

# A systematic review of Image Based Attendance Analysis

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**Abstract:** A systematic review of Image Based Attendance Analysis, is an automated face recognition (AFR) technologies that have been faced improvements in performance over the past years, and such technology are now widely used in different area in terms for security and commercial purpose. A face recognition in a real time either for colleges, companies and institution, public or private sector to mark the attendance of their members or relates. Face Recognition is of the real world solution which comes with day to day activities of handling employee's attendance in any company. The tasks of handling attendance using image based attendance analysis is getting some challenges and some difficulties are tried to be resolved as much as the technology is growing up. This technology come up to replaces the old hectic and time consuming methods of marking attendance where people used the manually system of making attendance using the papers and files where the security and manipulation was hard for management. Face Recognition begins with extracting the coordinates of features such as width of mouth; width of eyes, pupil, and compare the result with the measurements stored in the database and return the closest record which is known as facial metrics. The review of different algorithms have been proposed and implemented and some solutions and output have been addressed.

**Keywords:** Biometrics, Face Recognition, Face Detection.

## I. INTRODUCTION

Many biometrics systems are available but the key authentications are same in all techniques. Biometric templates can be of many types like Fingerprints, Eye Iris, Face, Hand Geometry, Signature, Gait and voice. The automatic attendance does not require the intervention of the concerns. Face recognition consists of two key majors' point, detection and recognition of image. Face recognition is an active area of research which is a computer based digital technology. Use of face recognition for the purpose of attendance marking is a smart way of attendance management system. Face recognition technology have improved dramatically in their performance over the past few years, and this technology is now widely used for various purposes such as for security and for commercial applications or area.

In our survey paper we will introduce various algorithm and methods that have been used and proposed in different research papers, compare then based on some different parameters. Therefore, each and every algorithm that have been proposed include three many stages. In facts the first one is about capturing an image and videos by the use of camera. The second one is about image detection of the image of the person who is passing in the range where the camera can be able to reach by extracting that image and the third one is image recognition where the comparison is made between the existing image and the image that have been detected.

A systematic review of images based attendance monitoring system is all about how systematically analysis

of different algorithms that have been used to handle the attendance management in a companies and institution to help human resource management or any department in charge. Let's define some important terminology on Systematic review on Image Based Attendance Analysis:

### A. Face detection

Face detection is a computer technology being used in a variety of applications that identifies human faces in digital images.

Face detection also refers to the psychological process by which humans locate and attend to faces in a visual scene

### B. Face Recognition

Facial recognition (or face recognition) is a type of biometric software application that can identify a specific individual in a digital image by analysing and comparing patterns.

Facial recognition systems are commonly used for security purposes but are increasingly being used in a variety of other applications.

### C. Attendance

Organizations of all sizes use time and attendance systems to record when employees start and stop work, and the department where the work is performed.

However, it's also common to track meals and breaks, the type of work performed, and the number of items produced. In addition to tracking when employees work,

organizations also need to keep tabs on when employees are not working.

**D. Detection and Recognition of face Architecture**

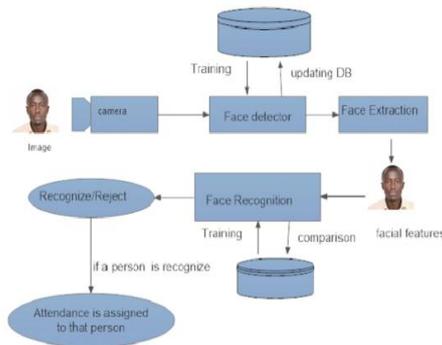


Figure 1. Architecture for Detection and Recognition

**II. LITERATURE REVIEW**

In the year 2015, C. A. Casado, M. B. López, J. Holappa and M Pietikäinen, these authors have made an application that detect and recognize the images using smart glasses technology. Where the Smart glasses are a type of Optical Head Mounted Displays (OHMD) that deploy a camera and a display in a very reduced form factor, allowing them to be wearable on top of a glass type object. Among the proposed uses for smart glasses are reading real-time notifications and visual instructions, instant connectivity access, instant photography or video capturing and augmented reality<sup>[1]</sup>.

