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Face Recognition Based Attendance System

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Abstract: ***Human face is one of the natural traits and crucial part of human body that can uniquely identify an individual. In the current old system the roll numbers are called out by the teachers and their presence or absence is marked accordingly which is time consuming and has a lot of ambiguity that caused inaccuracy and inefficiency of attendance marking. The productive time of the class can be utilized very efficiently by implementing automated attendance system. The main purpose of this project is to build a face recognition-based attendance monitoring system for any educational institution or organization where attendance marking is the demanding task. It enhances and upgrades the current attendance system into more efficient and effective as compared to before. This attendance system which uses HaarCascade a machine learning Object Detection Algorithm used to identify faces in an image or a real time video, Local Binary Pattern Histogram (LBPH) a face recognizer algorithm used to extract features and compare by using python programming and OpenCV libraries saves time and efficiently identifies and eliminates the chances of proxy attendance. This model integrates a camera that captures an input image and training database is created by training the system with the faces of the authorized students.***
Keywords: Haarcascade, Lbph, opencv, MachineLearning

I. INTRODUCTION

Attendance maintenance is a significant function in all the institutions or the organizations to monitor the academic performance of all the students. Some institutes used to take attendance manually by using paper or a file-based approaches and a few have adopted new ways of automatic attendance system using some biometric techniques. The recent methodology of the institutions for taking attendance is by calling out the name or roll number of the student to record attendance manually or asking the students to sign against a particular roll number. These methods are very less efficient as they carry a high chance of proxy and are time consuming. As the number of students in an educational institution or at an organization increases, the complexity of marking attendance by lecturers also increases. Therefore this project is a real world solution which evolves or upgrades the previous traditional system by improving efficiency, dataaccuracy and providing accessibility.

Since the introduction of Artificial intelligence(AI),Face recognition has becoming a worthy tool for many applications. Even with the deep learning techniques, performance are better than the normal human visual system. now-a-days computer vision is a comprehensive field that deals with a high level of programming by feeding the real time/input images/videos to automatically perform the tasks such as detection, recognition and classification. So With the advancement of the Machine learning technology which enables the machine to train itself by providing some datasets as input and provides an appropriate output during testing by applying different learning algorithms, the machine automatically detects the attendance performance of the students.

A facial recognition system which is a resourceful application of attendance system is a computerized biometric software suited for detecting or validating a person by performing comparison on patterns stored in the database based on their facial appearances. This project uses the face recognition approach for the Automated Attendance Management System. This Smart attendance system using Open cv and machine learning algorithms is going to be quicker and correct in marking the attendance of individual students. Facial recognition consists of two steps, in the step 1. faces are detected in the image and then in the step 2. these detected faces are compared with the database for verification and if the image matches within the database then the attendance will be recorded electronically with no need of any lecturer's interference. Over the recent years Face recognition system, a computer based digital technology, which is a powerful field of research have been upgraded appreciably in their management. In this project we developed a facial recognition attendance system uses opencv, *HaarCascade classifier* a machine learning Object Detection *Algorithm* used to identify faces in an image or a real time video, Local Binary Pattern Histogram (LBPH) a face recognizer algorithm used to extract features from an real-time input test image and match them with the faces in system's database by using python programming and OpenCV library. This technology is now vastly used in various application like security and commercial operations and can be compared with other biometrics such as fingerprint or eye iris recognition system

II. PROBLEM STATEMENT

Taking and following students participation physically, losing participation sheets, deceptive nature, sat around idly and high mistake scales are issues confronting the teachers utilizing the current participation framework. It is a hard cycle, require some investment and cause a ton of paper- based work. Thus, to tackle these issues and keep away from mistakes we recommend to mechanize this cycle by giving a framework that record and deal with students participation or attendance consequently using face detection andrecognition without expecting lecturers participation.

