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### **Student Attendance system using Face Recognition**

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### ABSTRACT-

The Student Attendance System using Face Recognition offers a modern and efficient way to monitor student attendance in educational settings. Unlike traditional methods like manual roll calls or swipe cards, which can be slow and error-prone, this system automates the process, reducing human mistakes and saving time. This system leverages facial recognition technology to uniquely identify students, offering a quick, accurate, and secure method for marking attendance. The system works by capturing the facial images of students via a camera at the start of each class. These images are then processed and matched against a pre-registered database of student faces in Webcam. Once a match is found, the student's attendance is automatically recorded in the system. The face recognition algorithm uses deep learning techniques to ensure high accuracy and efficiency, even in varying lighting conditions and with different facial expressions. In addition to improving the efficiency of attendance tracking, the system enhances security by reducing the chances of proxy attendance and unauthorized access. It also eliminates the need for physical interaction, making it a contactless solution ideal for modern educational environments. The system can be integrated with other management systems, such as grade books or student portals, for seamless data synchronization. Overall, this face recognition-based attendance system significantly reduces administrative workload, ensures data accuracy, and contributes to a more effective learning environment.

Keywords— Face Recognition, Webcam, Python, OpenCV

### INTRODUCTION

In educational institutions, managing student attendance is a fundamental administrative task, but it often involves cumbersome, time-consuming processes. Traditional methods, such as roll calls, manual sign-ins, or paper-based attendance sheets, are not only inefficient but also prone to human error, absenteeism, and sometimes even malpractice, such as proxy attendance. As educational environments increasingly embrace technological advancements, there is a growing demand for more efficient and reliable solutions to address these challenges. One promising solution to automate and enhance the accuracy of attendance tracking is the use of facial recognition technology. This approach offers a modern, contactless alternative that eliminates the need for physical interaction, reduces the risk of errors, and improves security. With facial recognition, students can be uniquely identified through their facial features, allowing for seamless and instant attendance marking. Student Attendance System using Face Recognition integrates machine learning and computer vision algorithms to accurately recognize and verify students based on their facial characteristics. By using a camera to capture the student's face at the beginning of each class, the system matches the live image against a pre-registered database, automatically marking the student's presence in the attendance system. The use of deep learning techniques in the face recognition process ensures high accuracy and reliability, even in diverse classroom environments with varying lighting and angles. This system offers several advantages over traditional methods. It significantly reduces administrative workload, eliminates the potential for fraudulent attendance practices, and provides a more streamlined and data driven approach to attendance management. Furthermore, by storing attendance data electronically, the system ensures easy retrieval and analysis, aiding in better student tracking, academic reporting, and overall institutional management.

### LITERATURE SURVEY

S. Lukas, A. R. Mitra, R. I. Desanti and D. Krisnadi,"Student Attendance System in Classroom Using Face Recognition Technique," in ICTC 2016, Karawaci, 2016.

#### **Described:**

Authentication is one of the significant issues in the era of information system. Among other things, human face recognition (HFR) is one of known techniques which can be used for user authentication. As an important branch of biometric verification, HFR has been widely used in many applications, such as video monitoring/surveillance system, human computer interaction, door access control system and network security. This paper proposes a method for student attendance system in classroom using face recognition technique by combining Discrete Wavelet Transforms (DWT) and Discrete Cosine Transform (DCT) to extract the features of student's face which is followed by applying Radial Basis Function (RBF) for classifying the facial objects. From the experiments which are conducted by involving 16 students situated in classroom setting, it results in 121 out of 148 successful faces recognition. N. M. Ara, N. S. Simul and M. S. Islam, "Convolutional Neural Network Approach for Vision Based Student Recognition System," in 2017 20th International Conference of Computer and Information Technology (IC- CIT), 22-24 December, 2017, Sylhet, 2017. Described:

The automatic face recognition system is one of the most significant research attentions in recent years. Face recognition technology has become an important tool in different applications such as access control, forensic analysis, and identity verification, It can match a human face from a digital image against a database of faces. This system is employed to certify users through ID verification services. This system was started developing in the 1960s, started as a form of Computer application. Since their beginning, facial recognition has become one of the most used technologies . These days, face recognition is used on smartphones, also used in industries to confirm the identity. In biometric face recognition technology uses computer algorithms to analyze and identify one's unique facial features. The process of face recognition basically goes through capturing an image of a person's face, extracting unique features from the image, and comparing those features with a database of shape of the jawline, the size of nose, the contours of face etc. As technology grows, attendances are stored in a database with security. All the information concerning the students is kept within the database. So that Manual attending can be replaced by the RFID.

