

# Dynamic & Intelligent Student Attendance Maintenance Based on Face Recognition



Liza M Kunjachan, Mhd Faheem Khan, Piyush Kumar, Rahul Ranjan, Sneh Pallav

**Abstract:** *The proposed system generally results a solution to some of the problems which occurs in colleges and schools by providing a monitoring camera with the help of “Artificial Intelligence (AI)”. The main problem which can be occurred is wastage of time in taking the attendance manually or through any biometric sensors. The next problem which can be solved is to control the usage of electricity in classrooms when students are not in class.*

*When the videos are getting recorded with the help of monitoring cameras, at the same time the head counting and face detection of the students present will also be done. When the strength of the class is zero, the head counting also results to zero. The electricity can also be saved at the same time when people are not present in the classroom. The face recognition is the easiest process which can be done for marking the attendance, where the attendance is marked automatically. This process also helps to prevent the fake attendance.*

*Face recognition and detection is generally based on line edge mapping to attain the identity of the student and also meets the wants of attendance in the universities and schools. The image of the student is to be captured and checked with the database simultaneously and marks the attendance of the particular student. The video gets recorded all the time and checks whether the student remains in class for the entire period. The attendance marking system with the help of technology is very essential for both the teachers and students.*

**Keywords-**Attendance System, Face Recognition, Haurdroff Distance, Line Edge Mapping.

## I. INTRODUCTION

Institutions of any size will always use the attendance marking system where it is applied to track all the people working in the institution. It can also be used to review the amount of work done on a particular day. Some institutions also keep the track of sick leaves and update the attendance system accordingly. The attendance system provides a lot of advantages to many institutions. The attendance which is

recorded in registers can cause a lot of errors in updating which is a loss for any institution. The proxy attendance can also be caused when the process is done manually. The technology plays a major role in this type of field to avoid all the bugs that may occur manually. The attendance system which is implemented using technology avoids buddy time punching where the virtual person cannot punch the enrolled persons attendance. This system makes easier for both children and teacher in colleges or schools. The registers can easily be exploited by the students and if the message reaches the parents, it can also be deleted even before they see the message. If the attendance system is used with the help of technology it even helps parents to know about their child’s presence in institutions. The proper monitoring system would be easily be printed and it can be sent to their parent’s personal accounts. The system basically is of two types i.e. manual process and automatic process. Manual process is not used nowadays where the registers are being misused. The automatic process increases the productivity of the institution where it saves time by not taking the attendance manually. It also improves employee accountability where it accurately identifies the person by detecting facial features.

The attendance system is related to a major factor which is salaries and bonuses for employee by their punctuality to the company and their work performance. The system generally is been required in larger institutions which has huge population in their company. The common procedure which is followed in many of the companies is to punch in card while they come and go off from the company. However, this process when used can cause to false attendance will affect the staff management in the company. To minimize the effect that dynamic attendance system is used with the help of face detection, the uniqueness of the face will be detected and compared with the data in the database. When face detection is done while the person enters the room, the process also has the capability to count the heads in the class and then track the attendance. This type of process is done without the help of humans. Face recognition used computer image processing technology to extract unique features of the person. The technological objective is to design the technical knowledge and their innovations. Artificial language is one of the most important domains which helps the machine to train itself with the help of unsupervised learning. The unsupervised learning method is used where the machines identify the object the by procuring some datasets as input and provides a proper output during the entire process by applying various suitable algorithms. By using the artificial intelligence technology, we keep the track of the population and the electricity.

Revised Manuscript Received on March 30, 2020.

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The lights and fans are switched off automatically when the population is zero in the classroom. The population detection is done by using various related cameras and analyse the attendance performance of each and every student. The human face detection is done by feature based approach and brightness-based approach. The simpler process in face detection is done based upon feature-based approach where the colour and shape filters are used to detect primary features such as eyes, ears, nose, chin, mouth, edges etc. Whereas brightness-based approach is used with the help of light compensation technique by real time imaging. The images when captured undergo both features based and brightness-based approach. The computer processed digital image is analysed and stored in dataset for the reference.