III. LITERATURE SURVEY

M.A. Meor Said, M.H. Misran[1]:This article is about a method that allows student attendance recorders to track student attendance using fingerprint identification, which is true online. The presence of fraudulent students currently mostly done by the students may be reduced and problems like missing paper may also be reduced and readily destroyed. This system can substitute a more systematic and electronic manual system for the present method. This attendance system is shown on a more appealing and graphical computer lecturer and is incorporated via the Fingerprint Reader and includes students with full details in Microsoft Visual Basic Studio.

Shailendra,Manjot Singh[2]:The system proposed features tiny portable hardware, remote server, and electronic data collecting component. They may be used to conduct surveys and control loop control systems in industry, hospitals, schools, and colleges attendance management systems, etc. This article provides a design and structure that will make the difficult process of taking part in schools and colleges easy and efficient. Their target consumers are educational institutions where an inexpensive, user-friendly, portable, energizing, and secure automated solution is required.

Dhiman Kumar Sarker[3]: The biometric fingerprint sensors and password-based technology for developing an affordable, reliable attendance management system are combined in this paper radio frequency identification. The attendance system is monitored via a desktop application in the C# environment.

Aditi Purohit, Kumar Gaurav[4]:This research focuses on the automation of the procedure by the use of a biometric scan approach. While the identification of fingerprints is an established area today, it takes still time to identify the individual from a collection of registered fingerprints. We have thus devised a project to effectively recognize the fingerprint of the individual, confirm its validity, and save the information in a database with different parameters such as entry time and date.

Vishal Naidu; KumaresanMudliar[5]: The methods offered involves exploiting the fact that over 99% of today's students have a smartphone on their own, all able to utilize and share information via Wi-Fi technology. The use of these technology, along with the background service on the smartphone of your host, to monitor the phones within this range and their time, allows the hosts to indicate that the hostis present in the host's local database with data concerning all students or visitors.

IV. PROPOSED METHODOLOGY

In our Project Face Recognition Based Attendance System there are two steps :

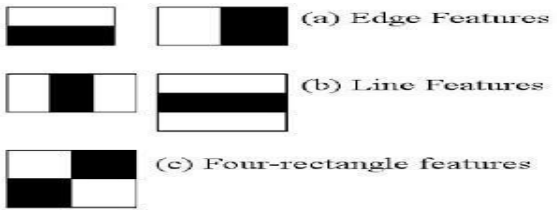
1) *Face Detection:* Face Detection is a method of detecting faces in the realtime video or image.This can be done by Haarcascade classifier which is a machine learning algorithm used to detect objects.
2) *Face Recognition:* Face Recognition is a method of identifying or verifying a person from images which already extracted, cropped, resized and converted to grayscale using LBPH algorithm which is responsible for finding characteristics and extracting features which perfectly describes the image

V. ALGORITHMS AND IMPLEMENTATION

A. *Haarcascade classifier:*

Haar feature-based cascade classifier is an effective object detection method(like detecting faces,buses etc..), "Rapid Object Detection using a Boosted Cascade of Simple Features" in 2001. This haarcascade classifier algorithm is a machine learning based approach where a cascade function is trained from a lot of positive as well as negative images and then used to detect objects in other images .In this project we are using this to detect face(object).

To train the classifier algorithm it needs a lot of positive images (images of faces) as well as negative images (images without faces) .Next we need to extract features from it. To do this Haar features shown below are used which are just like our convolutional kernel.By subtracting sum of pixels under the white rectangle from sum of pixels under the black rectangle each feature is obtained which is a single value.



The final classifier is a weighted sum of all these weak classifiers and It is called weak because it alone can't classify the image, but together with others forms as a strong classifier. It says that even 200 features provides detection with 95% accuracy. Their final setup had around 6000 features which reduced form 16000+ features.

To solve this the concept of Cascade of Classifiers is used. This concept says Instead of focusing and applying all the 6000 features on a window, the features are grouped into different stages of classifiers and applied one-by-one. Normally in the first few stages it will contain very many fewer features. If a window fails the first stage, ignore it and don't consider the remaining features on it and If it passes, apply the second stageof features and continue the process.If The window passes all the stages then it is a face region.

