Advances in Consumer Research
https://acr-journal.com/
Volume-3 | Issue-11 |NOV: 2026
Original Researcher Article

Programmed to capture and record scholar presence using a countenance multi-attribute comparison technique

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ABSTRACT
In many educational institutions, attendance is still tracked either online or offline by calling out students' names or register numbers and marking their presence. Although this approach is widely practiced, it tends to be time-consuming and inefficient. Over time, maintaining these records becomes increasingly challenging. A major concern is security, as physical attendance records are often not stored properly and can be easily altered or tampered with. Additionally, proxy attendance—where one student marks attendance for another—remains a common issue. These limitations highlight the need for a more advanced and reliable solution. The existing system also relies heavily on physical presence, requiring students to be in a specific location to mark attendance, which reduces flexibility. To address these issues, the proposed system incorporates facial recognition technology. This method is more efficient and dependable, as it identifies individuals based on their unique facial features. It effectively eliminates proxy attendance and prevents duplicate entries. Since each person's facial structure is distinct, the likelihood of errors is minimal, making the system more accurate and easier to manage than traditional methods.
In the paper, the proposed function works based on the identity of the input data captured by the camcorder, and the result is true if proper identification takes place. This process is more complex and takes a longer period, which is the main drawback of the existing system. However, in the proposed procedure, the facial features are trained and stored; the process is then immediately compared with the stored system, and the matched presence is recorded. At the end of the day, the administrator can easily obtain accurate attendance and other relevant details. This system reduces manual effort and calculation, enhances security, prevents duplication, and ensures that records are automatically updated. Additionally, information can be easily retrieved and compared whenever necessary.

Keywords- Smart presence, online recording, prominence data sets, human countenance, stored value comparison, Security enhancement

1. INTRODUCTION

Today, even in technologically developed countries, many educational institutions still monitor and record student attendance either physically or through online systems. In these systems, user credentials such as name, enrolment number, or admission number are considered. Any one of these credentials is manually called by the authorities, and attendance is recorded. After recording, the physical hard copies are maintained by a separate department, and the information is made available to the concerned department upon request. For any query regarding attendance, the ward must approach in person to obtain the information. Even in online systems, only the geographical location changes, while the overall process remains the same. Both systems have their merits and demerits. The main drawback of the existing system is security, and it is not easy to collect the credentials efficiently. In physical systems, unless records are maintained in a highly secure manner, they are prone to modification without any trace. Similarly, if online systems are not properly protected, the same issues arise. Hence, the system lacks adequate security. Additionally, generating daily, weekly, or monthly reports for a particular student, section-wise consolidation, or subject-wise consolidation is not easy in either system.

2. ESTABLISHED ARRANGEMENT

Attendance systems like biometric scanners and card-based methods are commonly used across organizations today. Despite their widespread use, they come with certain limitations. For example, if an attendance card is lost or damaged, the user cannot record their presence. There is also a possibility of misuse, as cards can be shared among individuals. Although biometric systems offer better security, they may sometimes be slower and less convenient for everyday use.To address these challenges, a more efficient system has been introduced. While the initial setup may require additional time and cost, it offers significant

long-term advantages. The system is adaptable and can be upgraded as technology advances, ensuring reliable and consistent performance. Its overall architecture is illustrated in Figure 1. In the modern digital era, educational institutions are increasingly adopting automated solutions to enhance operational efficiency, and attendance management is one area where such improvements are highly impactful. Traditional approaches—whether manual or partially automated, such as card-based or fingerprint systems—tend to be time-consuming, less user-friendly, and prone to errors or technical issues.

To overcome these limitations, a facial recognition-based attendance system provides a secure, contactless, and efficient alternative. A key drawback of traditional methods is the requirement for physical contact, which may raise hygiene concerns. In this system, student information is initially registered, and their facial data is captured and stored in a centralized database that can be accessed anytime and from anywhere. The attendance process is fully automated, eliminating the need for manual intervention. When a student enters the premises, the system captures their facial image and compares it with stored records. If a match is identified, attendance is recorded instantly. The data is updated in real time and can be easily accessed by administrators and other stakeholders. Additionally, students can receive attendance notifications when required. Overall, this system streamlines the entire process, maintains organized records, and ensures quick and convenient access to information.

