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Smart Attendance System And Management

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Abstract

Face recognition is an integral part of psychology, forensics and social media. In all these fields, a high degree of reliability of classification is imperative. After we detect the face from input image, specific features of the face are identified. Finally, the face is recognized using deep learning algorithms. Face Recognitionis capable of detecting, tracking, identifying or verifying human faces using a digital camera. We are creating a system that is able to manage and monitor the employee and visitors of an organization using face recognition as an authentication method. After the authentication and verification process, valid visitor's entry time and date will automatically get saved in software. This system is proposed to enhance the security of an organization from outsider and to mark the entry time and exit time of an employee. Centralize system enables managing and monitoring process more efficient. Cost of development is also taken into consideration as the hardware requirement is very less. Raspberry Pi and surveillance camera is used as hardware. As per the requirement of company our project consists of software which uploads the data on server.

Keywords- *Deep learning, Image processing, Face recognition, Python, OpenCV*

I.INTRODUCTION

Face recognition is crucial in day to day life in order to identify family or someone we are familiar with. We might not know that several steps have actually taken to identify human faces. However, we need large memory to recognize different faces, it is impossible to remember every face of the individual without making mistakes. To overcome human limitations, computers having almost limitless memory, high processing speed are used. Every human face has unique representation and individual identity. Thus, face recognition is a biometric method in which compares real-time captured image with stored images in the database of a person. Nowadays, face recognition system is prevalent due to its simplicity and awesome performance and ease of use.Every organization requires a robust and stable system to record the attendance of their employees and every organization have their own method to do so, some have adopted biometrics system such as fingerprint sensor , Radio Frequency Identification card reader, Iris system to mark the attendance of employee. The RFID card system, each employee assigns a card with their corresponding identity but there is chance of card loss or unauthorized person may misuse the card for fake attendance. While in other biometrics such as finger print, iris or voice recognition, they all have their own flaws and also they are not 100% accurate.Using face recognition system for attendance marking is one of the advanced way of attendance management system. Face recognition is an accurate and faster technique compared to other techniques and it minimizes chance of proxy attendance. Basically, face recognition involves two steps, first step is the detection of faces and second step involves identification of those detected face images with the existing database. There are number of face detection and recognition methods

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are introduced. Face recognition is either appearance-based covering the features of whole face or feature-based covering the geometric feature like eyes, nose, eye-brows.

II.LITERATURE REVIEW

In recent years, a number of face recognition based attendance management system have introduced in orderto improve the performance of students in different organization. In [4] JomonJoseph, K. P. Zachariaproposed a system using image processing, PCA, Eigenfaces, Microcontroller, based on Matlab. Their system works only with front face images and there is need of a suitable method which works with the orientation of thesystem. Our report [5] proposed aface recognition approach for attendance marking usingViola jones algorithm, Haar cascades are used to detect faces in images and recognition performs through Eigen face method. Another approach of making attendancesystem easy and secure, is[6] the system with the help of artificial neural networks, they used PCA to extract face images and testing and training were achieved by neural networks, their system performsin various orientation

1) AyodejiOlalekanSalau, Shruti Jain, et.al[13] "**Feature Extraction: A Survey of the Types, Techniques, Applications**", IEEE 2019.

In this paper, methods to extract different features like color feature, text feature, shape feature, motion feature and face feature is mentioned. Feature extraction can be used in text mining, speech recognition, data mining and image processing. Applications of feature extraction and their extraction techniques are mentioned.

2) Paul Viola et.al[19] "**Real-Time Face Detection**"- International Journal of Computer Vision 57(2), 137–154, 2004

Machine learning approach is used for emotion detection. Viola-Jones algorithm and Haar features are used for feature extraction. Decision tree is used for classification of emotions. No specific dataset is mentioned to be used.Face detection is done for frontal and upright faces. Failure modes are mentioned

3)Shervin Minaee1, AmiraliAbdolrashidi,et.al[12] " **Facial Recognition Using Attentional Convolutional Network**", 2019.

Convolutional Neural Network is used to detect seven emotions. SoftMax classifier is used to identify the emotions. Accuracy for FER-2013 dataset is 70.02%, for FERG dataset 99.3% and for JAFFE dataset it is 92.8%.

4) Jireh Jam **"Face Detection and Recognition Student Attendance System "** , 2018.

This paper will show you how to implement algorithms for face detection and recognition in image processing to build a system that will detect and recognize frontal face of student in classroom.