### II. LITERATURE SURVEY

Attendance recording and handling is a real-world problem that requires immediate attention in many capacities. Therefore, a system that is based on recognizing the students ace might be the most applicable. Such a system may use many modern technologies such as Deep learning etc, so that the system may be able to train itself by progressively providing data[1][3]. Such a system is quite definitely effective than a manually recorded attendance, which may be quite time consuming and tiresome.

Therefore, system like attendance automation system (AAS) may be used to instantly and automatically record the presence the students in the classroom. The features of the face can be scanned in such a way so as to detect if the student s awake or sleeping during class hours[3]. This is system based on local recognition approach, where the features such as ears, nose, eyes, lips etc are read and recorded in the database. The application of this system may be smooth and reliable. The student may require to carry an RFID with himself/herself so that the attendance may be automatically recorded and the student may be traced[10].it is convenient as it facilitates non-intrusiveness and non-interference.in some particular systems, raspberry pi was also used as a micro controller. The camera will be connected to the raspberry pi apparatus and hence it will transmit information. Similarly, a biometric system may also be established by scanning the irises of students[7]. it can therefore be derived that face recognition is one of the few reliable methods that provides a high rate of accuracy and precision.

There are many important aspects that need to be taken care of when using face recognition, such as posture, lighting, position, motion of the objects, spectacles etc[10]. Here images are converted to digital data and processed later.

There are many kinds of approaches that can be applied here namely, either holistic, hybrid or feature based. Such an approach maybe helps to keep the features of the data set intact while simplifying it further[13][3]. RGB colour schemes can be used to identify skin colour and texture. Such systems can easily identify students by relating the image captured to a particular pixel's range and ratio. sometimes noise filtering algorithms are also used to remove unwanted material from an image.to transfer data from the source, wireless network systems can be used as wired systems are more prone to damage[3][1].

Thus, the objective of this paper is to present a simple and applicable method to provide easy attendance recording and

storing for the students, which can be implemented to monitor students accordingly.

### III. METHODS AND IMPLEMENTATION

I. The project describes the attendance system for students in the college, school, or any bigger organization. Generally, this type of process can also be done manually and attendance is a major role in any organization to follow. To make the process simpler we use attendance system through artificial intelligence. The existing procedures are biometric detection of fingerprint, eye detection or the facial detection. The time is a major factor which plays in any organization. To save time of both the teacher and students the simpler process is used. The biometric sensors which are already existing will require for the students to form a queue and scan, and it is very time taking process. As biometric sensors are a long procedure, the machines process their algorithm and marks attendance for the people without the help of humans. The proxy attendance is also avoided by using the better attendance system. The attendance of every person is taken by taking pictures of every person who enter the room, detect every picture and compare their face with the database which is already been stored. The pictures are been captured every time the person enters the room. The attendance will be only marked when the person enters and leaves from the room according to the specified time mentioned in the database. The primary step of the process is detecting the face, with the motive of extracting appearance of the face from the background of the human. This system comprises of different approaches such as image retrieval, crowd tracking and many HCI's. The face of the human is a unique feature which differs from each person and face detection has a higher degree of variability when compared with other biometric parameters. Every time when the face is detected, it compares with the database and also is identified by their unique register number. There are many numbers of varieties such as edge-based algorithm and high-level approaches using recognition algorithms. The proposed system captures the image and process with their internal resizing of the image. Line edge mapping algorithm is used for the high recognition and accuracy and also for the faster data processing. This algorithm plays important role in analysing the features of all edges of the face. The face recognition is done by extracting all the unique features present all around the face with the help of high-level perception functions. Line edge mapping extracts feature and integrates with the data containing structural data of a face by collecting all face-edge map to line segments. After making the process simpler, a polygonal mapping is done to generate the line edge mapping of the face. The basic and primary process is to gather all the pixels of a line edge map. There are many other procedures which are used to find similarity in the face and store it in database, but they take long time to process it. There is also a method where line segment hausdorff distance are to be measures by the similarities found in the face. The distance is measured by two different line sets found by their similarities. The hausdorff distance is measured for various factors for detection.