2. ESTABLISHED ARRANGEMENT:

In Several parallel schemes are physical or online, where evidence is poised and deposited through required humans' relations. The system is also geographically restricted; if a process is recorded or a user requires data, they are limited by these restrictions. They need to visit the location and request the needed content. Without third-person intervention, the user does not receive their credentials. Additionally, systems based on hygiene concepts are highly vulnerable. If biometric methods are used, the system is not reliable due to these factors. Overall, the existing system is more vulnerable and complex. Information requests and retrieval are not easy, as users must repeatedly demand their needs. There is no automated process for recording and retrieval; every step requires third-person intervention, which burdens the user.

2.1 Requirements of of Established arrangement:

Every entry is manually collected and stored.
There are many chances of proxy and it leads to a long process.
Physical card swiping has a chance of proxy.
An additional amount must be paid if the input process is lost or damaged.
The biometric hygiene aspect is not recommended, and it is also very slow.

2.2 Draw backs of Established arrangement:

No real-time monitoring.
Proxy attendance goes undetected.
Difficult data handling and record keeping.
Risk of transmission in contact-based systems.
Hardware-intensive or cost-inefficient solutions.

3. SUBMITTED PROPOSAL ARRANGEMENT:

In the proposed system, all the drawbacks mentioned above will be overcome. It will work without any third-person intervention. Every process is done automatically, and the main advantage is that the system is user-friendly; it does not require any technological knowledge or any special device. It will work on any electronic gadgets, so the user does not need to spend any extra money on this system, and it supports an anytime, anywhere working nature. The initial setup may take a long time; however, once the process is initiated at the beginning, it will continue until the ward leaves the school or college. Also, the system is easy to enhance. Due to the fast growth of technology, the system can be easily upgraded without affecting the existing setup, so the user can access any data without any interference.

The proposed technique is shown in the figure. Student information is initially registered, and facial samples are collected and stored. The recorded data can be accessed anytime and anywhere through electronic devices. The system captures attendance automatically without manual intervention. When a pupil arrives the premises, the installed camera detects their countenance properties and equivalences them with the deposited information. If the credentials match, the student is marked present in the predefined database. This information is immediately transferred to the authorities and relevant stakeholders. The main advantage is that it is very user-friendly, and the information is readily available in the required standard structure at any time and place. The ward will get their credentials, and the authorities can easily generate reports in terms of daily, weekly, or monthly data. Also, particular ward performance, section-wise, or subject-wise information is easy to retrieve, and there is no chance of proxy. Additionally, the time spent by authorities on taking attendance is completely avoided, allowing them to spend more time on the academic development process.

3.1 Advantage of Submitted proposal arrangement:

The system has no geographical restrictions; users can access the data from anywhere at any time.
Fully automated.
One-time investment; later the process can be easily switched or upgraded.
Prevents duplication or false attendance
Generates day-wise standard reports based on the user's choice.
Completely avoids proxy.
Contactless and hygienic.
The staff are fully devoted and encouraged to spend more time on academic activities.
Easy to enhance based on technological development.
Works on any electronic gadgets.

4. INVESTIGATION ARRANGEMENT:

The proposed arrangement is shown in the figure. The investigation setup is simple and efficient. It requires a high-definition camcorder with a resolution of 1080p or higher to record pupil presence in the classroom. Initially,

before the process is initiated in the classroom, each ward's input is captured from different angles, and a ward countenance property database is created as the source of information. Second, another important requirement is high-capacity storage, with a minimum of five terabytes, which helps in storing image data. Since most of the information is in high resolution, the storage capacity must always be on the higher end. The stored data is maintained in an unreadable format so that even if a third person tries to admittance the database, they will be unable to interpret the content. This secure storage mechanism is an improved feature of the proposed system.

The system includes a high-speed processor integrated into the system to facilitate the storage and retrieval of data in two separate databases. The proposed system has strong security and the benefit of being accessible at any time and from any remote location. Thus, it is possible to process the data much faster than a traditional system. In terms of the software, QPy and Pandas are used to capture and store the image input so that it is easier to manage data. The entire system workflow is given in Figure 1. The system is designed for two types of users. The first category is the general users who use the system to view and/or generate reports. The second category is the administrators, who are in charge of running the system, creating ward countenance features, database management, and other support functions. Every user needs to register in the system as a client or as an administrator.

Each user is first registered, then divided by the system based on the role. A verification system is used to ensure that every login attempt is correct by verifying the user credentials. Only users that have successfully verified themselves are allowed to access the system/database to either store or retrieve data. Both clients and administrators use the system by entering the same login interface, where they are then directed to the respective dashboard. To store data, the user must first log in with the system. Once the user has successfully logged in, the system allows the user to capture the input and then store it on the backend server. The system uses two databases, one for administrators and the other for clients. As the system stores ward countenance data, the system then performs a second verification with the system. The system compares the captured input with the stored features in the system. The ward is only marked as present if there is a match. The system uses two cameras, one for the entry camera and the other for the exit camera.

