint detection, iris detection or by using barcode as an ID. So the idea in fabricating the below project is to generate a time efficient, cost efficient as well as error free mechanism by using real time face detection and updating the attendance automatically inside the MySQL database. The software constitutes the dataset of students with their images which can be readily edited as well as updated. These images can be uploaded by the administrator and the mentioned algorithm detects the faces and compares it to the student image dataset in the recognition phase. The corresponding attendance is thus fetched to the database. This system rectifies the complications in physical record maintenance and results in effortless yielding of attendance.

**Keywords:** face recognition, face detection, OpenCV face recognition, LBPH algorithm.

## 1. INTRODUCTION

In this growing era where the domain of data is expanding enormously and the need for handling that data precisely is in demand, the conventional systems lack the integrity and legitimacy. Also, deploying these methods on a large scale proves to be cost inefficient. So the inspiration for the proposed work was to construct an effective attendance system constituting of the least possible errors and a significantly increased precision. So far, many researchers have implemented their ideas in various technologies such as:

- 1) Biometric scan based (fingerprint scanner, iris scanner etc.)
- 2) Smart-Card based (bar-code scanning)
- 3) Web based (manual- entry)

The basis of an automated attendance management system is to generate a system in which the students or the employees update their respective attendance just by showing their face and by no further intervention.

The given work solves the above problem without any human effort and is implemented by using face detection and updating the attendance using MySQL as database. The given system has the capability of updating, creating, editing and removal of attendance. The proposed system recognizes the faces of the employees or students by comparison with the provided dataset, and directly update their attendance inside the database through MySQL.

The algorithm used in the previous mentioned work were: - Eigen faces, Line Edge Map, Histogram of oriented gradients (HOG) etc. The algorithm used in the mentioned work is LBPH and facial detection is achieved through Python's OpenCV library.

## 2. LITERATURE SURVEY

### 2.1 Summary of Approaches

- 1) Biometric scan

Firstly students scan their respective biometrics (fingerprint or iris) which later gets matched with the dataset. For every single attendance the need for repeated biometric scanning arises.

## 2) ID card swipe system

College id cards contain RFID by which persons scan their attendance in front of the barcode scanner. Students need to scan their id card in every class and database gets updated every ten minutes. The final attendance is fetched and is then updated physically or digitally.

### 3. EXISTING ALGORITHMS

#### 1) Template based Methods

Template matching is primitively related to holistic approach that attempts to identify faces using global representations (J. Huang, 1998). These methods approach the face image as a whole and extract features from the facial region and then classify the image by imposing a pattern classifier. One such method used to extract features in a holistic system, is based on statistical approaches

2) Statistical Approaches. There are various techniques that identify, parameterize, and analyze linear subspaces. Apart from linear subspaces, there are a few statistical facial recognition techniques based on non-linear subspaces (like kernel-PCA and kernel-LDA), transformation (like DCT, DCT & HMM and Fourier Transform) and Support Vector Machine (SVM). Appearance-based approaches for face recognition like PCA, LDA, and probabilistic subspace project a 2D face image as a vector in image space.

#### 3) Neural Network based Approach

Artificial Neural Network (ANN) (B. Yegnanarayana, 1999) is an impactful tool for pattern recognition problems. In Kohonen's associative map (T. Kohonen, 1998), the earliest demonstrations of neural network for face image applications is reported. Using a small set of face images, accurate recall was reported even when input image is very noisy, low resolution and dimension even when portions of the images were missing.

#### 4) Single Layer adaptive NN

A single layer adaptive NN (one for single person) for face recognition was reported in (T. J. Stonham, 1984). A system named Wilke, Aleksander and Stonham's recognition device (WISARD) was devised. It needs roughly around 200-400 projections for training each classifier where the training patterns inhibited translation in facial expressions. One classifier was constructed corresponding to one subject in the database.

### 4. METHODOLOGY USED

The algorithm used in the given work is LBPH (local binary patterns histogram) it was first described in 1994 as LBP, which later with histograms of oriented gradients and was came to known as LBPH in 1996.

LBPH generally uses 4 parameters as:

- a) Radius
- b) neighbors
- c) gridX
- d) gridY

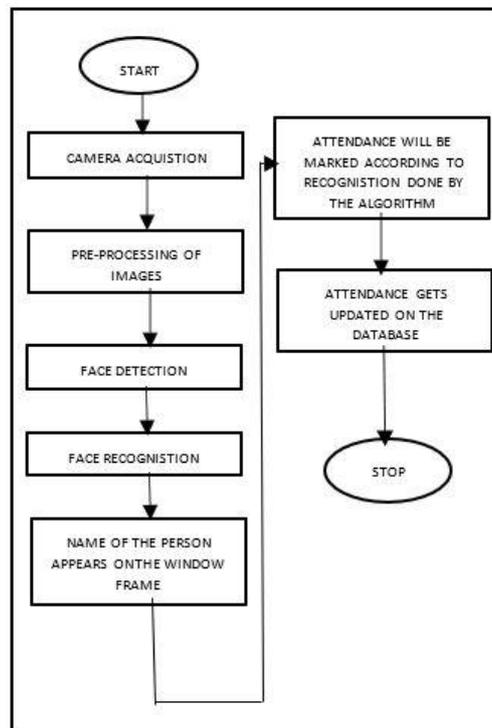
OpenCV is the open-source library used for image processing, training of pictorial dataset. It contains many algorithms.

Haar Cascade Classifiers is an effective object detection approach. It was proposed by Paul Viola and Michael Jones in 2001. Using Haar Cascade Classifiers through machine learning approach. In which a cascade function is trained from a dataset containing both positive and negative images. After training is done the object is detected and name gets appeared on it according to the label or the text attached on it by the user. The reason for using LPBH algorithm is that it is one of the easiest algorithm. It gives good results.

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### 5. SYSTEM DESIGN

- a) Firstly, the person faces the camera so that the camera detects his/her face and identifies it
- b) Secondly, the LBPH algorithm identifies the person by comparing with the dataset present in the dataset.
- c) The dataset contains the photographs of all the students/employees and at the time of face recognition the live feed corresponds to the dataset.
- d) After face recognition, attendance gets updated automatically in the database.
- e) Any student/employee can access their respective attendance at any time.



**Fig -1: Flowchart of Algorithm**



**Fig -2: Functioning of GUI**

## 6. EXPERIMENTAL RESULTS

- a) The proposed work ensures facial features comparison even in low illumination since rather than a coloured image, the classifier is fed grayscale images.
- b) If the quality of training images is increased, the classifier will identify all the faces.
- c) The dataset is stored in file system and would be even more secure than any other dataset storing techniques if LINUX's file system is used.
- d) Attendance storing and retrieving could be easily done if it is stored in database and not in excel files since they cannot be embedded in the GUI (if introduced later).
- e) The no. of simultaneous faces detected can be increased by decreasing the confidence which is an LBPH virtue and denoted as difference from actual value

## 7. CONCLUSIONS

The Real Time Automated Attendance system helps in proliferating the precision and pace eventually effectuating the high-precision real-time attendance to cope up with the lessened time constraint available for the automated classroom attendance. The proposed work helps capture the live stream of the students, segregate it into numerous frames, correspond it with the dataset in the file system to verify their presence or absence and inscribe attendance to the appropriate student to maintain the record. The feasibility of the given work is ensured by avoiding the use of complex structures for images in database and rather using the file system for easier manipulation and retrieval.

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