5) Chin Howard "**FACE RECOGNITION BASED AUTOMATED STUDENT ATTENDANCE SYSTEM ",** 2018.

In this paper they develop a technique using deep neural network for human facial recognition. Kernel PCA is applied to feature before feeding them into the deep neural network that consists of 1 input layer,2 hidden layers and a Softmax classifier. They have used the Extended Cohn-Kanade Dataset for training and testing. It is demonstrated that the network generalizes to new images fairly successfully

with an average recognition rate of 99.8%. Compared to shallower neural Networks and SVM methods, the proposed deep network method provides better recognition performance.

BIOMETRIC TECHNOLOGY	CORRECTNESS (ACCURACY)	PRICE	ASSOCIATED DEVICES	SOCIAL ACCEPTANCE &ADAPTIBILITY
ADN	HIGH	HIGH	TEST EQUIPMENT	LOW
IRIS RECOGNITION	HIGH	HIGH	CAMERA	MEDIUM TO LOW
RETINA SCAN	HIGH	HIGH	CAMERA	LOW
FACE RECOGNITION	MEDIUM TO LOW	MEDIUM	CAMERA	HIGH
VOICE RECOGNITION	MEDIUM	MEDIUM	MIC,PHONE	HIGH
GEOMETRY OF HAND	MEDIUM TO LOW	LOW	SCANNER	HIGH
FINGERPRINT RECOGNITION	HIGH	MEDIUM	SCANNER	MEDIUM
SIGNATURE RECOGNITION	LOW	MEDIUM	OPTIC PEN,TOUCH PANEL	HIGH

Figure 1 Different Biometric Technology

The approach performs face recognition based employee and visitor management system. The flow begins by capturing image using simple and handy interface, followed by pre-processing of the captured facial images, then feature extraction from the images we capture which uses subjective selection and last method is classification of the facial images to be recognized. In this LBPH and Haar Cascade feature extraction methods are studied in detail and computed in this proposed approach in order to make comparisons. LBPH is enhanced in this approach to reduce the illumination effect. An algorithm and LBPH is combined to enhance LBPH in order to increase the accuracy. The details of every stage will be discussed in the following sections. The flow chart for the proposed system is categorized into two parts, first training of images followed by testing images (recognize the unknown input image) and second is recognition as shown in Figure 3.1 and Figure 3.2 given below respectively.

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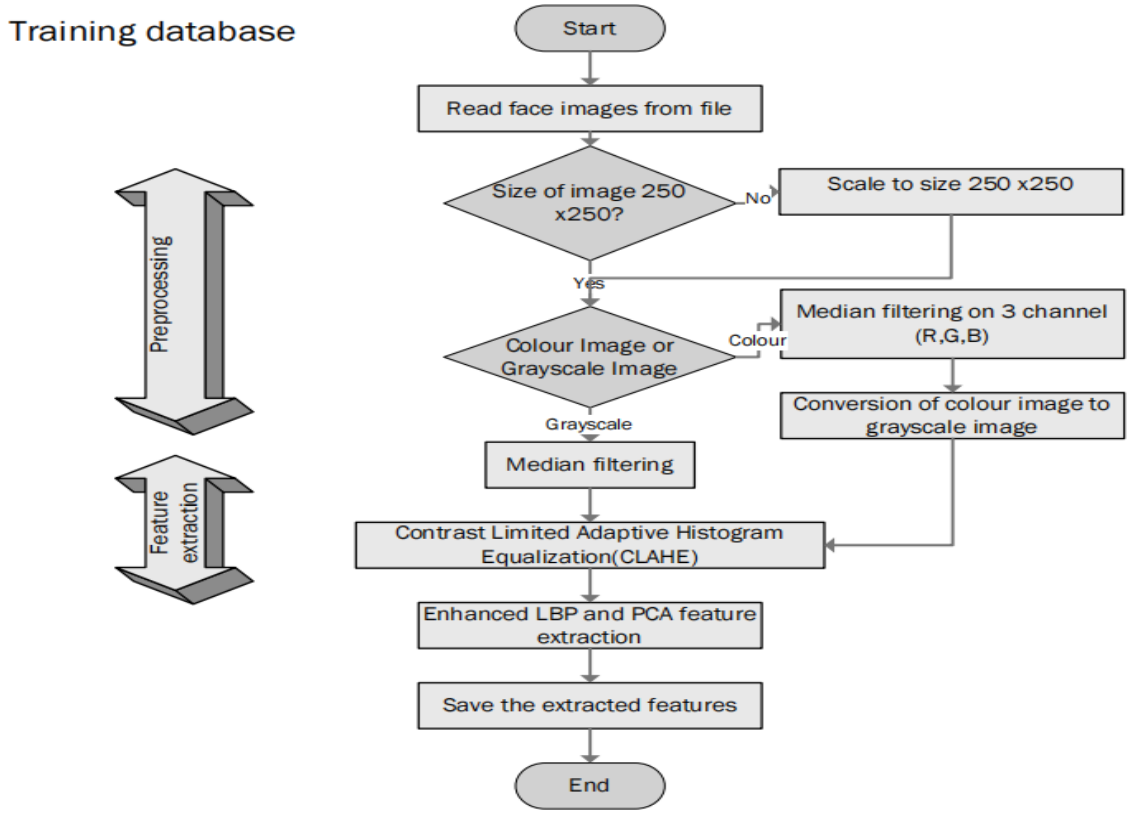