The perpendicular distance, parallel distance between twoline sets are to be measured and identified by hausdorff distance. These parallel and perpendicular distance are to be noted and stored in database and compared. The line sets are the data which covers the distance between all the parts of the face. Face recognition is done for orientation, detection and localization. The main aim of face detection is to detect and check if the same face is present in the database and returns to the extent of every face. The localization of the face is done to detect if only one face is present in the digital image which is captured. The orientation is done in the next step for rotating the face into the proper format such that two eyes are horizontal to each other. These two steps are very important to be done before face recognition such it does not give any error or the wrong output. The image when captured always scale to the same resolution before the orientation and localization.

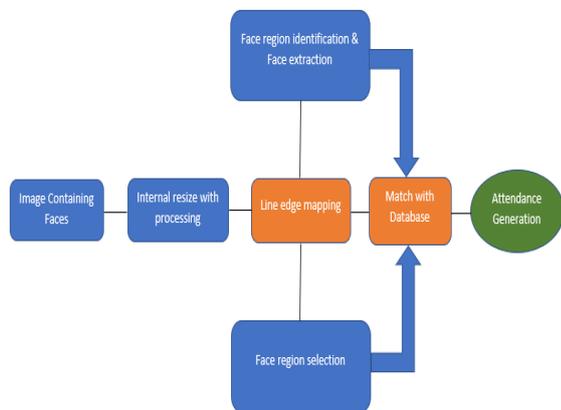


Fig.1. System Architecture

II. Eye detection using line edge mapping

Before face detection, eye detection is the primary step to be done to make it advantage for the data to store. The important reason is that the face features will be detected based upon the position of the eyes. The eye detection is technically divided into three categories such as appearance based, feature based, template based. Feature based are detected by the features such as iris and the colour of the eye. The iris detection is unique way of identifying a person feature where iris is a unique feature. Every feature of the eye is taken into consideration while detecting. The template-based model describes that the eyes are to be captured and designed in general eye shaped model. Every face when captured would be fixed into the particular template such that it will be easier for the calculation of all features and their distance between each other.

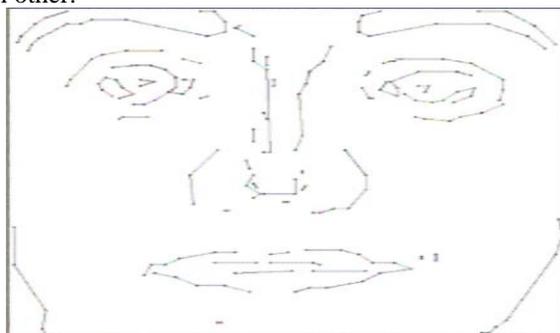


Fig.2 Line Edge Mapping

The template based is a process which is more accurate and it takes a lot of time. To reduce the time feature based is used

before the template based such that all features are detected at the primary level. It reduces the regions of the eyes and reduced area would be sent to the template based for extracting features. The final step is appearance based where a lot of data is to be collected where eyes features of every various condition are collected. By classification of all features the training data is to be detected and stored. The accuracy is very higher in the eye detection procedure. Every small region of the face is detected. The template matching is done as the final step for the result.