Information collected from both sources is maintained in distinct databases so that users and administrators can retrieve data as desired. The system is different from conventional approaches in that it is fully automatic, with little user intervention required after initial setup. Recording, checking, and report generation are all automatically performed by the system. Although the initial effort may be somewhat more costly and time-consuming than conventional approaches, long-term benefits are considerable. As new technologies become available, the system can be upgraded with relative ease for consistent performance.

This process is further processed for the following investigation steps:

Generate users' registration step.

Process validation setup

Using camcorder generate Scholar countenance properties.

Generate coded message database.

Generate reports

Advantage of the system:

Easy to install.

Can be upgraded at any time.

Data is stored in an encrypted manner.

Less complex in nature.

Produces standard output.

User-friendly.

Works in any environment.

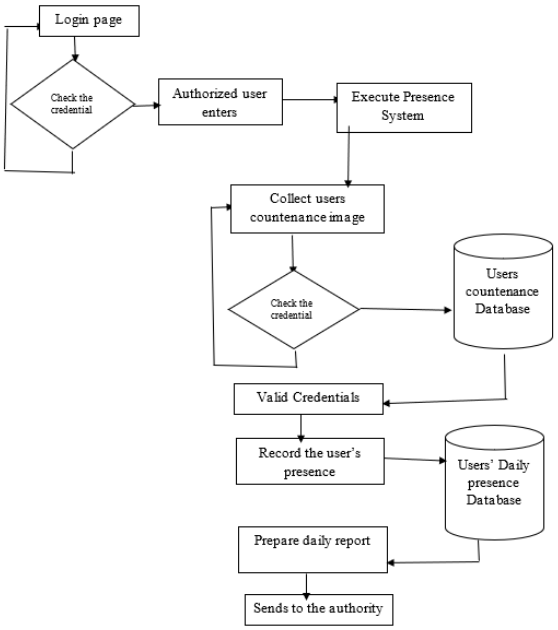

Fig 1. Proposed Architecture

6. INVESTIGATION WORKFLOW:

The investigation arrangement is as follows:

6.1 Generate users' registration step.

Process validation setup

Using camcorder generate Scholar countenance properties.

Generate coded message database.

Generate reports

6.1 Generate Users registration step:

This is the initial setup of the investigation process. In this process, the entire system will be divided into two important functionalities. This is one of the primary setups of our experimental process; without this setup, the process will not work. This process will capture all necessary inputs and store them in the data repository. Each time the input is captured by the camcorder, it is going to be compared with this process, and finally, based on the comparison, the output will be recorded in another database. The first step of this process is called administrator registration. Each user will be treated as either a client or an administrator. The person who is allowed to record the information and generate various reports based on user queries will be called the administrator. During registration, the user will be treated as the administrator and will be responsible for storage and other data-related maintenance functions. Each time a transaction occurs, the pupil countenance is allowed to be recorded during the particular session handled by this administrator. The system needs to identify who is allowed to record, who will monitor, and who will be responsible for any client query; all these functions are controlled by the administrator.

After this, the second process is called client or user creation. They are all real users allowed to store their records. In our proposed work, the pupils are called clients. Each client's countenance is captured using a high-quality camcorder, and the corresponding picture attributes are collected and stored in the database. This process is a one-time, long-term process; once the input records are created, they will be used until the corresponding user completes and leaves the school. Each of these countenances is stored in the database. After each session, whenever a pupil enters the premises, the system will capture the information and compare it with the existing properties. If both match, the student will be recorded as present. If the credentials do not match the stored information, the corresponding person will be identified as an unregistered student. For all these processes, this step is one of the important setups.

The advantage of the proposed system is that the information is captured and stored in an unreadable format, so even if a hacker tries to access the information, they may not have any clue whose record it is or what type of information is stored. Therefore, the proposed work is more secure, and the information avoids being handled through regular methodology. Another main advantage is that the process allows users to get the needed reports in a standard output format, so users can easily download the required information from anywhere at any time, without waiting for someone's approval or to access their own information. The process is shown in the figure 2 and figure 3. This process is similar in the function wise during the creation the process properties are assigned whether the registered user will treat as administrator or the client.