Fig.2 Flow of the Proposed Approach

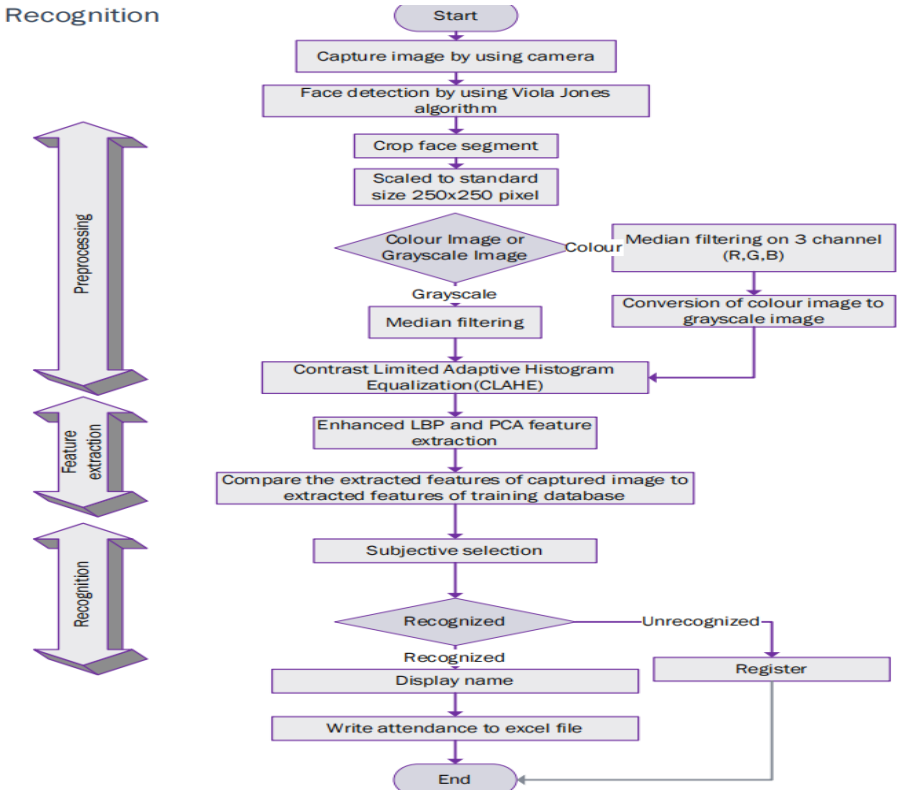


Figure 3 Flow of the Proposed Approach(Recognition part)

Face Detection -

Haar cascade object detection framework will be used to detect the face from the video camera recording frame. The limitation of the Haar cascade framework is that the facial image needs to be a frontal upright image,the face of the individual must point towards the camera during a video frame.

Machine learning is employed to detect face during this project Haar Cascade & LBPH algorithm is used to createa stronger management system.Haar Cascade may be a machine learning based approach within which a cascade function is trained from plenty of positive and negative images. It's then used to detect objects in other images. We want to extract features from these images. For detection, all possible sizes and locations of every kernel are accustomed calculate many features. Integral images are introduced which simplify the calculation of sum of pixels. We select features with minimum error rate. Each image is given an equal weight within the beginning. After each classification, weights of misclassified images are supposed to be increased. Save for same process is completed. New error rates are calculated, also new weights. The method is sustained until required accuracy or error rate is achieved or required numbers of features are found.

