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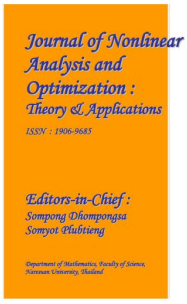

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SMART ATTENDANCE SYSTEM USING ANTI-SPOOFING TECHNIQUE

[#1]Mrs. Afreen Subuhi, Assistant Professor

[#2]D. Uday Kiran Chary, Student

[#3]P. Vamshi, Student

[#4]N. Santosh Kumar, Student

Department of Information Technology

CMR College of Engineering and Technology, Hyderabad, India

ABSTRACT: With the advancement of technology in recent years, human attendance tracking tactics have been replaced by sophisticated automated systems. This research offers a novel method of monitoring attendance using a Smart Attendance System (SAS) that uses participant photos that are taken and assessed in real time through webcam input. These systems' susceptibility to spoofing attacks, in which malevolent actors try to trick the system by providing fictitious biometric data, is one of its main problems. With the integration of advanced spoofing detection algorithms, this project offers a comprehensive solution to enhance the security and dependability of the Smart Attendance System. The technology uses deep learning techniques to discriminate between real and fake facial photos in order to guard against fraudulent attempts. To train the neural network model, several spoofing techniques are used, such as print, replay, and 3D mask attacks. The three essential processes that constitute the foundation of the suggested system are face identification, feature extraction, and spoofing detection. These procedures look at camera input in real time to allow precise identification and strong defense against spoofing attempts. The system is made to be dynamic and flexible, always picking up new techniques from new data to improve its spoofing detection capabilities. A number of tests were conducted using various real-world circumstances in order to verify the efficacy of the suggested Smart Attendance System. The outcomes show a considerable drop in false positives and false negatives, demonstrating the system's capacity to precisely track real attendance while foiling attempts at spoofing..

KEYWORDS: Facial Recognition Attendance, Anti-Spoofing Techniques, Liveness Detection, Face Recognition Security.

1. INTRODUCTION:

The project aims to meet the need for enterprises to have an accurate and efficient attendance tracking system. While there are limited options for alternative automatic identifying systems like fingerprints and ID scans, traditional techniques like writing names down or signing documents are laborious and insecure. The project's objective is to develop an advanced facial recognition system that can accurately identify and validate people for attendance purposes by utilizing anti-spoofing technologies. High forecast accuracy, a brief training time, and adaptability to a variety of settings—such as governments, airports, schools, and colleges—are essential features of the system.

Research objective:

The research goal of the project is to develop a real-time attendance system that both solves the shortcomings of previous methods and offers an effective one. High precision, minimal processing complexity, and cost-effectiveness are the goals of the proposed system. It gathers student faces using cameras and facial recognition software, then compares them to previously uploaded images stored in the database. The fake proxy pixels are the system's primary focus for spying.

Fig:1 Spying the fake proxy pixels.

2. EXISTING SOLUTION

Alhanaee Khawla advanced. Face identification has become a major research topic in recent years due to its importance in biometric authentication in a variety of applications, including access control and attendance management. Attendance management systems, despite their complexity and the amount of effort required to keep consistent attendance records, are critical to every type of organization. There are numerous automated approaches for identifying people, such as biometrics, RFID, eye tracking, and speech recognition. The face is one of the most common biometrics used for identity authentication. This research offers an attendance system for facial recognition that employs deep learning convolutional neural networks. We used three pre-trained convolutional neural networks on our data to perform transfer learning. The three networks outperformed expectations in terms of training time and prediction accuracy.

Arjun Raj There is now a model for educational institutions, and the current concerns concern consistent student accomplishment. Inadequate attendance is one of the factors contributing to the decline in student achievement. While there are numerous methods for confirming your attendance, signing or phoning the students is the most usual. It was more difficult and took longer. A computer-based student attendance tracking system will now help instructors keep track of attendance statistics. We used an advanced face-recognition attendance system for this project. Our goal is to merge Face Recognition technology with a Smart Attendance System for a wide range of applications. The new method reduces time by using facial recognition and removing the potential of proxy attendance via face authorization. Now, this strategy can be used in situations when participation is required. For this setup, you'll need OpenCV, Python-based Dlib, and a Raspberry Pi. The system in place instantaneously recognizes a person's face using an LBPH face recognizer. It is not always possible to get optimum lighting conditions in real life because light influences both Eigen and Fisher faces. To overcome this issue, the LBPH face recognizer has to be upgraded. This method compares the test image to the training image to determine who is and isn't present. The attendance data is stored in an excel spreadsheet that is automatically refreshed by the system. When a pupil is absent, GSM will instantly send a message to the parent's phone number. We used MIT App Inventor to construct an Android app that allows students to validate their attendance.

