Attendence Using Face Recognition

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ABSTRACT

Face detection and face recognition are very important technologies these days, furthermore we noticed that they have a variety of uses such as cellphones, army uses, and some high risk information offices. We decided to make a device that detects and recognizes the face as a student attendance system and can be a substitute for the regular paper attendance system and fingerprint attendance system. The main function in our project is going to be done using LabVIEW because, LabVIEW is a very helpful programming tool in regards to facial uses and very helpful in other uses. Our project is based on a main program in LabVIEW that detects and recognizes faces with giving scores and parameters, furthermore the subsystems are an Excel sheet that is integrated with the program, and a messaging device that is for either a message for absent students or to the student's parents. Components of our project are the LabVIEW program as the main system and subsystems, Office Excel sheet to include students' names, and a computer (or laptop) to integrate the programs together.

I INTRODUCTION

Making attendance and keeping the record is the most complicated thing in the manual attendance system. Taking attendance manually is much laborious and causes a lot of productive class time loss as well. Manual attendance like putting name and id in a paper is a frightening system to ever take attendance. It takes an enormous amount of time to take attendance one by one and has a huge chance of being a proxy. In the last few years, some automated systems have been developed significantly like fingerprint, QR-code technology.

However, time makes the difference here with facial recognition technology. QR-code technology has some advantages. It's very easy and fast to use but every time students forget to ring their ID card, then the student won't get attendance. In this system, students should scan their code one by one as a result the system can consume a huge amount of time. Face recognition-based attendance systems have less time-consuming and fewer chances of being a proxy for overcoming this

problem . Face recognition-based attendance systems can be the best. But in the past research had some gaps.

Many automated systems like facial recognition-based systems are unable to take attendance for a group. Students have to come one by one in front of the camera. To solve this problem, we proposed a smart attendance system using a machine learning-based Haar cascade technique for detecting and recognizing faces for its robustness of image using LBPH algorithm for face recognition. With this system, no one can make a proxy for another who does not present in the class. Using this technology along with face recognition the proxy will be significantly reduced and a huge amount of time could be saved. And this system also takes attendance for multiple faces at a time. The application of object detection is massive and Optical Character Recognition or OCR is used for object detection. This is a system of extracting characters from typed images, handwriting, and subtitles from video. This is the fundamental concept of the text-to-speech translating system.

II RELEATED WORK

Face recognition technology has been widely explored in various domains, including security, authentication, and automated attendance systems. Several researchers have investigated different biometric-based attendance systems, such as fingerprint recognition, RFID-based systems, and QR-code scanning, but these methods have certain limitations, including physical contact, time consumption, and vulnerability to fraud.

In recent years, face recognition-based attendance systems have gained attention due to their contactless nature and higher efficiency. Previous studies have implemented different approaches for facial recognition, including Principal Component Analysis (PCA), Convolutional Neural Networks (CNNs), and Local Binary Pattern Histogram (LBPH). PCA-based systems have been effective but often require extensive training data, while CNNs provide high accuracy but demand significant computational resources. The LBPH algorithm, on the other hand, has been widely used due to its robustness against lighting conditions and computational efficiency, making it suitable for real-time applications.

Various studies have attempted to improve the accuracy and speed of face recognition in attendance systems. Some have integrated

We can realise the importance of object detection when it comes to autonomously driving cars. This type of vehicle needs the information of its surroundings. Using object detection cars can easily identify traffic lights and pedestrians and generate more information for the machine to reduce unexpected events like accidents.