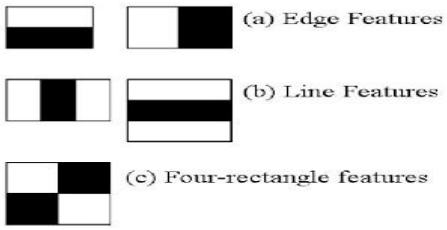


Figure 4 Haar Feature Detection

Pre-Processing

Testing set and training set images are captured employing a camera. There are unwanted noise and uneven lighting exists within the images. Therefore, several pre-processing steps are necessary before proceeding to feature extraction.

Pre-processing steps that may be applied include scaling of image, median filtering, conversion of color images to grayscale images and adaptive histogram equalization

Scaling of Image

Scaling of images is one in every of the frequent tasks in image processing. The scale of the images has should be carefully manipulated to forestall loss of spatial information. In order to perform face recognition, the dimensions of the image must be equalized. This has become crucial, especially within the feature extraction process, the test images and training images must be within the same size and dimension to make sure the precise outcome. Thus, during this proposed approach test images and train images are standardize at size 250 × 250 pixels.

Median Filtering

Median filtering is a robust noise reduction method. It's widely employed in various applications because to its capability to get rid of unwanted noise as well as retaining useful detail in images. Since the colour image taken by using a camera are RGB images, median filtering is completed on three different channels of the image. If the input image may be a grayscale image, then the median filtering are often performed directly without separating the channels.

Conversion to Grayscale Image

Camera captures colourimages, however the proposed contrast improvement method CLAHE can only be performed on grayscale images. After improving the contrast, the illumination effect of the picture ready to be reduced. LBP extracts the grayscale features as 8 bit texture descriptor from the

images in which contrast is improved (Ojala, T. et al., 2002).Therefore, colour images needs to be converted to grayscale images before proceeding to the later steps. By converting color images to grayscale images, the complexity of the computation will be reduced leading to resulting in higher speed of computation.(Kanan and Cottrell, 2012). Figure shows the conversion of images to grayscale image.

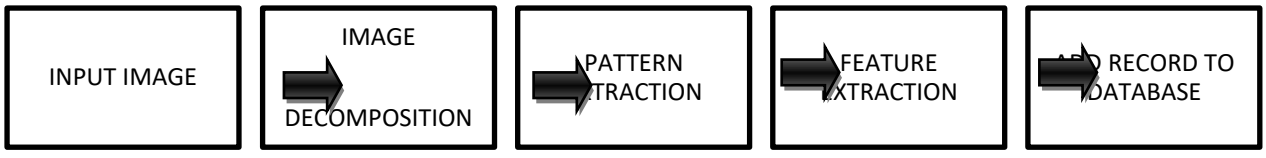
Figure 5 Conversion of Image to Grayscale Image

Feature Extraction

Different facial images mean there are changes in textural or geometric information. In order to perform face recognition, these features need to be extracted from the facial images and classified appropriately. Inthis project, we have used enhanced LBP and PCA for face recognition. The concept comes from nature of human perception whichperforms face recognition counting on the local statistic and global statistic features.

Enhanced LBP is used extracts the local grayscale features by performing feature extraction on a tiny region throughout the complete image. On the alternative hand, PCA extracts the global grayscale features which implies feature extraction is performed on the full image.

IV.DESIGN AND DIAGRAM



PROCEDURE FOR FACIAL FEATURE'S EXTRACTION

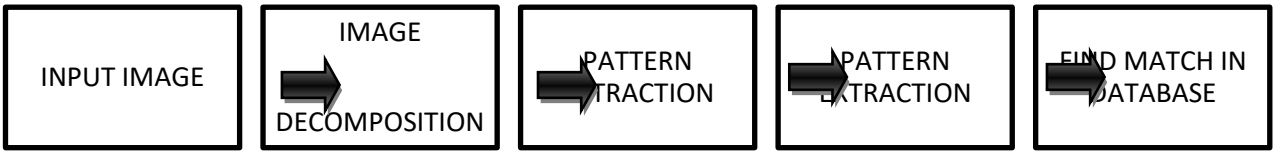


Figure 6 Procedure for face recognition

When the visitors enter the organization for visiting or any other business purposes for the first time, the visitors need to register at the register counter of the organization. The person-in-charge will check in the system whether the visitor is already registered beforehand or not.

Employee data is already fed to the system. After realization of employee, his attendance is marked. The visitors already registered in the system before, need to scan their face as an authentication to retrieve their details.