Dev Samridhi, and Patnaik Tushar[3] Face recognition is one of the most widely used applications of image processing in business. Facial recognition is a major difficulty in authentication, particularly for school attendance. The "face recognition" attendance system uses high-definition surveillance, face biostatistics, and other computer technologies to identify students. The system's development goal is to digitize the prior technique of attendance tracking, which required manually calling names and keeping paper records. The current processes for tracking attendance are difficult and time-consuming. Manually keeping track of attendance simplifies record-changing. The traditional method of tracking attendance, as well as modern biometric technology, are susceptible to proxies. It is consequently recommended that this essay address all of these topics. Gabor filters, generative adversarial networks, CNN, SVM, KNN, and Haar classifiers are all implemented in the proposed system. Following facial recognition, attendance reports will be generated and saved in Excel format. Several settings are tested for the system, including variations in head motions, lighting, and the distance between the student and the camera. After extensive testing, the overall correctness and complexity are assessed. The suggested approach proved to be a reliable and effective instrument for taking classroom attendance that required no time or human work. The developed solution is less expensive and easier to apply.

Alaa Albahrani designed an attendance tracking system. It can be difficult to get students involved in the classroom, especially in large groups. Proxy attendance is always an option, but the tedious and time-consuming old system of calling out students' names remains in use. We solved this challenge by implementing a smart attendance management system (SAMS) that employs GPS, fingerprints, and facial recognition to track student attendance. SAMS helps teachers in two ways. It starts with a flawless automatic roll call. In addition to producing a DN list of students with low attendance ahead to tests for the academic affairs unit, it keeps track of students' attendance over time and shares it with the advising unit. SAMS tells students when the rollcall window on their smartphone is engaged or opened for

a specific date/time slot in a class, using the instructor ID, topic ID, and classroom location fields. Students can register for classes using the fingerprint or facial recognition technology built into their smartphones. As a result, the system records both the classroom's location and the student's roll call. The system employs deep learning (DL) approaches for biometrics, such as the histogram of directed gradients for fingerprint and facial identification. The suggested strategy is also effective for roll call in virtual classes.

In this day of rapidly expanding new technology, E CHARAN SAI [5] has developed a critical educational strategy, such as attendance, that should not be treated in the same, uninteresting manner. Large class sizes make traditional classroom management difficult. Entering data into a system is not recommended because it is time-consuming and error-prone. Real-Time Face Recognition is an effective method for tracking the daily attendance of a large number of pupils. Despite the fact that numerous techniques and algorithms have been developed to improve face recognition ability, our proposed model employs the OpenCV library's Python implementation of the LBPH (Local Binary Pattern Histogram) face recognition technique in conjunction with the Haarcascade classifier to distinguish between positive and negative aspects of the face. For user interface activities, we use the TkinterGUI.

PROPOSED SYSTEM

The following actions are taken by the project:

Face Detection: To detect faces in the input image, the system employs the Haar Cascade Classifier.

Face Recognition: The system uses the FaceNet model to detect faces..

Liveness Detection Algorithm (Motion Analysis): To decide if a face is genuine or not, the system employs the Convolutional Neural Network (CNN) model.

Step 1: Data Acquisition

Take a camera and record a live video feed of the subject's face.

Step 2: Preprocessing

Make all of the video frames grayscale.

Use face detection to identify and segregate the facial region.

Step 3: Feature Extraction

Keep track of crucial face features like the lips, nose, and eyes throughout time in the isolated area.

Determine how the landmarks moved or shifted during the next few frames.

Determine the total or average motion magnitude.

Step 4: Liveness Assessment

Set a limit on the amount of mobility over which the topic is considered "live." If the topic (which could be a photo or a video) falls short of this threshold, the algorithm considers it non-living.

Check your motion magnitude calculation against the threshold.

Step 5: Decision

Once the motion magnitude exceeds the cutoff, the subject is termed "live."

Mark the topic as "non-live" or request additional verification if the motion magnitude is less than the threshold.

Attendance Marking: The system marks the attendance of all identifiable faces in the database.

Attendance Marking: The technology logs the attendance of recognized faces in the database.