Each user, whether an administrator or a client, has their credentials verified each time they try to enter the process. The process is explained in the next experimental setup. The countenance attributes are collected and stored in a common database for both users; there is no special consideration for the administrator during the assignment of permissions, as they are all differentiated. Process-wise, this initial process does not have any difference. Both users are allowed to set their own secret inputs to enter the system. After collecting the information, this may be a time-consuming process initially, but it will work for a extended dated of time. Based on these credentials, the system decides whether the user is authorized or not.

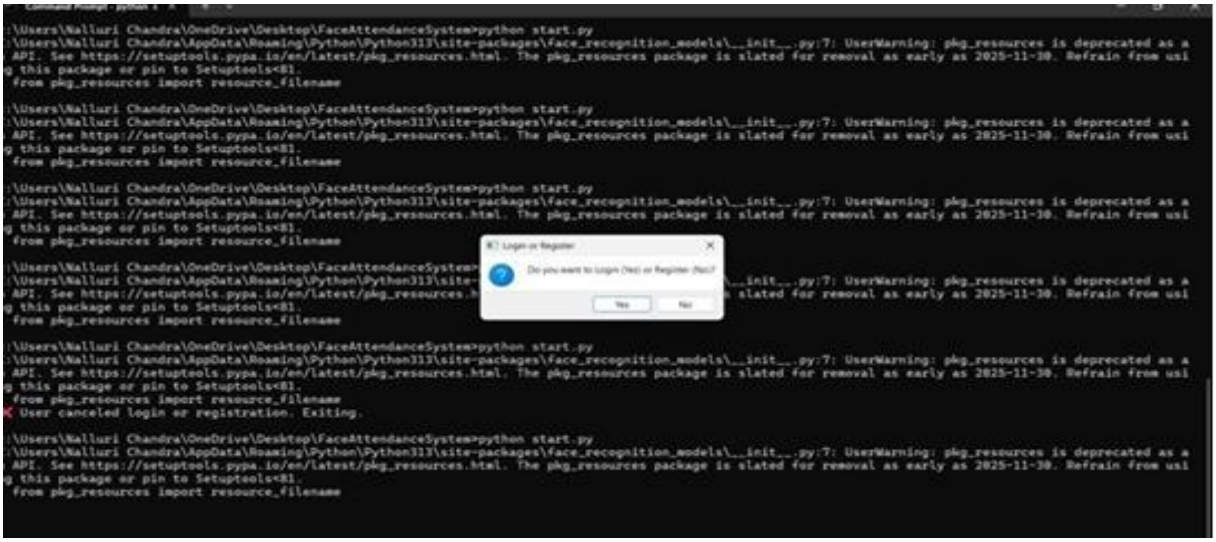

Fig 2. Pupil countenance properties are collected.

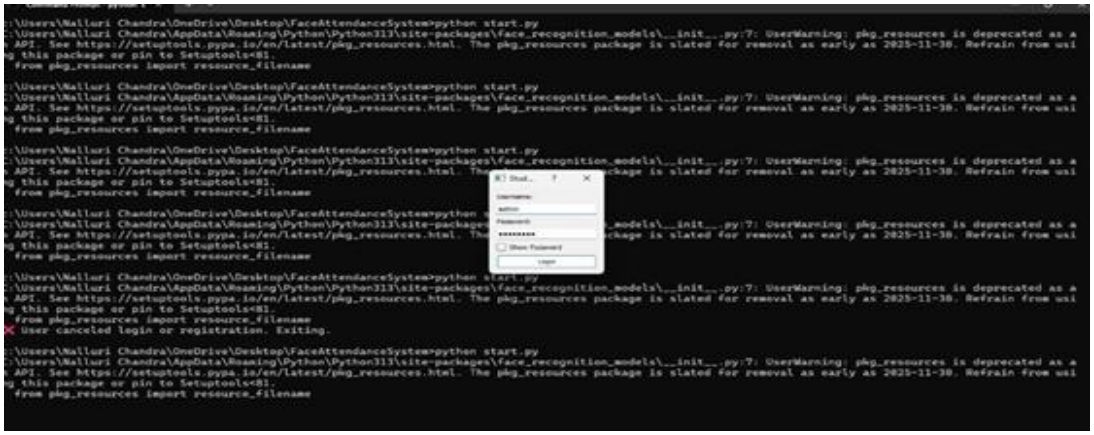

Fig 3. Creation of Administrator portal.