If their face image matches with the one that already stored in database, visitor's detail such as date of visit, time in and out, purposes, the name of the person that going to be visited. If the visitors are new visitors or not registered before, the visitors need to provide their details to be fed in by the person in-charge to the system. Then the person in-charge will capture the face image to be stored in database using the camera. This image will become a personal ID of the visitors, which will be used for authentication.

V.RESULTS

Figure 7

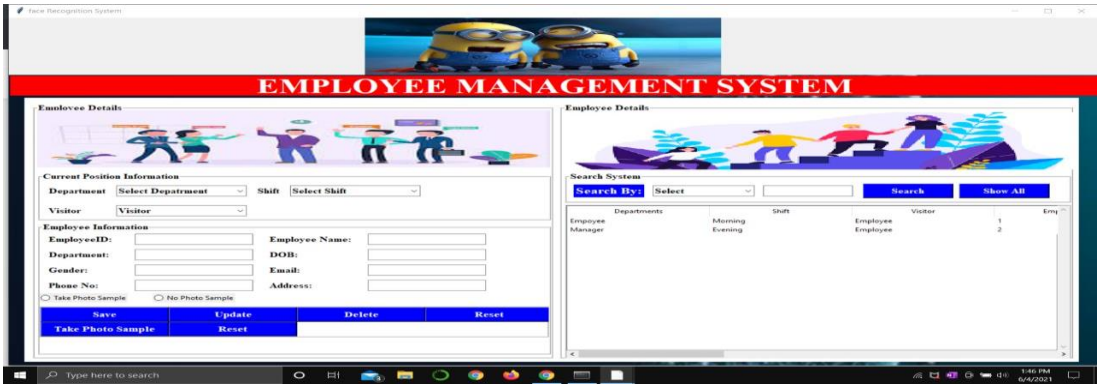


Figure 8

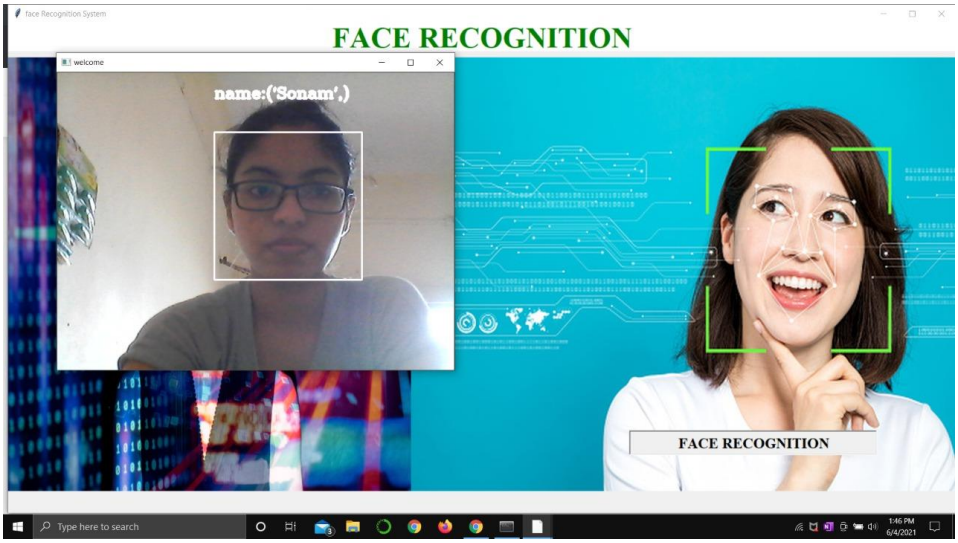


Figure 9 Face Recognition

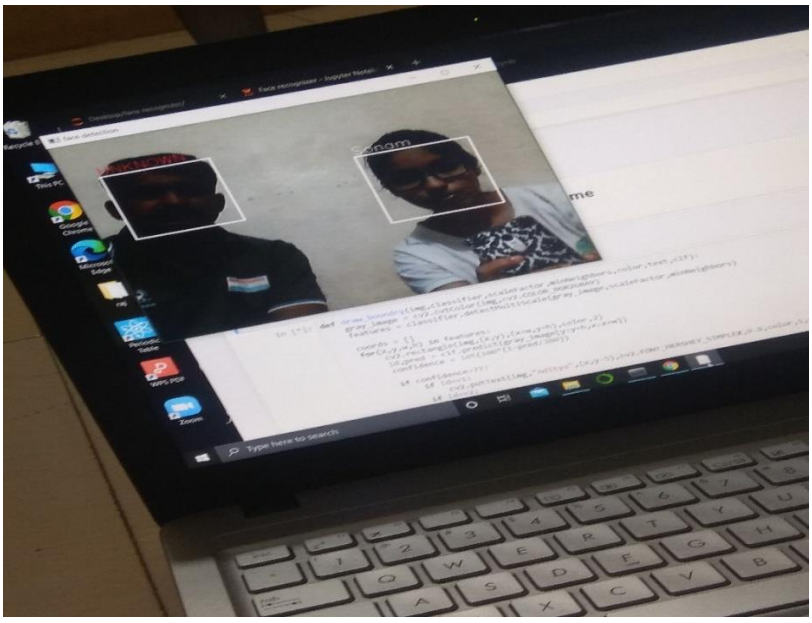


Figure 10 Face Recognition

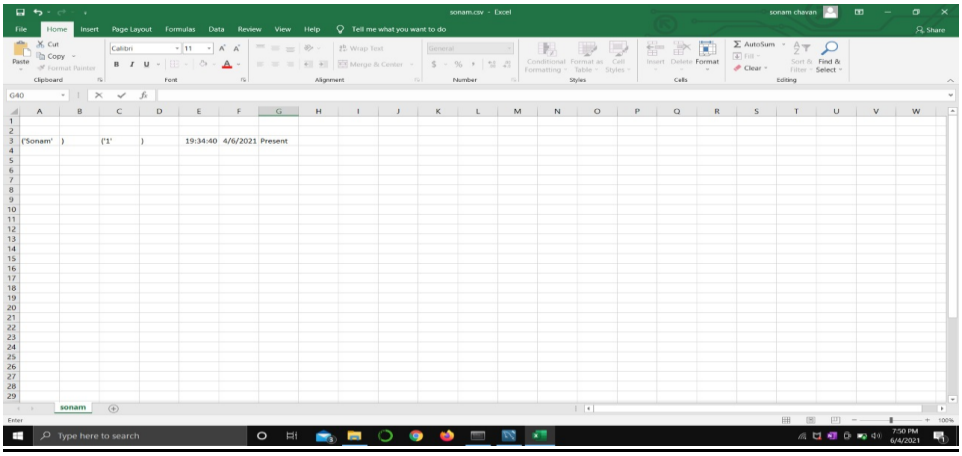


Figure 11

VI.CONCLUSION

Security of personnel and property are threatened by workplace violence, industrial espionage and global terrorism. Security at the entrance of an organization will be the first line of defence as when facility entrances aren't secure; companies are vulnerable to illegal access by outsiders. Security can be enhanced if the organization supports security physically electronically and procedurally. Visitor management systems are become important nowadays.

REFERENCES

1. [1] Willelectronics, 2012.VISITOR MANAGEMENT SYSTEMS. [Online]
2. Hasam (2010). VMS 3000 Visitor Management System. [ONLINE]
3. HID (2013). EasyLobby® Secure Visitor Management (SVM™) Software. [ONLINE]
4. Face recognition PDF Reasarch gate.