Face Detection Steps: OpenCV includes a simple interface for utilizing Haar Cascade Classifiers to detect faces. The following are the main steps involved:

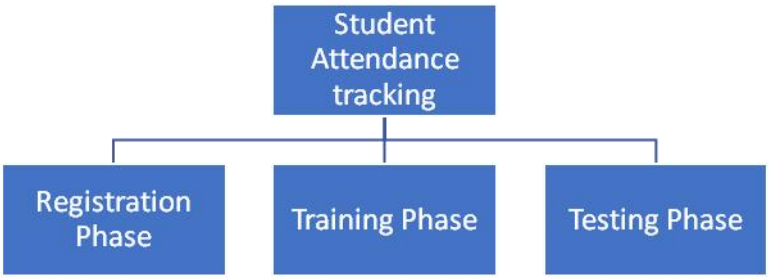

Fig:2a Student attendance tracking

Registration phase:

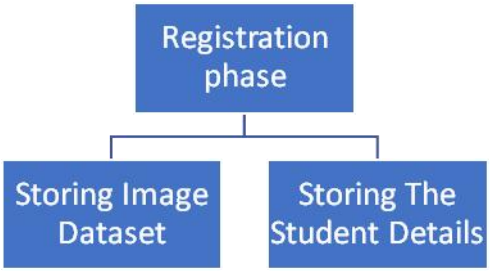

Fig:2b Registration phase

Steps involved in registration phase:

• Complete the student information.

• Turn on the webcam.

• Take fifty webcam pictures per employee.

• Image scaling and face detection.

• When you have taken fifty pictures, destroy the webcam.

• A local directory is where images are kept.

• Entering data about students into the database.

Training Phase:

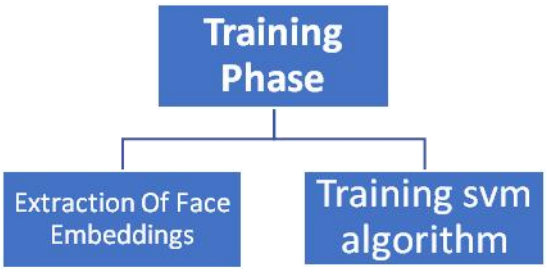

Fig:2c Training Phase

During the training phase, the Facenet model will receive a 160*160 picture from the face embeddings extraction process. The image will then go through the first architecture phase, which involves embedding all of the photos. Finally, it will generate 128-dimensional feature vectors and labels, also known as facial embeddings.

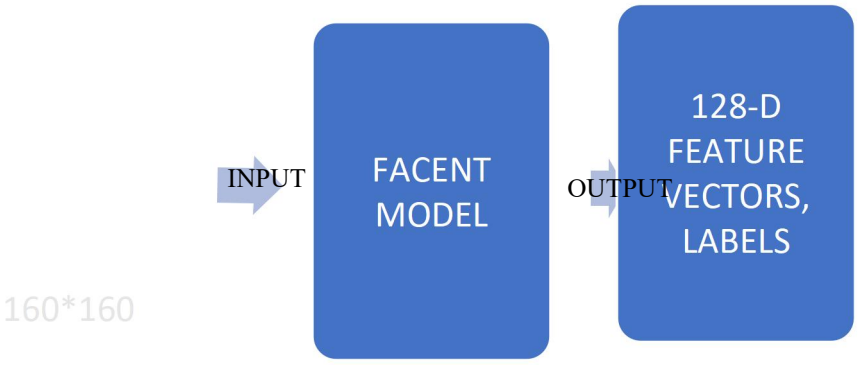

Fig:2d Extraction of face embeddings

Marking Attendance:

Flow chart for marking attendance:

RESULT:

In addition to the falsified images not being registered in the database, the recorded faces are properly saved with no duplicate values for a certain day.

FaceNet was generated using Cosine model metrics.

Using Cosine model metrics, FaceNet resulted

Threshold : 40

Accuracy :98.21

Precision : 100

Recall : 96.42

F1 : 98.18

Also using Euclidean model metrics, FaceNet resulted

Threshold : 11.26

Accuracy :98.57

Precision : 100

Recall : 97.14

F1 : 98.55

CONCLUSION:

The smart attendance system is strengthened against spoofing attacks by incorporating anti-spoofing technology, in which users attempt to mislead the system by submitting false or altered biometric data.Anti-spoofing solutions can include measures such as liveness detection, which ensures that the biometric data supplied is from a real person rather than a false or cloned source. Anti-spoofing technology protects attendance records from unauthorized access and ensures data integrity. This is especially important in workplaces, educational institutions, and other settings where attendance tracking is required for a variety of reasons, such as compliance, payroll administration, and security.

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