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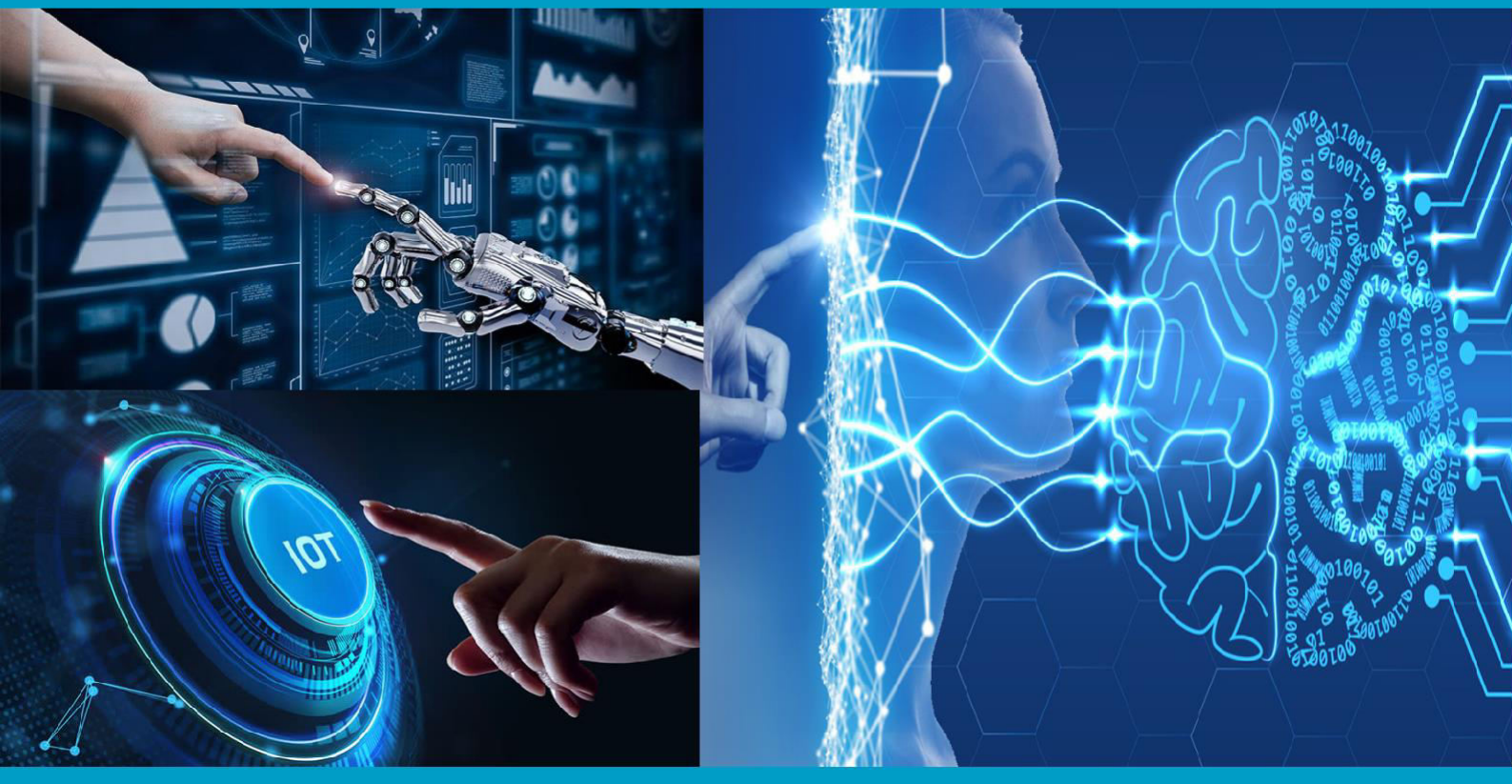

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Attendance360: Next-Generation Attendance Management with AI-Powered Cameras

[1] Dr. Sanjeev Kulkarni., [2]Narahari Hegde, [3]Nihal, [4]Shamith B Kulal, [5]Vethesh Kumar

[1], Associate Professor, Dept. of Information Science and Engineering, Yenepoya Institute of Technology, Moodbidri, India.

