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Attendance Monitoring System using Machine Learning Algorithms

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Abstract: *Facial expressions are vital in practically every industry in this digital age. One of the most popular biometrics is face recognition. It can be used for security, authentication, identification, and has many additional benefits. Face recognition systems can also be utilised in schools, colleges, and offices, among other places. This program aims to build a classroom plan that uses the concept of facial recognition as a reality manual presence system. It is expensive and difficult to maintain. And there may be opportunities to become a representative to be present. This program contains four phases- database construction, face detection, facial recognition, review of attendees. After face identification, the Haar-Cascade Section and Local Binary Histogram pattern method sequence is used to detect faces*

Keywords: Facial expressions

I. INTRODUCTION

Almost all organisations and institutions have an attendance monitoring scheme in place. There are two types of programmes accessible today: manual and automatic. Automatically based is the most extensively utilised participative method. Use a high-quality Python programming language and a high-level currently open source CV in this software. This project's goal is to create a face.

The traditional way of marking students to go to school often faces a major problem. The face-to-face recognition system emphasizes its simplicity by removing the traditional marking system of student presence such as calling students' names or checking consecutive ID cards. It not only disrupts the teaching process but also causes disruption for students during exams. Without naming names, attendance papers are passed on to the classroom during lessons. The classroom, especially the classroom with a large number of students, may find it difficult to transfer the attendance sheet to the classroom. Therefore, a student face recognition program is proposed to replace the student handwriting which is a burden that causes students to be distracted from signing their presence. In addition,an automated face-based face recognition system that can eliminate fraud and eliminate the need for instructors to count the number of pupils multiple times to assure student presence.

Based on an automated student attendance software, the goal of this research is to improve facial recognition.Expected outcomes for achieving goals are: Visualization of the face in the video frame. Removing useful features from the detected surface. To segment features to see detected faces. Recording the presence of an identified student.

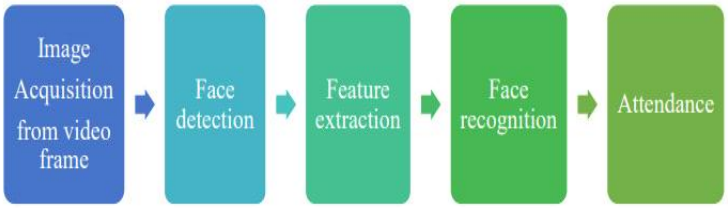

Figure 1.1 Block Diagram of the General Framework

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1.1 Existing System

Arun Katara et al(2017). pointed out the flaws in the RFID (Radio Frequency Identification) system, the fingerprint system, and the iris alert system (2017). The RFID card system is designed to be simple.However, as long as they have a friend's ID card, the user normally assists his buddies in logging in. The fingerprint system is functional, but it is inefficient because the verification procedure takes time, requiring the user to enter the queue and execute each verification individually. When it comes to facial identification, however, the human face is constantly visible and includes less information than the iris. An iris detecting system with additional information could compromise user privacy. Despite its accessibility, voice recognition is less accurate than other approaches.

As a result, it is recommended that facial recognition technology be included in student attendance programmes.

System type	Advantages	Disadvantages
RFID card system	Simple	Fraudulent usage
Fingerprint system	Accurate	Time-consuming
Voice recognition system	-	Less accurate compared to others
Iris recognition system	Accurate	Privacy Invasion

Previously many scholars have attempted to locate the face using a variety of ways. However, the majority of them use single-faced straight front photos. The facial area is completely exposed with no impediments and no mirrors.

Others (2014) investigated the Local Binary Pattern (LBP), the Adaboost algorithm, the sequential localization quantities of quantization quantization transform (SMQT), The sparse network of Winnows (SNOW) Classifier Method and face detection methods like the Viola-Jones technique and a neural network are used. They concluded that the Viola-Jones method was valid since it is the quickest and most accurate of all methods. Other methods, such as Binary Area Pattern and SMQT features, have a straightforward computation and can handle minor difficulties.