Template matching is done many times such that if any data is missed it would be easy to retrieve and store. The eye centers and iris centers are to be located and detected which is more useful for localization of the face. When The detection of face and eyes are done then other features of the face are to be located by using the golden ratio. Golden ratio is found based on the photometrical detection. The data when taken into consideration is done by symmetry and unique features of the face. Every pair of data is stored in backend such that it can be compared every time during the processing time. The recursive centroid is used for extracting the iris detection features by eyeballs centroid. The line edge mapping finds the distance between every part to the other part of the face. The face features can be changed because of age and emotion also. Some features in the face can never change in any condition. The golden ratio is generally used to find the distance that is to get the distance between the chin to eyebrow, eyebrow to cheeks, chin to ear etc. When every training is passed then it is known as "Potential region pair". This process less manpower and also has less error. The error can only be less than 0.1%. The normalized errors are less than 0.07%. So, this process has 99% success rate which is used for various advantages. When the person enters the classroom, many pictures are taken at a time such that it does not capture any blur image. Some images are taken as test images and some are taken as model images. Model images when captured are stored in database for the first time and every test image are to be matched in the database for the secure recognition. The hausdorff distance is to measure for every image which is captured and check in the database for matching the data. Thus, the face recognition is used as a simpler process where student will not waste any time. It is easier for both the organization's management and the parents.

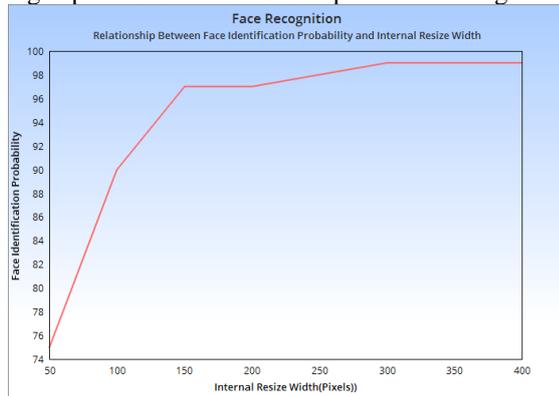
IV. RESULTS

The exhibition assessment of the framework is completed with a couple of factors and constants. The consistent parameters right now are Illumination and Face Posture. While the differing parameters are: Internal Resize Width of the Image preparing motor and False Acceptable Rate (greatest blunder rate) in face format coordinating:

A. Face Identification Probability

While testing for ideal face recognizable proof likelihood by changing the inward resize with, higher inside resize width gives a higher distinguishing proof likelihood. These qualities are exponential extent until resize width comes to around 300 pixels.

This can be believed to deliver ideal outcome for the face recognizable proof parameter. Albeit expanding the resize width builds the likelihood of distinguishing proof, it additionally adversely affects the exhibition of the framework, making superfluous time slacks in picture handling.



**Fig.3. Relationship Between Face Identification Probability and Internal Resize Width.**

## B. Bogus Acceptable Rate (FAR)

The False Acceptable Rate (FAR) is the mistake estimate (in %) to which two distinctive face formats can be said to coordinate. FAR and FRR are conversely relative to one another and are utilized reciprocally in the plan of the framework. All together words, when working with FAR, a low worth will improve the coordinating exactness, while a high FRR will improve the coordinating precision. Right now, is to be utilized to determine the comparing coordinating exactness by differing the FAR incentive as a rate. Figure 6 shows the diagram of the connection between the FAR and the coordinating exactness.

Internal Resize Width (PIXELS)	Facial Feature Identification Probability (Avg.%)	Recognition Rate (Avg.%)	Permissible Distance from Camera (cm)
50	75	90	30
75	80	88	45
100	90	84	70
150	98	78	80
200	98	70	100

**Fig.4. Facial feature detection tests varying internal resize width of face detection.**

## V. CONCLUSION

Face recognition is one of the identity approaches. It's a massive benefit among different distinctive identity approaches like the Fingerprint, iris scanner and RFID. All the pinnacle of approaches required a voluntary action collectively with bigger time intake. However, Face reputation is mechanically carried out whereas the scholars are taking note of the category in order that they may consciousness at the course extra. Additionally, to it, the time taken by way of this approach is a smaller amount. From this institution photo, the usage of the character student faces is detected and identified using face popularity module. When the face of every student are being identified, attendance for the particular session of every student will be given as present in their attendance. When the gadget isn't always capable of locate any "human-faces" from the picture procured inside school room, the machine exams for the strength supply in the school room and marks it into OFF state.

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