[2,3,4,5], Students, Dept. of Information Science and Engineering, Yenepoya Institute of Technology, Moodbidri, India

ABSTRACT: Automatic face recognitionbased intelligent attendance system with AI is a tool to recognize students' face in attendance detection by using face biometrics based on monitor camera image captures. In our face recognition based project, a AI ML Model will be able to quickly and accurately find and recognize human faces in images. The time-honored method of calling out each student's name is tedious, and there is always the possibility that a substitute is present. The proposed system relies on facial recognition to capture student attendance.Following the commencement of the attendance detection procedure, the system takes pictures of the kids and uses a facial recognition method on the resulting image. The detected individuals are labelled as present, and their attendance records are changed to reflect the correct time, student name, and registration number.

KEYWORDS: Biometric presence verification, face recognition,Image processing,OpenCV, Web camera.

I. INTRODUCTION

Nowadays, The stability of students' performance worries educational institutions.Inadequate attendance is the mainreason for the fall in student outcome. The customary attendance taking method was manually collected, which is extremely time consuming and frequently results in human error. The old method of taking student attendance on paper sheets will be phased out. The development and production of facerecognized attendance systems that uses cameras are very efficient in further enhancing the accuracy of data and are beneficial for the highly mobile users that utilize them. Because a facial attendance system utilizing a camera can develop a dependable and powerful tool to recognize the faces to be utilized as a timekeeping with attendance gadgets, It is extremely reliable and safe for identifying person.The fundamental components of this system are Python, and OpenCV And Excel sheets.

In order to identify a person's face in real time, the system implementation uses a webcam as an input device.

Manually recording attendance is thought to be a time-consuming process, and occasionally teachers may miss someone, or students may answer more than once regarding a friend's absence.

A robotic procedure of confirming or recognizing a live person's identity based on physical traits. Biometric attendance involves the use of unique identifiers, such a person's fingerprints, their face, or certain behavioural traits. Biometric systems are challenging to hack because they base a person's identity on biological characteristics.

Face recognition is one of the few biometric techniques that can accurately identify anindividual while remaining non-intrusive.

A type of biometric software called face recognition creates a mathematical map of a person's facial features and stores it as a facial image. To confirm a person's identification, the system compares a live capture or digital image to the recorded face print using deep learning algorithms. Once the detected face matched with a recorded photo, then for particular person attendance is markedin excel sheet for that user. The second justification for using facial recognition as a factor that it removesthe need to physically contact items or data, resulting in a contagious-by-contact-free world that is already being accepted by everyone. Automatic attendance systems that use machine learning techniques automatically identify faces, mark attendance, and preserve a record of the data they have collected.

Intensity-based face recognition falls into two categories: Holistic facial recognition based on features. A face

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recognition technique called feature-based facial recognition analysis input images to recognize and extract facial features like the nose, mouth, eyes, and so on. Next, It figures out how these face points relate geometrically, turning the images of faces into feature vectors.

II. LITERATUREREVIEW

Face recognition research has been done for human purposes, particularly in relation to Surveillance, universal identity checking, picture database examinations, legal systems, video searching, witness face restoration [1] are all examples of security systems . Face Recognition is split into three categories in [1], based on data collecting methodology: Recognition based method on Image Intensity, a technique which is based on clips, and FaciallyRecognisingtechniques, which needs additional tools such 3 dimensional data and infrared images.
The first feature-based face recognition investigation was undertaken by [2]. In that study, the Geometrical Features and Template Matching approach was used to identify a person's face. The integral projection feature extraction approach and the Bayesian Classifier were both employed in that study to classify the data.

In paper[2], the following charecterbased techniques utilizing the self organisingmap technique was done by [3]. In this studythe he method employed was feature visualisation with a self-organizing map, at that time the classification technique was applied. The Multi-layer Perceptron and CNN approach is the one that is employed. Compared toearlier techniques, the one being utilized is good at recognizing faces. The following feature-based face recognition investigation is carried out by [4]. In this study, feature extracting techniques make use of Euclidean Distance classification methods.

A fairly broad kind of pattern recognition was utilized by the first completely automated system [5]. It generated an order of picture comparison pattern for this model and explicitly compared a general face model of anticipated traits. This method, which uses histogram and grey scale data, is statistical in nature.

One of the technologies that is now developing the quickest is image processing, which may be used into a variety of cutting-edge applications [6]. One of the methods in use, biometrics or fingerprint scanning, requires time since the learner must expressly imprint their prints on the device [7].

The Locality Preserving Projections method of extraction of characteristics and Euclid Distance of classification were used in this work to perform face recognition, which was then followed by [8]. Face pictures during the analysis phase, they are divided into multiple subspaces. With this LPP approach, it is possible to identify key components of the observed face structure while still keeping track of local information. The LPP approach is distinct from supervised and unsupervised algorithms, which typically employ the Euclid Distance approach for classifications. This study's methodology may lessen a wide range of lighting fluctuations, light-level shifts, emotions on the face, and diverse positions.