Face detection method	Advantages	Disadvantages
Viola jones algorithm	1. High detection speed 2. High accuracy.	1. Long training time. 2. Limited head pose. 3. Not able to detect dark faces.
Local Binary pattern	1. Simple computation. 2. High tolerance against the monotonic illumination changes.	1. Only used for binary and grey images. 2. Overall performance is inaccurate compared to Viola-Jones algorithm.
AdaBoost algorithm (part of Viola jones algorithm)	Need not to have any prior knowledge about face structure.	The result highly depends on the training data and affected by weak classifiers.
SMQT Features and SNOW Classifier Method	1. Capable to deal with lighting problem in object detection. 2. Efficient in computation.	The region contain very similar to grey value regions will be misidentified as face.
Neural-Network	High accuracy only if large size of image were trained.	1. Detection process is slow and computation is complex. 2. Overall performance is weaker than Viola-Jones algorithm.

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II. PROPOSED METHOD

2.1 Viola-Jones Algorithm:

P. Viola and M. J. Jones (2001) developed the Viola-Jones algorithm, which is the most extensively used approach for recognising the face segment in static pictures or video frames.

The qualities of the Viola–Jones method make it an effective detection algorithm:

A high true-positive rate and a low false-positive rate over time are considered robust.

A minimum of 2 frames per second must be handled for practical applications

To discriminate between faces and non-faces, face detection (not recognition) is used (detection is the first step in the recognition process).

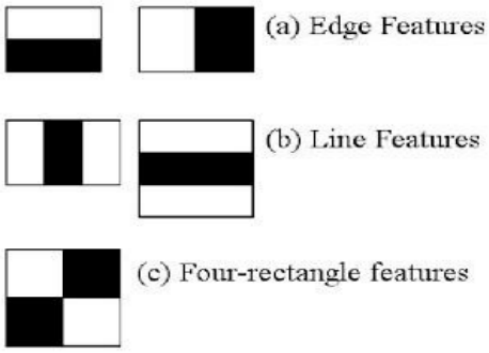
The algorithm has four stages:

- Haar Feature Selection
- Creating an Integral Image
- Adaboost Training
- Cascading Classifiers

Haar-like characteristics are used in object recognition. The eyes are darker than its neighbour pixels, and the nose is brighter than the eyes, which are both universal characteristics. Add the pixel values of both zones together and compare them to see whether zone is lighter or darker. The darker area's pixel values will be less than the brighter area's pixel values. If one side of the table is lighter than the other,it might represent the edge of a brow, or the middle area of the box could be shinier than the surrounding boxes, indicating a nose. This can be performed by employing Haar-like features, which allow us to interpret the various elements of a face.

In their research, Viola and Jones discovered three types of Haar-like features:

- Edge features
- Line-features
- Four-sided features



Both the data structure and the algorithm used to locate this data structure are referred to as an important image (also known as a summary table). It's a quick and easy technique to figure out how many pixels are in a photograph or a rectangular section of an image.

There are around 160,000 features in a 24 x 24 detector window, but just a few of them are relevant for identifying the face. So, out of 160,000 features, we utilise the AdaBoost method to find the best ones.

For example, each element like Haar represents a weak reader in the Viola-Jones algorithm. AdaBoost assesses the functionality of the partitions you offer to decide the kind and size of the feature to the final separator.