OpenCV provides a training method or pretrained models like **Cascade Classifier** , In this project we will are using pretrained Haar cascade models to detect faces in an image. Firstly, a **cv2.CascadeClassifier** is created and then the necessary XML file is loaded and then the detection of faces is done using the **cv2.CascadeClassifier.detectMultiScale** method, which returns boundary rectangles for the detected faces.

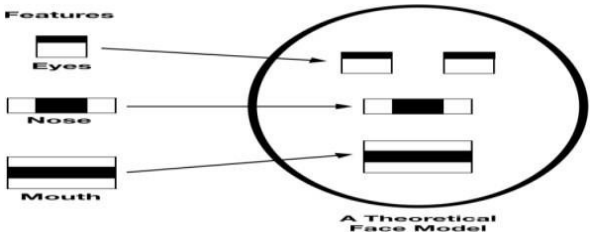


Fig : cascade detector

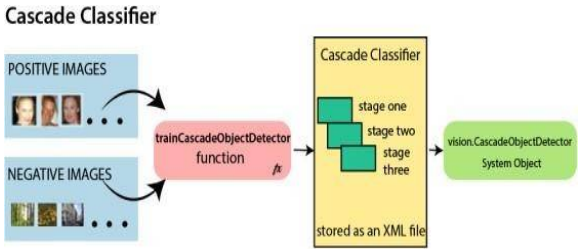


Fig : cascade classifier

OpenCV already contains various pre-trained classifiers for face,eyes, smile etc.. which is stored in XML file format .

1) *Step-1:* First, we need to load the necessary XML classifiers and input the images or video through camera which then converted into grayscale mode.
2) *Step-2:* After converting the image into grayscale, it can do the manipulation of the image where the image can be resized, cropped, blurred, and sharpen if required. The next step is image segmentation means classifier quickly detects objects like face from multiple objects in the single image.
3) *Step-3:* The haar-Like feature algorithm is used to find the Position of the human faces in frame or image or realtimevedio. All the Human faces have common universal features of faces like the eye region is darker than it's neighbor's pixels.
4) *Step-4:* Here In this step, we extract the features from the image, with the help of edge detection, line detection, and center detection. Then provide the coordinate of x, y, w, h, which makes a rectangle box in the picture to show the location of the face in the desired area where it detects the face.

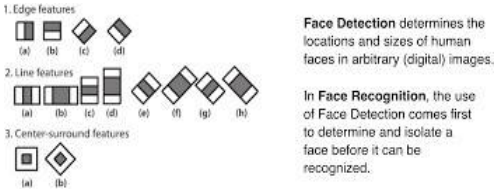


Fig : face detection

B. Procedure For Creating Data Set

These are the various steps to be followed to detect faces by using haarcascade algorithm.

1) Give the id.
2) Reads the image and converts image into gray scale.
3) Using Haar cascade it detects human face and draw rectangleframe in the desired location
4) Saves the image which is in the rectangle frame.

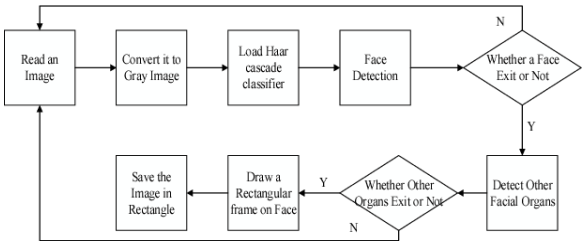
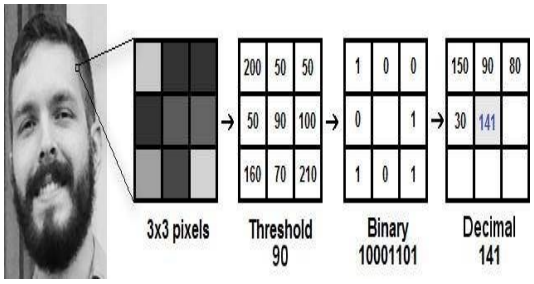


Fig 6.Flowchart for detecting face

C. LBPH

1) Training the dataset by applying LBPH Algorithm: To do this, we need to use a dataset with the facial images of the people we want to recognize and also set an ID for each person. Then the algorithm will use this information to recognize an input test image and give you the desired output. The first step of the LBPH is to create an intermediate image by highlighting the facial characteristics that describes the original image in a better way. To do this,the algorithm uses a sliding window concept, based on the parameters of radius and neighbors.



