

# **Review Paper on Face Recognition-based Attendance System**

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**Abstract** - The Attendance System performs image and class training that enables OpenCV data extraction functionality. The central objective behind this project involves building Face Recognition technology for attendance management to transform existing manual procedures into new automated systems. The system operates within the classroom space to train student with information that consists of name along with roll number and class details and sections and images. The extraction of images occurred through OpenCV software. When the corresponding class period began students would approach the machine for a photo capture session against the registered database photos. The development of a facial recognition-based attendance solution through Raspberry Pi forms the main objective of this project. The integration of face recognition algorithms in this system removes the requirement for manual user contact and achieves better precision levels together with enhanced dependability. The system first recognizes faces through its capture function and then creates records about attendance while determining presence as well as absence based on time spent in front of the system. The application features Face Detection and Face Recognition functionalities conducted through the Haar Cascade classifier using Open CV algorithms executed on Raspberry Pi hardware.

*Key Words*: Face Detection, Face Recognition, HaarCascade classifier, Open CV, Raspberry Pi

# **1.INTRODUCTION**

A signal requires image or photographic input to qualify as an Image Processing system. Two forms exist in image processing known as analog and digital processing. The image processing technique of analog involves modification of hard copy images from photographs and printouts. Advanced computers handle digital image manipulation under the process of digital image processing. The requirement for student attendance has become crucial for educational institutions regardless of their level from colleges to universities and schools today. The two available attendance systems include Attendance System (Manual) and the Attendance (Automated). The system System will accept photographed images used for entry registration. A person's image submission in the classroom will trigger an automated marking of student attendance. The manual tracking method checks every student record on paper which takes faculty/staff members longer to complete while providing higher opportunity for students to have others take attendance for them. The new system operates efficiently because it works on contemporary everyday electronic devices. The presented research marks the inaugural effort in creating an automated attendance identification system that employs facial recognition technology along with image processing for attendance recording in educational classrooms. Perpetual facial detection through this solution minimizes the performance obstacles of current technologies while improving face recognition precision. We examined different methods to use face recognition based continuous surveillance for marking attendance. The proposed method of this paper seeks to acquire face images plus position and attendance data which serves useful information for both classroom and lecture activities.

# 2. LITERATURE SURVEY

#### Barla Dikshit, Lakshay Arora, Pushkar Verma, Rajat Chandel, Kodekandla Saiganesh Reddy

Project aims to automate attendance management in educational institutions and offices using a Face Recognitionbased system. Replacing traditional roll calls, it leverages OpenCV for image processing and utilizes student details such as name, roll number, and class. Equipped with a Logitech C270 web camera and an NVIDIA Jetson Nano, the system captures and processes images. The Haarcascade classifier detects faces, while the LBPH algorithm identifies them by comparing them to a pre-trained dataset. Attendance is marked automatically, and records are updated in an Excel sheet. This system enhances efficiency and modernizes attendance tracking.[1]

# Md. Saidur Rahman, Rubab Ahmmed, Md Abdur Rahman, Md Asaduzzman Sarker

Md. Saidur Rahman along with his colleagues developed a Biometric attendance system based on fingerprints which used distinct fingerprint features of individuals to deliver accurate attendance recording solutions. The implementation of fingerprint-based biometric systems enables schools to replace conventional attendance methods and provide both better security measures and efficient operation. Along with this system comes automatic text message capabilities for guardian attendance verification. Additions of a GSM system to the attendance system will improve its operational features according to participants.[2]

Ankur Shukla, Shanteshwar Tripathi, Raj Mishra, Shiva Verma, In the review paper of Ankur Shukla and his team Address the inefficiencies and errors in traditional attendance tracking methods. Among their proposals stands an RFIDbased attendance system which operates in real-time with Excel spreadsheets. A combination of RFID tags and readers operates attendance marking automation and instant Excel sheet file updates without requiring manual input. The system performance becomes more secure and dependable when RFID technology works together with fingerprint or facial identification methods for authentication. Such integration

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helps stop proxy attendance while permitting authorized users to set their presence mark.[3]