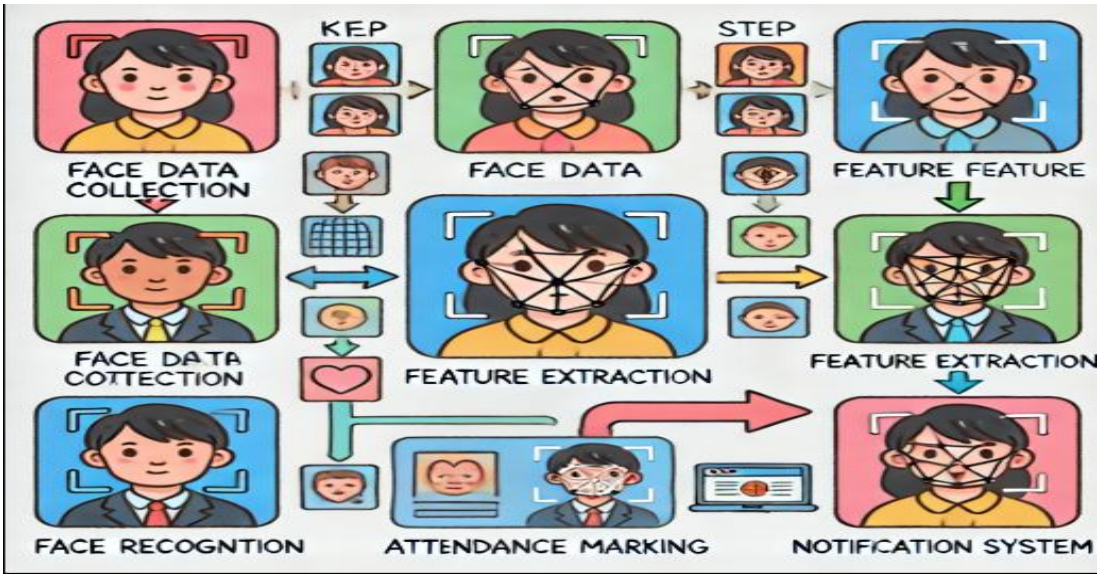
The most common example of the facial recognition system that we encounter every day in our life is phone security login by facial recognition. The Eclecticism of the object detecting system is enormous. This system is often used in sports like cricket and football. A cricket ball tracking system is used for checking LBW out; this is an example of an object detection system also used in another game for reducing human error. This system is often used in home security, object extraction from images and videos. Vastly used in medical imaging like detecting brain tumors, cancer cells, and other skin and internal disease recognition. Also used in robotics and object counting.

Haar Cascade classifiers for face detection, which allows for efficient identification of facial features. However, earlier implementations often struggled with issues such as pose variations, occlusions, and the inability to recognize multiple faces simultaneously. To address these challenges, researchers have combined Haar Cascade face detection with LBPH recognition, enabling real-time, multi-face recognition with increased accuracy.

In comparison to these previous works, the proposed system builds upon existing research by integrating LabVIEW for a user-friendly interface, automating attendance tracking with Excel integration, and implementing an absentee notification system. Unlike past models that required students to individually scan their faces, this system can detect and recognize multiple students simultaneously, reducing processing time and preventing proxy attendance. The incorporation of machine learning techniques and real-time image processing ensures a more efficient, scalable, and practical solution for educational institutions.

By leveraging these advancements, the system improves upon previous limitations, making face recognition-based attendance tracking faster, more accurate, and highly adaptable to real-world classroom environments.

III. METHODLOGY



1.Start

The system is initialized and ready to begin the attendance tracking process. The system activates the camera and prepares for facial recognition.

2.Face Data Collection

The camera captures real-time facial images of students as they enter the classroom. This step

ensures that every student's presence is recorded for processing. Live streaming or frame-by-frame capture can be used depending on system settings.

3.Image Preprocessing

Once the image is captured, it undergoes preprocessing to improve accuracy. Preprocessing steps include:

- Converting the image to grayscale (removes unnecessary color information to simplify processing).
- Enhancing contrast (helps in clearer feature detection).
- Noise reduction (removes unnecessary distortions in the image).
- Resizing and normalization (ensures uniform dimensions for analysis).

These steps ensure that the image is in an optimal format before detection.