Commonly in face detection and tracking, few facial features are first extracted, selected from the image and compared to a pre-existing images feature in the database. Our face detection solution of the authors above Haar features Algorithm has been used. Then a cascaded classifier structure speeds up the detection, here the minority of features are considered and the majority is rejected by the help of AdaBoost, that can be applied to find the most discriminative features for distinguishing the face patterns from the background. The image is processed in multiple scales until all the faces in the frame are detected. As a result, the rectangular coordinates of the detected faces are obtained. The detected images or faces are then divided into multiple windows, and after sometime some feature are visible and this increase the speed up instead of compare each and every part.

Recognition side, the detected images is compared with the current image used, then if the distance is so large then it goes and compare with the other images in the database by the help of feature vectors based on local binary patterns (LBP). Once the comparison is responding negatively then at that time the image is then added.

In the year 2015, Y. Lee, and C. Kim in the research named Confidence Measure Using Composite Features for Eye Detection in a Face Recognition System, confidence measure have been proposed as method to detection and recognition images by measuring the size of eyes<sup>[2]</sup>. In this research some algorithm have been used for detection and

recognition side where the composite features are extracted by using Composite Biased Discriminant Analysis(CBDA), during the extraction of eyes detection the positive samples of eyes are similar and negative sample are not. Therefore, CBDA, which finds a linear transformation that makes the scatter of the positive samples as small as possible while keeping negative samples as far away from the positive samples as possible, can be an appropriate method in eye detection problems.

The confidence for the detection results is measured with the distance between the detected eye and positive samples in the training set in the CBDA feature space. The confidence for the detection results is measured with the distance between the detected eye and positive samples in the training set in the CBDA feature space<sup>[3]</sup>.

An individual eye detector has its pros and cons depending on the conditions; thus, there is no one particular detector that always outperforms the others. When there are several eye detection results, we can determine the best one to be the final result by using the confidence measure. Then it might be possible that we can even get multiple positive samples of similar eyes samples, at this time we need to choose one with a good and best result by using confidence measure.

J. Li, B. Li, Y. Xu, K.Lu, K. Yajust for vision, L. Fe, they have proposed face detection and recognition under the complex background, this research involves two stages. First stage is about identifying the object by which the first-dynamic-then-static foreground objects detection strategy. This strategy exploits the updated learning-based codebook model for moving object detection and uses the Local Binary Patterns (LBP) + Histogram of Oriented Gradients (HOG) feature-based head-shoulder detection for static target detection. The second stage determines whether the face is disguised and the classes of disguises<sup>[4]</sup>.

In the year 1998, A. K. Singh, P. Joshi, G. C. Nandi, Robust liveness detection scheme based on challenge and response method have been proposed for image detection and recognition where by the liveness module have been added as extra layer of security before the recognition of the face module. The liveness module utilizes face macro features, most especially eye and mouth movements in order to generate create and random challenges and observing the user's response on account of this.

The reliability of liveness module is tested by placing different types of spoofing attacks with various means, like using photograph, videos, etc. In all, five types of attacks have been taken care of and prevented by our system. Here the idea is to divided the approach into two parts (a) liveness detection and (b) face recognition<sup>[5]</sup>. First we are testing for liveness of the user, and if person is live then the system will recognize the identity else not. On the behalf of this research on the detection phase and facial features the Haar have been used for face extraction. The challenges arise mostly when the person is live or not,

the possibility is that when a person is live then the movement of the facial can be possible otherwise no. The challenges are presented in terms of their eye and mouth movement (openness/closeness) in a sequence. These sequences are generated at random, so that no one can make a prior estimation about the challenges. The designed system is able to calculate the movement by measuring the teeth HSV value (Hue Saturation Value).