## P. Wagh, S. Patil, J. Chaudhari and R. Thakare, "Attendance System based on Face Recognition using Eigen face and PCA Algorithms," in 2015 International Conference on Green Computing and Internet of Things (ICGCloT), 2016. Described:

This work presents a study on the sensitivity of bare fiber Bragg grating (FBG) to detect ultrasonic frequencies under various temperature. Two infrared (IR) laser with excitation wavelength,  $\lambda$ =1310nm and  $\lambda$ =1550nm were employed. Various types of FBG with operating wavelength of 1546nm, 1550nm and 1554nm were used to identify the optimum design of sensor in detecting range of ultrasonic frequencies between 5kHz until 30kHz under various surrounding temperature from 20°C until 30°C. The principle of FBG vibration detection lies in the fact that spectral shift would occur due to the acoustic-induced variations in the medium. In this study, the ultrasonic signal had been investigated by monitoring the amplitude of optical output power. At 30°C, the bare FBG with operating wavelength of 1554nm using 1310nm light source exhibits the optimum performance in detecting ultrasonic vibration Frequency, in which its sensitivity was obtained as  $\Delta$ P=0.10dBm. We believe that the sensitivity of the proposed sensor can be enhanced by introduce nano materials onto the FBG or by altering the physical structure of FBG. Attendance of students in a large classroom is hard to be handled by the traditional system, as it is time-consuming and has a high probability of error during the process of inputting data into the computer. This paper proposed automated attendance marking system using face recognition technique. The system deployed Haar cascade to find the positive and negative of the face and eigenface algorithm for face recognition by using python programming and Open CV library. The proposed method using PCA to resolved the problems such as lightning of the images, noise from the camera, and the direction of the student faces. The attendance of the student was updated to the Excel sheet after student's face has been recognized.

## K. Goyal, K. Agarwal and R. Kumar, "Face Detection and track-ing" in International Conference on Electronics, Communication and Aerospace Technology, ICECA 2017.

#### **Described:**

The proposed automated attendance system using face recognition is a great model for marking the attendance of students in a classroom. This system also assists in overcoming the probabilities of proxies and fake attendance. In the modern world, an outsized number of systems using biometrics are available. However, the facial recognition turns out to be a viable option because of its high accuracy along with minimum human intervention. Automated Attendance System has been envisioned for the purpose of reducing the errors that occur in the traditional attendance taking system. The aim is to automate and make a system that is useful to the organization 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. No need for specialized hardware for installing the system in the office. It can be constructed using a camera and computer.

# B. Kranthi kiran and P. Pulicherla, "Face detection and recognition for use in campus surveillance", International Journal of Innovative Technology and Exploring Engineering, vol. 9, no. 3, pp. 2908-2913, 2020.

### Described:

We had seen the show "Las Vegas" in social media which has seen face identification software in task. In that one episode, the security department at the fictional Montecito Hotel and Casino used CCTV to capture an image of a card counter, thief or blacklisted as distinct. It should process the captured image through the data warehouse in order to identify the person. At last the all the brutes are accompanied from the casino and they are prisoned. Since the social media cannot brings the fact as it is to the world. In 2001, the Tampa Police Department placed police cameras furnished with visual perception technology in their York City nightlife district in order to avoid the offence in that area. But it was not succeeded and it was abolished in 2003 because of its inefficiency. Hence people were opposed and forbid the cameras from getting such a clear shot to recognize anyone. Boston's Logan Airport also installed two individual tests of face identification devices at their security end. Within three months the results were thwarted.People have the capability of identifying & differentiating faces naturally, but such type of computers had built in recent days. In the mid-1960s, software developers had started to innovate the device to identify and distinguish the human faces which takes longer time and different types of algorithms and technical programs have been developed by software developers that are explained below.

### METHODOLOGY

Data Collection: Capture high-quality images of enrolled students during the registration phase. Create a dataset of faces with multiple angles and varying lighting conditions to ensure robustness. Face Detection: Utilize advanced algorithms like Haar Cascade or DNN (Deep Neural Networks) for detecting faces in real-time from video streams or images. Face Recognition: Employ pre-trained models such as: Face Net, Deep Face, or Dlib for extracting facial embeddings. Compare detected faces with stored embeddings in the database. Attendance Marking: Match the detected face with the stored records If a match is found, log the student's attendance automatically. If not, flag the instance for manual verification. System Workflow Student Registration: Capture face data and student details (name, ID, etc.). Store processed facial embeddings in a secure database. Classroom Setup Place a camera in the classroom to capture video or periodic images. Real-Time Detection and Recognition: Detect and recognize faces during the class session. Mark attendance in real time by updating the database.

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