Now we have a facial image in grayscale after detection using haarcascade algorithm.

Now Get a part of this image as a window of 3x3 pixels and It can also be represented as a 3x3 matrix containing the intensity of each pixel (0~255).

Then, we need to take the central value of this matrix as the threshold value.

This threshold value will be used to define or set the new values for the 8 neighbors.

For each neighbor of the central value (threshold), we have toset a new binary value. We have to set 1 for all the values equal or higher than the threshold value and 0 for all the values lower thanthe threshold.

Now, the matrix will contain only the binary values (ignore the central value). We have to concatenate binary values from each position line by line from the matrix into a new binary value.(e.g.in clockwise direction, in which the final result will be the same).

Then, convert this binary value into a equivalent decimal value and set it to the central value which is actually a pixel from the original image.

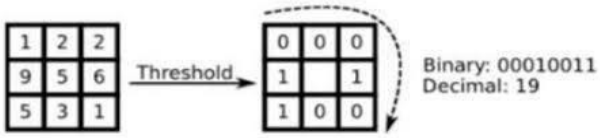
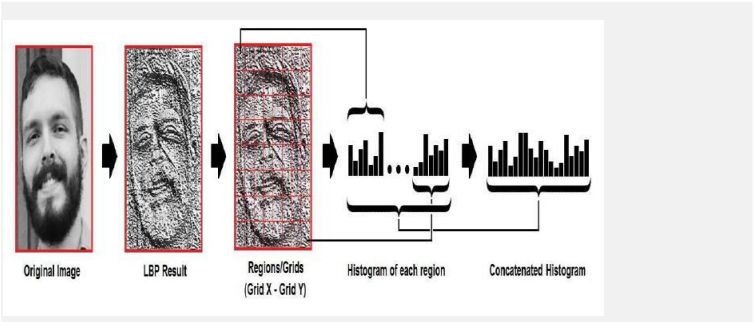


Fig :converting into binary number

At the end of this LBP procedure, we got an image which represents characteristics of the original image in a better way.

2) *Extracting the Histograms:* Now, use the image generated in the last step and then apply **Grid X** and **Grid Y** parameters to divide the image into multiple grids, as shown in the following image:

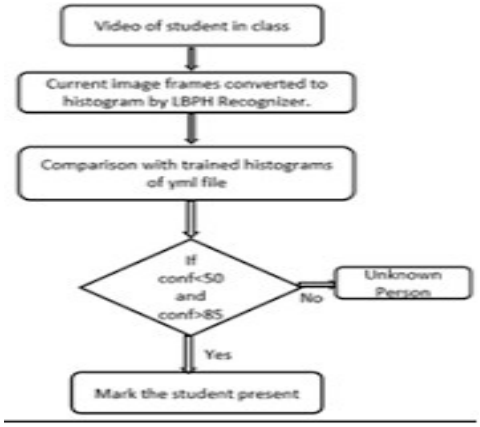


Now we have an image in grayscale, each histogram from each grid will contain 256 positions (0~255) representing the occurrences of each pixel intensity.
Then, we need to integrate and connect each histogram from each grid to create a new and bigger histogram. Suppose if we have 8x8 grids,then we will have 8x8x256=16384 positions in the final histogram. Thus obtained final histogram represents the characteristics of the image original image.

D. Performing the Face Recognition

Now the algorithm is already trained. Each histogram thus created is used to represent each image from the given training dataset. So, when given an input image, the same steps will be performed again for this new image and then creates a histogram for this new image. Now we need to compare two histograms to find the image that matches with the input image and to return the image with the closest histogram.