K. Yadhul, T. B. Mary, Lakshmi P. S., A.<sup>[6]</sup>, in face detection and recognition with video database, they have proposed a method, the main focus was to reduce the complexity in computation while in face detection and the improvement of accwe propose a simple and efficient cascade face

Detection scheme: the tester's head is automatically detected by the body moving information between adjacent frames. Then the possible face area is serially verified by our proposed three verification modules: face skin verification module, face symmetry verification module, and eye template verification module racy rate of face recognition.

Therefore, Viola jones algorithm have been used for image detection, although some challenges need to be face such as illumination, noise reduction, low resolution but this problem can be handled by hue saturation for illumination, median filters for noise reduction and low resolution by super resolution algorithm. Then for image recognition Convolutional neural network technique have been used

Ping Zang, in A Video-based Face Detection and Recognition System using Cascade Face Verification Modules have proposed a simple and efficient face detection scheme: the head of the person is directly and automatically detected by the movement of the body of information between adjacent frames.

Then the possible face in the range is one by one verified by our proposed three verification modules: face skin verification module, face symmetry verification module, and eye template verification module<sup>[7]</sup>. Only the frontal face image, which has passed the three verification modules, is sent to face recognition engine for recognition.

In 2014 J. Kanti 1, A.Papola in smart attendance using face recognition with percentage analyser where PCA and Artificial neural network have been use for Image recognition in attendance database management. In addition to this the introduction of a function that was for analysing the percentage of attendance<sup>[8]</sup>.

In Implementation of Face Recognition Algorithm for Biometrics Based Time Attendance System by A. R. S. Siswanto, A. S. Nugroho , M. Galiniu, where the main purpose of the research was to get the best facial recognition by using two algorithm (Eigenface and Fisherface) provided by Open cv 2.4.8 by the comparison of ROC (Receiver Operating Characteristics). Finally, they

have find out that Eigenface is better than Fisherface in terms of result<sup>[9]</sup>.

### III. COMPARATIVE ALGORITHMS

Due to the various algorithms that I have been refer to, we will compare them based on the following parameters.

Table1: Comparison of Algorithm

No.	Publication Date	Algorithms	Advantages
1	2015	Haar features for detection hue saturatio-Local Binary Pattern for detection	-Reduction of amount of data that are copied -Speed up face detection
2	2015	Haar-like Feature based Eye Detector(HLED) MCT Feature based Eye Detector(MFED) - hybrid detector (complementa racy of MFED and HLED)	MFED has an advantages in a situation in which there are variation in illumination, - HLED has an efficient computation in Eye detection
3	2014	-LBP + HOG feature-based -Haar feature-based disguised Adaboost classifier	Combination of LBP and HOG gives better detection of the human's head Shoulders.
4	2014	Local Binary Patterns (LBP) + Histogram of Oriented Gradients (HOG) Head Shoulder for detection	-It use first-dynamic-then-static foreground object detection strategy -Determination whether the face is disguised
5	1998	Haar feature and HSV (Hue Saturation Value)	resolving the dynamic movement of the face feature such as (eyes and mouth) that mostly accounted in image processing

6	2014	- Viola jones algorithm has been used for detection Convolutional neural network technique have been used for image recognition	-For this research hue saturation is used as a solution to the problem in illumination and noise reduction
7	2014	-Cascade Face Verification Modules -Face recognition engine	The head of the person is directly and automatically detected by the movement.
8	2014	PCA and Artificial neural network	-The advantages is that this system provide an option to student to track their attendances.
9		Eigenface and Fisherface and ROC for measurement	- It have been approved that Eigenface is giving a good result compare to Fisherface

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**IV. CONCLUSION**

We have presented the survey on image based attendance analysis which encompasses the detection and recognition of face by using various algorithms. Commonly the detection and recognition always invoke three main phases where by the camera capture the images or videos, and it is extracted based on facial features either mouth, eyes, even the hall face based on some measure, therefore the image detected is compared with the existing image in the database, when the similar image is found then the recognition is occur, therefore the attendance is generated based on time and date, so that the daily or monthly attendance can be generated to support the management the member of the institution to support the department in charge.

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