Next by [9] The system is put through its paces with different lighting scenarios, a range of emotions on the faces, partial faces present (as in crowded classrooms), beards present or absent, and spectacles and beards present or absent.

Available for Attendance Management in [10] is the Open CV face recognition approach.The LBPH algorithm has been used in the system's implementation. By a margin of 2 to 5, LBPH outperforms other algorithms and introduces the least amount of noise interference. The Smart Attendance System's implementation shows that the threshold value and the proper recognition rate are in accord. LBPH is the most reliable and skilled face recognition algorithm available in Open CV, making it ideal for identifying students at educational institutions.

Convolution neural networks (CNN), which outperform more conventional methods, are the basis of the algorithm for face detection and identification proposed in the paper [13]. A smart classroom for tracking student attendance using facial recognition has been proposed in order to verify the effectiveness of the suggested algorithm.

The sampling approach used in the research [15] improves the particular prediction accuracy for minority classes while somewhat lowering that of those majority groups

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III. PROBLEM STATEMENT

Nowadays, fingerprints are used as a biometric parameter or manually entered information is used to record attendance. Students are often called by name when attendance is manually recorded.

This method takes much time and increases the possibility of mistakes and mix-ups, which leads to erroneous investigationof student performance. It takes a lot of time and resources to keep records for this kind of attendance.

Using fingerprints as a biometric characteristic to track attendance is readily available and takes less time than manually tracking attendance. Torepeatedly touch the fingerprint recognition sensor without a significant interval in time is risky, however, given the current epidemic. A lot of upkeep is also necessary with this kind of registration. The necessity for a new attendance system with a contactless device and no teacher involvement results from this.

IV. PROPOSED METHODOLOGY

Each student's face will be photographed by the planned system, which would then store the images for attendance purposes. The student's face must be captured and placed in a well-lit space so that the student's facial characteristics and posture may be identified. This system saves a video, and using image processing, the system recognizes the users facial traits and updates the attendance database in a spreadsheet, eliminating the need for the lectures to maintain record of students' attendance in class. The photos are captured by the suggested system using a camera.

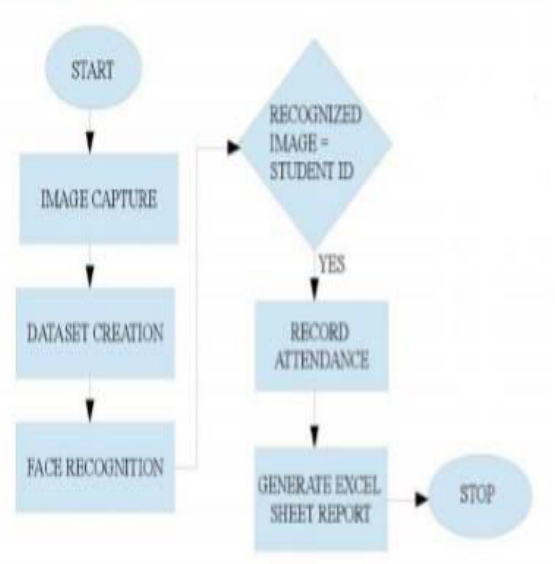

Figure 1: Flowchart representation of the system's design process and architecture.

There are several initiatives that employ the face recognition approach because of its many benefits. To follow the individual and record his existence, the system needs data. Each person's photograph is marked with their ID and name to load the data. The image capture option is accessible once the system has begun, and it needs the entry of the ID and name.

Several projects employ the face recognition approach because of its many benefits. The system needs data in order

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to follow the user and record his presence.

Each person's photograph is tagged with a corresponding identity and the name to import the data. The image capturing, which needs the ID and name to be input, is available once the system has begun.