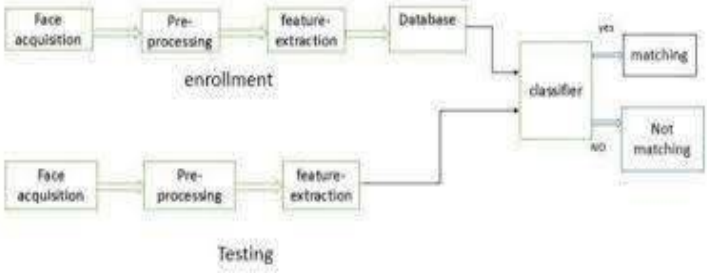
In this project we use the Euclidean distance which is quite known based on the following formula:



$$D = \sqrt{\sum_{i=1}^{n}(hist1_i - hist2_i)^2}$$

Now the output of the algorithm is the '**confidence**' the calculated distance. Lower confidences are better because it is the distance between the two histograms is closer

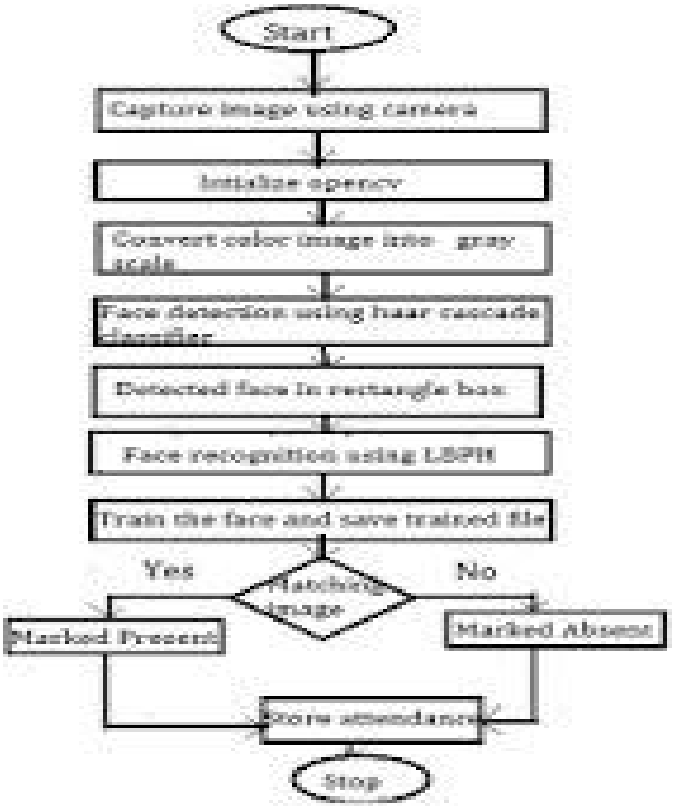
Then use a threshold value and the 'confidence' to automatically estimate if the algorithm has correctly recognized and verified the image. We can say that the algorithm has successfully recognized if the confidence is lower than the threshold value defined. Based on this threshold and confidence comparison ID of the image which is the closest histogram is updated as present or absent in excel sheet.