5. Okokpujie, Kennedy O., et al. "Design and implementation of a student attendance system using iris biometric recognition." 2017 International Conference on Computational Science and Computational Intelligence (CSCI). IEEE, 2017.
6. Rathod, Hemantkumar, et al. "Automated attendance system using machine learning approach." 2017 International Conference on Nascent Technologies in Engineering (ICNTE).
7. IEEE, 2017.
8. Siswanto, Adrian RhesaSeptian, AntoSatriyoNugroho, and MaulahikmahGalinium.
9. "Implementation of face recognition algorithm for biometrics based time attendance system." 2014
10. International Conference on ICT For Smart Society (ICISS). IEEE, 2014.
11. Lukas, Samuel, et al. "Student attendance system in classroom using face recognition technique." 2016 International Conference on Information and Communication Technology Convergence (ICTC). IEEE, 2016.
12. Salim, Omar Abdul Rhman, RashidahFunkeOlanrewaju, and Wasiu Adebayo Balogun. "Class attendance management system using face recognition." 2018 7th International Conference on Computer and Communication Engineering (ICCCE). IEEE, 2018
13. http://www.willelectronics.com/visitor_management_systems.html
14. http://www.hasam.eu/en-us/products/identificationsystems/visitormanagementsystem.aspx
15. http://www.hidglobal.com/products/software/easylobby/svm.
16. https://becominghuman.ai/face-detection-using-opencv-with-haarcascade-classifiers941dbb25177
17. https://www.superdatascience.com/blogs/opencv-face-recognition