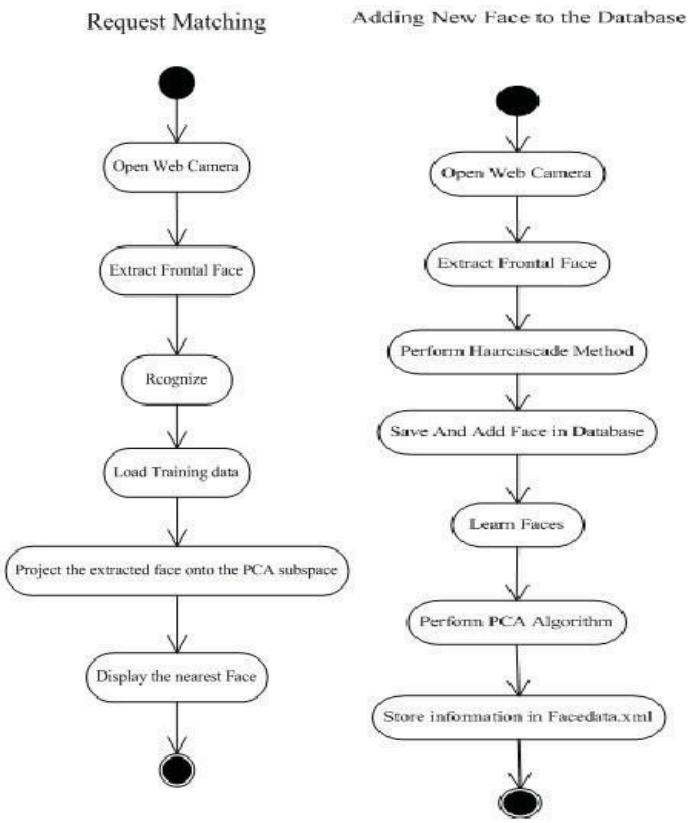

Figure 2: The System design of proposed model.

To further recognize the faces if necessary, the dataset must be constructed in the way outlined above. In order to identify faces, use the "Track images" option. Each person's presence is noted in a spreadsheet when their face is identified, along with the appropriate date and time.

Face Detection and Extract:

The openCAM function is used to activate the camera and capture the photo first. The frontal face is extracted from the videos using the OpenCVHaar Cascade method, and it is then loaded into the classifier as part of the process by calling the ExtractFace() function.

The classifier provides the output of "1" and "0." If the object is visible in the area, the value will be "1," else "0." The classifier must be used to examine each position in order to identify an object in a picture.

You need to move the search window in order to do this. The classifier is extremely adaptable and is simple to use for items of various sizes by scaling when it is possible to obtain objects of varied sizes.

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Learn and Train Face Images:

- Snap a photo of the student.
- To locate a subspace, apply a hair cascade to it.
- Show the trainees' faces.
- Save all of the training data.

Open CV:

OpenCV is a free and open-source computer vision and machine learning library. It includes a comprehensive range of tools and functionalities for real-time image and video processing, object identification and recognition, facial recognition, and more.

OpenCV is built in C++ and may be used with Python and other computer languages. Its prominence in the disciplines of robotics, driverless vehicles, and augmented reality makes it a vital tool for developers and researchers.

Face Recognition:

The technique that uses a person's facial traits to identify or confirm their identification is called face recognition, sometimes known as facial recognition. This cutting-edge technology extracts and analyses face data from photos or videos using sophisticated algorithms and machine learning techniques. Finding, following, and comparing facial traits to a database of recognised faces are all steps in the process.

Report generation: Attendance records are entered into an Excel spreadsheet before the student's name and matriculation number during a lecture to produce face recognition reports.

Haar Cascades:

Regardless of their size or position, objects may be found in photos using the Haar cascade technique. This method can be carried out in real time and is not overly difficult. A hair cascade detector may be trained to recognise a variety of items, including vehicles, bicycles, structures, fruits, and more.

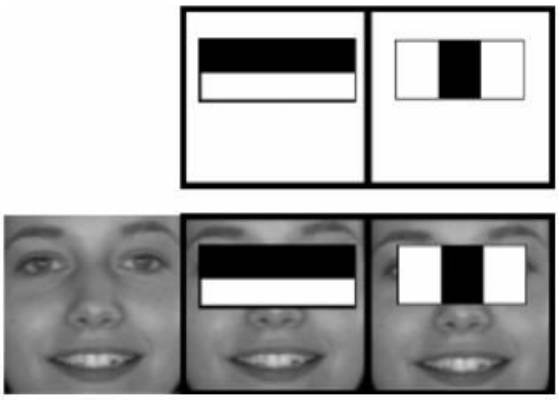

Figure 3: Representation of Haar Classification.

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V. EXPERIMENTAL RESULTS

It is simple to use and effective to utilise the artificial intelligence-based intelligent presence system that is based on face recognition. After each student has been registered and a record has been established, the system starts operating automatically.