Recognizing face matching with trained data set

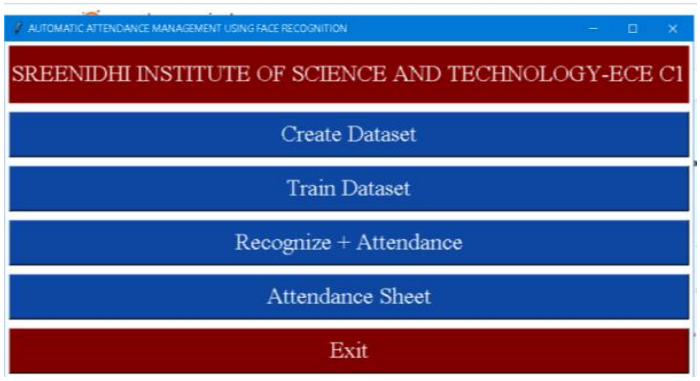
VI. PROJECT FLOW

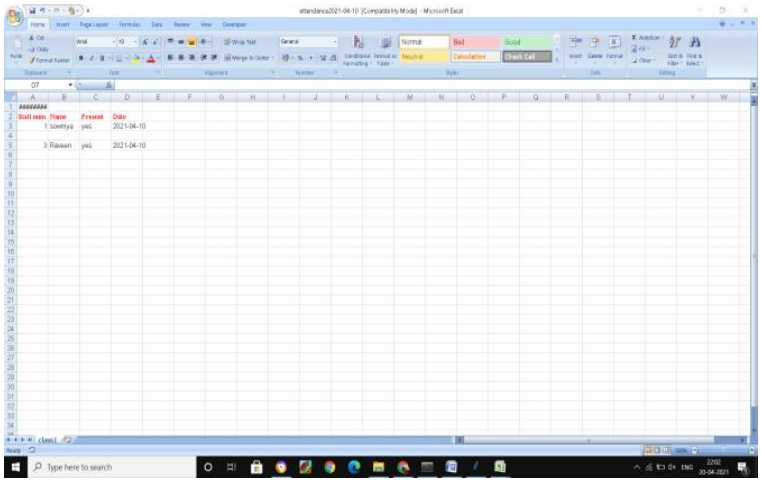
Steps for Face recognition:Work flow of face recognitionbased attendance system:



1) Step 1: First of all, it captures the input image
2) Step 2: After capturing the image it will pre-processor the imageand coverts the image into gray scale Image.
3) Step 3: By using Haar Cascade Classifier face detection will bedone and desired face in rectangular box is stored in data base
4) Step 4: face recognition is done by using Local Binary Patterns Histogram which converts the stored image into histogram and trains with the given dataset
5) Step 5: Histograms of test image will be compared with the histogram of trained data set.
6) Step 6: If it matches attendance will be updated in the attendance excel sheet with date,roll number and name.
7) Step 7: If not matches attendance will not be updated in the attendance excel sheet with date,roll number and name.

VII.RESULTS





VIII. CONCLUSION

In the proposed framework the point is to give an answer for the previously mentioned issues by incorporating face acknowledgment in the process of attendance management that can be utilized during tests or a talk which will save exertion and time. The whole system is implemented in Python programming language. As of now, the facial acknowledgment framework is executed by different reasearchers too, however there is additionally have a few constraints with respect to on functionalities, precision, lighting issue, and so forth that expected to be addressed by the proposed framework.