4.Face Detection

The Haar Cascade algorithm (or another detection model) is used to identify and isolate faces from the image. The system scans the image and marks the Region of Interest (ROI), which contains the face.

- If no face is detected, the system may prompt for re-capturing.
- If multiple faces are detected, it processes each face individually.

This step ensures that only the relevant facial region is analyzed for recognition.

5.Feature Extraction

Once the face is detected, the system extracts unique facial features. This process includes:

- Identifying key facial points (eyes, nose, mouth, jawline, etc.).
- Applying feature extraction algorithms such as Local Binary Pattern Histogram (LBPH), Eigenfaces, or Fisherfaces to encode facial data.
- Creating a numerical representation of the face to be used for comparison.

This step converts the face into a format that the system can recognize.

6.Face Recognition

The extracted facial features are compared with a pre-stored database of student images. The system then:

- Matches the extracted features with stored face data to recognize the student.
- If a match is found, the system confirms the student's identity.
- If no match is found, the system either marks the face as unknown or prompts the user to register.

The recognition process uses machine learning techniques to improve accuracy over time.

7.Attendance Marking

Once the student is successfully recognized, their attendance is automatically logged into a database, Excel sheet, or cloud-based system.

- This eliminates the need for manual roll calls, saving time.
- The system prevents proxy attendance, ensuring only present students are marked.
- Attendance reports can be generated in real-time for teachers and administrators.

8.Notification System

If a student is absent, the system sends automated notifications to:

- The student (reminder of absence).
- The parent (if linked to the student's profile).
- The teacher/admin (for attendance tracking).

Notifications can be sent via email, SMS, or mobile app alerts.

9.End

The attendance process is completed successfully. The system logs all attendance records for future analysis and generates attendance reports as needed.

IV. DIGITAL IMAGE PROCESSING

Digital Image Processing (DIP) plays a crucial role in the Face Recognition-Based Attendance System by enhancing image quality and extracting key facial features for accurate recognition. The process begins with image acquisition, where a webcam or camera captures real-time student images. These images undergo preprocessing, which includes converting them to grayscale, reducing noise, enhancing contrast, and normalizing dimensions to improve recognition accuracy. Once preprocessed, the system segments the image to detect and isolate the face from the background using the Haar Cascade algorithm. After detection, the feature extraction process identifies unique facial characteristics such as eyes, nose, and mouth using the Local Binary Pattern Histogram (LBPH) algorithm. These extracted features are then compared with stored facial data in the database to determine the identity of the student. Once the face is recognized, the attendance is automatically recorded, and notifications are sent if necessary. Digital Image Processing ensures high accuracy, efficiency, and robustness in the system, making it an essential technology for automating attendance tracking in educational institutions.

V. REQUIREMENTS

Hardware Requirements

● PROCESSOR : Intel i5-5th gen processor or Greater ·
● RAM : 8 GigaByte (GB) or Greater
● SSD : 512 Giga Byte (GB) or Greater ·
● MONITOR: Colour (For Best Result)
● WebCam : Resolution of at least 720p or higher ● Graphic card : NVIDIA GeForce 1050 (4GB)

Software Resources Required

● 1. Operating System: Windows 7+
● 2. Programming Language : Python 3.0, Flask
● 3. Framework: PyTorch 1.4 ,
●4. Cloud platform: Google Cloud Platform
● Libraries: OpenCV, Face-recognition,Numpy,Pandas