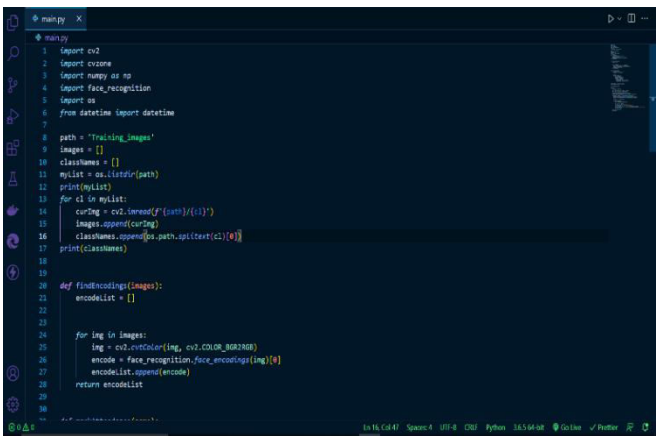
Following are the outcomes of the project:

- Saving time
- being more effective
- being accurate in real-time
- having an automatic spreadsheet report
- being simple to update online

	A	B	C	D	E
1	Id	Name	Date	Time	
2					
3	10	Nihal	08-04-2023	19:43:40	
4	11	Shamith	08-04-2023	19:43:50	
5	12	Vethesh	08-04-2023	19:43:55	
6	13	Narahari	08-04-2023	19:44:00	
7					
8					
9					

Figure 4: The excel sheet that displays the attendance is preserved.

Code snippet:



```
import cv2
import cvzone
import numpy as np
import face_recognition
import os
from datetime import datetime

path = 'Training_images'
images = []
classNames = []
myList = os.listdir(path)
print(myList)
for cl in myList:
    curImg = cv2.imread(f'{path}/{cl}')
    images.append(curImg)
    classNames.append(os.path.splitext(cl)[0])
print(classNames)


def findEncodings(images):
    encodeList = []


    for img in images:
        img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
        encode = face_recognition.face_encodings(img)[0]
        encodeList.append(encode)
    return encodeList
```

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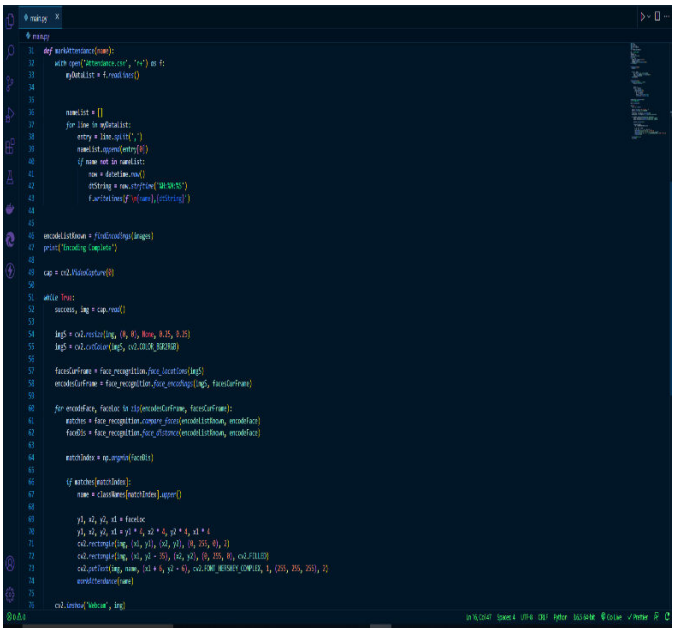

Figure 5: Shows the coding implementation.

VI. CONCLUSION

This article on facial recognition based smart attendance taking system utilizing Artificail Intelligence presents one of the finest methods of attendance taking method that is time efficient, more effective, realtime, and exact, delivers automated report in spreadsheet, and makes online updating easy. Webcam, OpenCV, Haar cascade, and Python have all been used to create the system. To verify the system's standards, the Haar cascade, one of the best face detection algorithms, is employed. The face recognition enhanced Smart Attendance System that uses AI is easy to use and effective. After the dataset is produced and each student's registration is complete, the system operates automatically.Several of the problems with current manual methods and biometric systems based on finger prints are addressed by the project. The system is improved and made more effective by using the face recognition idea to record student attendance. All other attendance systems may be replaced with this project, which operates effectively. The Automatic Attendance taking System aids in enhancing accuracy and finally obtaining accurate attendance to satisfy the requirement for automatic evaluation. The facial recognition-based attendance system used in this study achieves the paper's goal of reducing mistakes and human effort in traditional attendance taking.

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