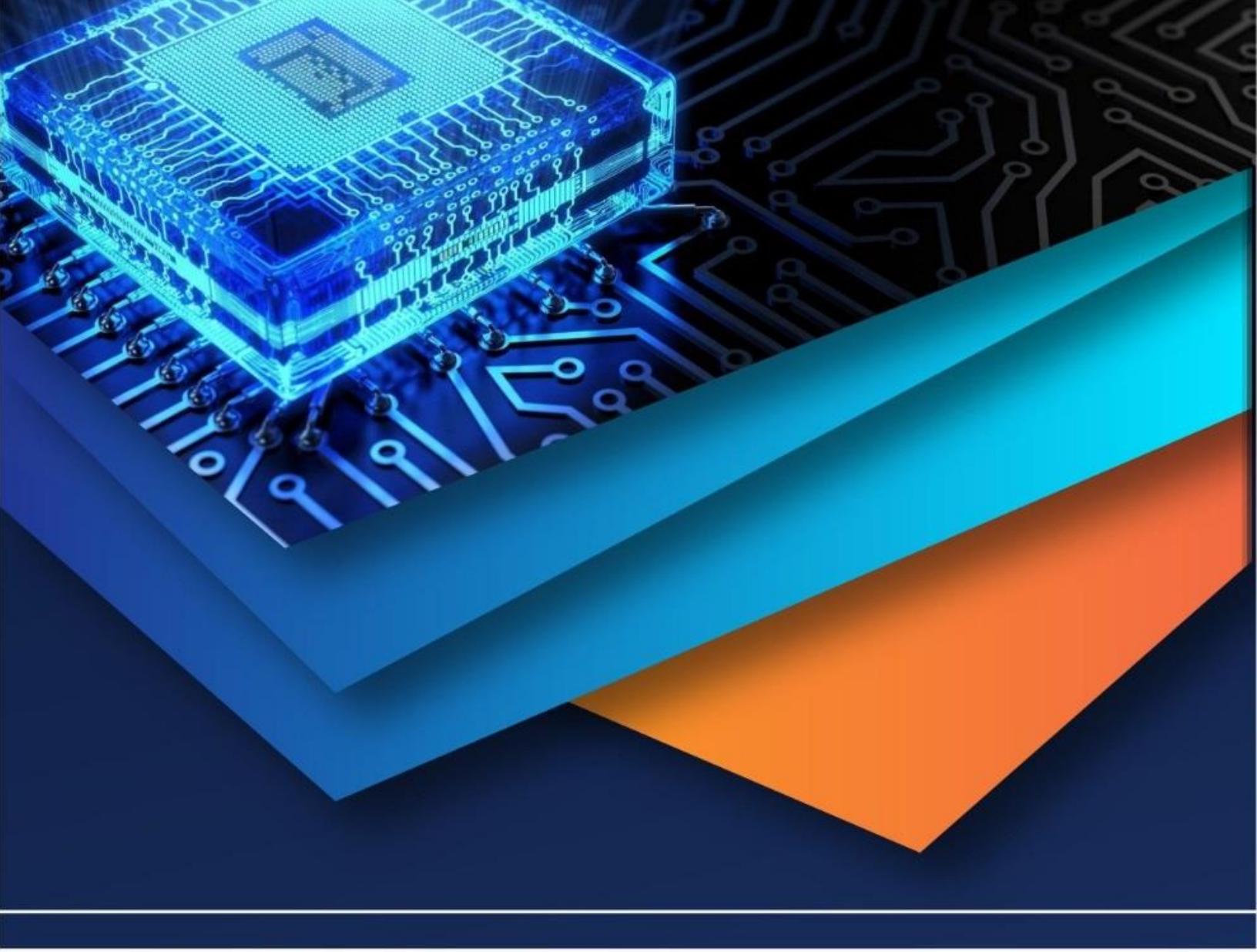
Thus, the proposed framework will uphold the performance of existing student's attendaceframework in the accompanying ways:

•Minimizing the time needed for stamping participation and boosting the time needed for actual teaching process.

•Increase the productivity of the in general system.•Improving the security.

REFERENCES

[1] M.A. Meor Said; M.H. Misran; M.A. Othman; M.M. Ismail; H.A. Sulaiman; A. Salleh; N. Yusop;"Biometric attendance",Publisher: IEEE https://ieeexplore.ieee.org/document/6936516
[2] Shailendra; Manjot Singh; Md. Alam Khan; Vikram Singh; Avinash Patil; Sushma Wadar:"Attendance management system" https://ieeexplore.ieee.org/abstract/document/7124938
[3] Dhiman Kumar Sarker; NafizeIshtiaque Hossain; Insan Arafat Jami;" Design and implementation of smart attendance management system using multiple step authentication" https://ieeexplore.ieee.org/document/7860345
[4] Aditi Purohit; Kumar Gaurav; Chetan Bhati; Atul Oak;" Smarattendance" https://ieeexplore.ieee.org/document/8203717
[5] Vishal Naidu; KumaresanMudliar; Kailas Devadkar;"WLANattendance management system" ://ieeexplore.ieee.org/document/8089117
[6] Muhammad Ayat Hidayat; HolongMarisiSimalango;"Students Attendance System and Notification of College Subject Schedule Based on Classroom Using IBeacon" https://ieeexplore.ieee.org/abstract/document/8720948



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