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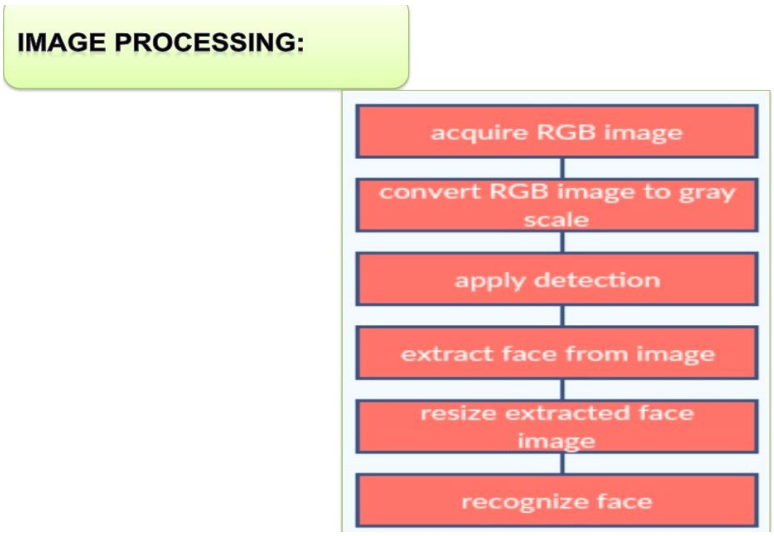
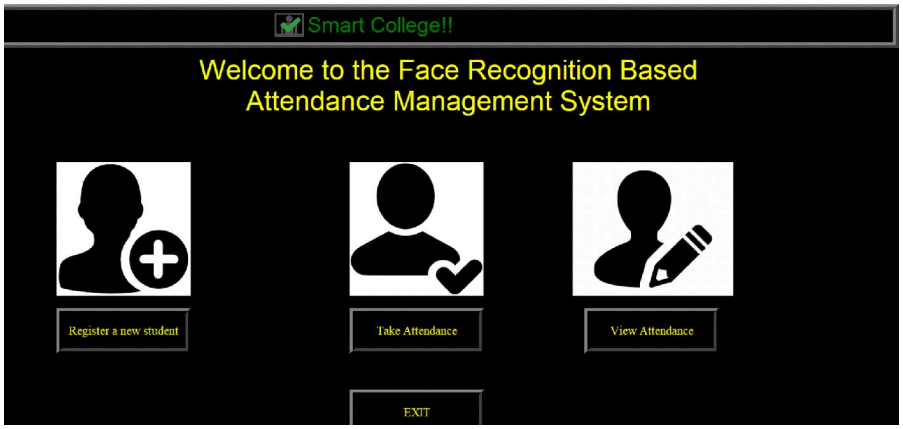
III. PROPOSED SYSTEM DESIGN



IV. RESULTS AND EVALUATION



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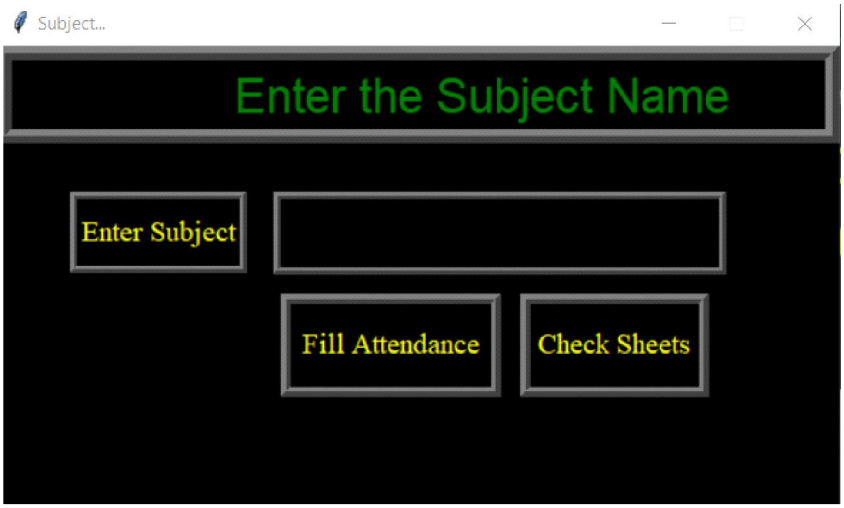

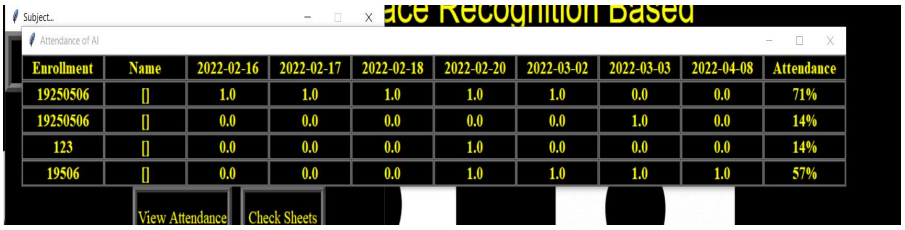

Based on the findings, the project has the following features.

- To avoid problems, the system must carry out its procedure precisely.
- Flexibility: The system should be easy to repair, and anything that isn't working should be fixed.
- Students' privacy must be protected and maintained by the system.
- Maintenance: The repair personnel should take care of any problems that emerge unexpectedly.
- Quick and responsive performance is required.

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