# Onkar Akirke, Atharva Patange, Devesh Sonawane, Chinmay Yenugwar, Prof. S.S. Bhong

This paper explores the use of facial recognition technology for attendance management in educational and organizational settings. It highlights how biometric advancements, particularly facial recognition, offer a secure, accurate, and non-invasive solution for tracking attendance. The paper provides a comprehensive review of the current state-of-the-art systems, discussing the technology, implementation challenges, benefits, and ethical considerations involved.[4]

#### Vismitha P Y

Vismitha P Y discusses the importance of student attendance and critiques traditional manual methods, highlighting their time-consuming nature and susceptibility to errors. It emphasizes the need for more efficient systems, especially in the context of challenges posed by situations like the COVID-19 pandemic.[5]

#### Xin Geng, Zhi-Hua Zhou, and Kate Smith-Miles

The practice of traditional face recognition systems requires carefully controlled conditions that must maintain specific lighting formats together with particular head positions while blocking any possible barriers to visual clarity. Such limitations reduce their ability to succeed in practical settings. The research by Geng explores Individual Stable Space as an approach to achieve face recognition beyond controlled conditions. The main shortcoming of Geng's method exists because it demands photographs showing one person at a time. The requirement for single-face images prevents its practical use in real-time monitoring systems such as attendance tracking since multiple persons could appear in each frame.[6]



Fig 2.1. Graph of Pros and Cons of Attendance System

## **3. FIOW CHART AND SYSTEM**



fig 3.1. Flow Chart of Attendance System

- 1. Camera: This serves as the first data source. The system generates live environmental images which contain the face of the person under recognition
- 2. Image Acquisition: The image data goes through reception then storage in a format optimum for subsequent processing.
- 3. Face Detection: The image data goes through reception then storage in a format optimum for subsequent processing.
- 4. Pre-Processing Block: The system converts images Grayscale conversion takes place because colour details are unnecessary for facial recognition yet the computations become simpler. Through image enhancement techniques that combine contrast adjustment with noise reduction methods, researchers obtain improved image quality that shows human facial features better. Specific processes in image filtering remove picture contaminations which results in elevated image quality.
- 5. Local Binary Pattern (LBP) Histogram: The texture descriptor LBP detects spatial pixel relationships in image data to determine their associations. The information derives from facial recognition systems because it lets them distinguish one face from another. A histogram describing LBP pattern distributions appears in the image.
- 6. Machine Learning Prediction: The LBP histogram features that were extracted are sent to a trained machine learning model in the final step. The image features are processed by an analytical model which determines

## 4. METHODOLOGY

- 1. Image Acquisition: The process begins by taking pictures through webcam capture. The capture of images through a webcam constitutes an essential first step that creates the necessary raw information for subsequent operations.
- 2. Face Detection: The system operates through algorithms that find faces inside the recorded image. The system detects faces using two main algorithms which are Haar cascades and HOG (Histogram of Oriented Gradients).
- 3. Face Comparison: After detecting the face the system derives features from it. A combination of Histogram of Oriented Gradients (HOG) and deep learning-based feature extraction approaches are presently used for



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this process. After extracting features from the face they get compared with preloaded facial images in a database. A database that runs under this system includes feature representations of authorized persons.

4. Decision Making: The system checks the proximity of detected facial features with stored database features whenever it finds a match. The verification process uses this step to confirm correct matches occur. The system continues its process to the next step after confirming that the game match requirement is met by proximity check results. The system activates the selected action like door opening when it confirms the match of an individual. The system prevents any security-sensitive operations when there is either no detection match or the proximity test results in failure. This prevents unauthorized entry.

# **5. CONCLUSIONS**

Recent years have seen an increase in interest in research regarding face recognition systems which constitute an aspect of facial image processing applications. The system execution contains functions for crime protection and video monitoring alongside person authentication and related protection activities. The face recognition system development process belongs to the University infrastructure. A Face Recognitionbased Attendance System has been developed to minimize the mistakes that appear within traditional manual attendance procedures. This system adopts automation to develop functionality that serves organizational needs similar to those of institutes. The current method of workplace attendance enables efficient and accurate performance as an alternative to outdated manual procedures. The method delivers sufficient security alongside reliability and remains ready for deployment.

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