VI. SAMPLE OUTPUT

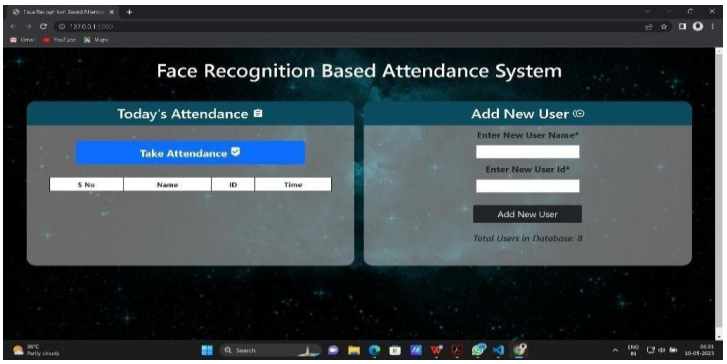


Figure 6.1 Home page

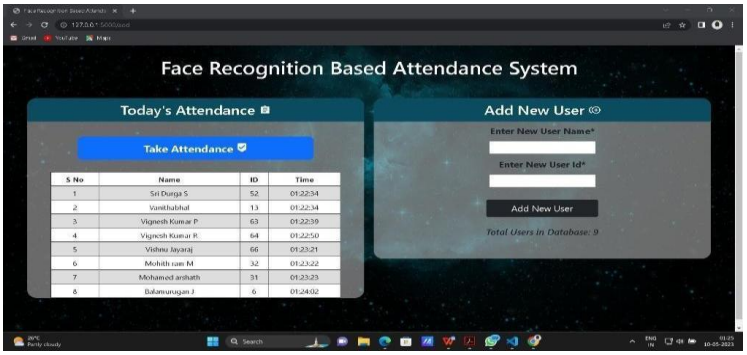


Figure 6.2
Attendance page

	A	B	C	D
1	Name	Roll	Time	
2	Sri Durga S	52	01:22:34	
3	Vanithabhal	13	01:22:34	
4	Vignesh Kumar P	63	01:22:39	
5	Vignesh Kumar R	64	01:22:50	
6	Vishnu Jayaraj	66	01:23:21	
7	Mohith ram M	32	01:23:22	
8	Mohamed arshath	31	01:23:23	
9	Balamurugan J	6	01:24:02	
10				
11				

Figure 6.3. CSV output

VII. CONCLUSION

Face recognition systems are part of facial image processing applications and their significance as a research area are increasing recently. Implementations of the system are crime prevention, video surveillance, person verification, and similar security activities. The face recognition system implementation can be part of Universities. Face Recognition Based Attendance System has been envisioned for the purpose of reducing the errors that occur in the traditional (manual) attendance taking system. The aim is to automate and make a system that is useful to the organisation such as an institute. The efficient and accurate method of attendance in the office environment that can replace the old manual methods. This method is secure enough, reliable and available for use. Proposed algorithm is capable of detect multiple faces, and the performance of system has acceptable good results.

REFERENCES

1. **Paul Viola and Michael Jones**, *Rapid Object Detection using a Boosted Cascade of Simple Features*, Conference on Computer Vision and Pattern Recognition (CVPR), 2001.

2. **Kushsairy Kadir, Mohd Khairi Kamaruddin, Haidawati Nasir, Sairul I Safie, Zulkifli Abdul Kadir Bakti**, *A Comparative Study between LBP and Haar-like Features for Face Detection using OpenCV*, 4th International Conference on Engineering Technology and Technopreneurship (ICE2T), DOI:10.1109/ICE2T.2014.7006273, 2015.

3. **Kelvin Salton do Prado**, *Face Recognition: Understanding LBPH Algorithm*, *Towards Data Science*, November 2017. Available at: https://towardsdatascience.com/face-recognition-how-lbph-works-90ec258c3d6b

4. **Corinne Bernstein**, *Face Detection*, *TechTarget Network*, February 2020. Available at: https://searchenterpriseai.techtarget.com/definition/face-detection

5. **Ian Sample**, *What is Facial Recognition and How Sinister is It?*, *The Guardian*, July 2019. Available at: https://www.theguardian.com/technology/2019/jul/29/what-is-facial-recognition-and-how-sinister-is-it

6. **Face Recognition with Haar Cascade**, *Towards Data Science*, December 2020. Available at: https://towardsdatascience.com/face-detection-with-haar-cascade-727f68dafd08