Fig 4. Administer home screen

Process validation setup

The main drawback of the existing system is security, and it is not easy to collect credentials efficiently. In physical systems, unless records are maintained in a highly secure manner, they are prone to modification without any trace. Similarly, if online systems are not properly protected, the same issues arise. Hence, the system lacks adequate security. In this process, registered users, based on the procedure explained above, are allowed to enter the system. Each time, the system validates the credentials of every user. The input captured from the camcorder is compared with the existing countenance properties. Only if all these credentials are validated will the system allow the user to enter. At the same time, if an unregistered entry occurs, the system will reject it and will not allow the data to be stored in the database. Compared to the existing online process, this approach is more secure and more efficient. This process is further explained in the flowchart shown in Figure 5

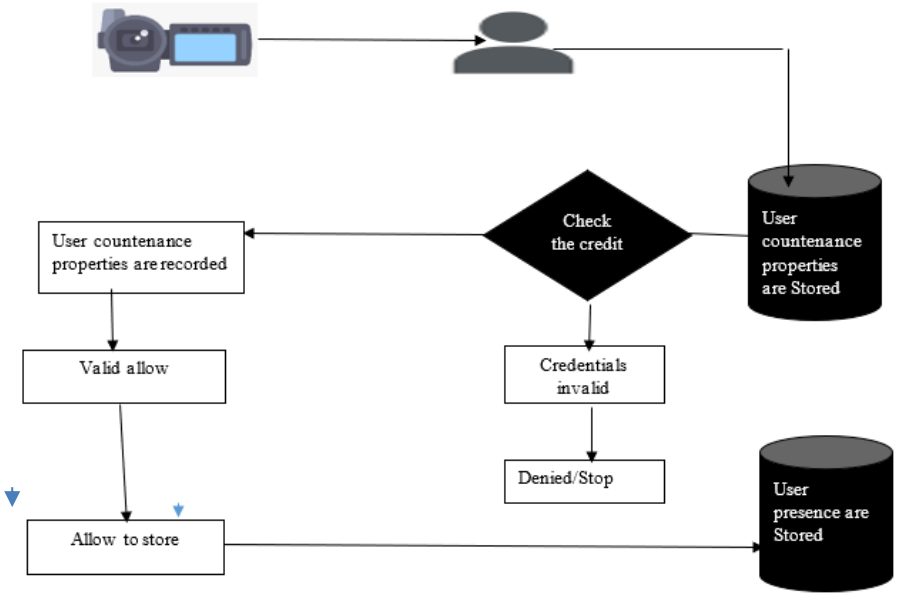

Fig 5. Users' credentials validation setup



Fig 6. User validation checking and approved the entry

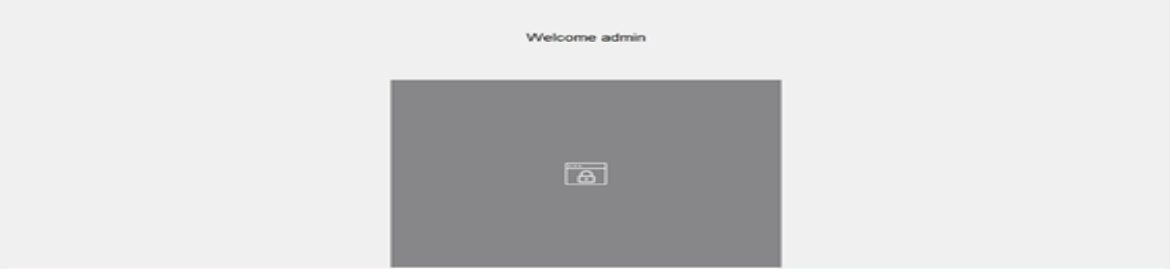

Fig 7. User validation checking and approved the entry

Using camcorder generate Scholar countenance properties:

The proposed system works without user interference. Many existing systems require third-party intervention, either to start, capture, or stop the process. During the process, human responses or suggestions are required to capture the data. However, in the proposed system, once the initial setup is completed, the system automatically performs all operations without any user interference. High-resolution camcorders are installed at the entry and exit levels. Before installation, prerequisite functions such as capturing all necessary inputs and storing them in the data repository are completed. Each time an input is captured by the camcorder, it is compared with the stored data, and based on this comparison, the output is recorded in another database.

Once the system starts recording ward countenance, a second validation process begins. Each captured input is equated with the deposited countenance properties, and only if both contest is the corresponding ward marked as present. Two camcorders are installed: one records entry-level activity, and the other records exit-level activity. Both sets of information are stored in dedicated databases. From this stored information, both clients and administrators can extract the required data. Compared to previous systems, this mechanism operates fully in automatic mode, with no user interference required after the initial setup. The system automatically records and generates the required outputs after validation. This process is shown in the below figure 8 and figure 9.

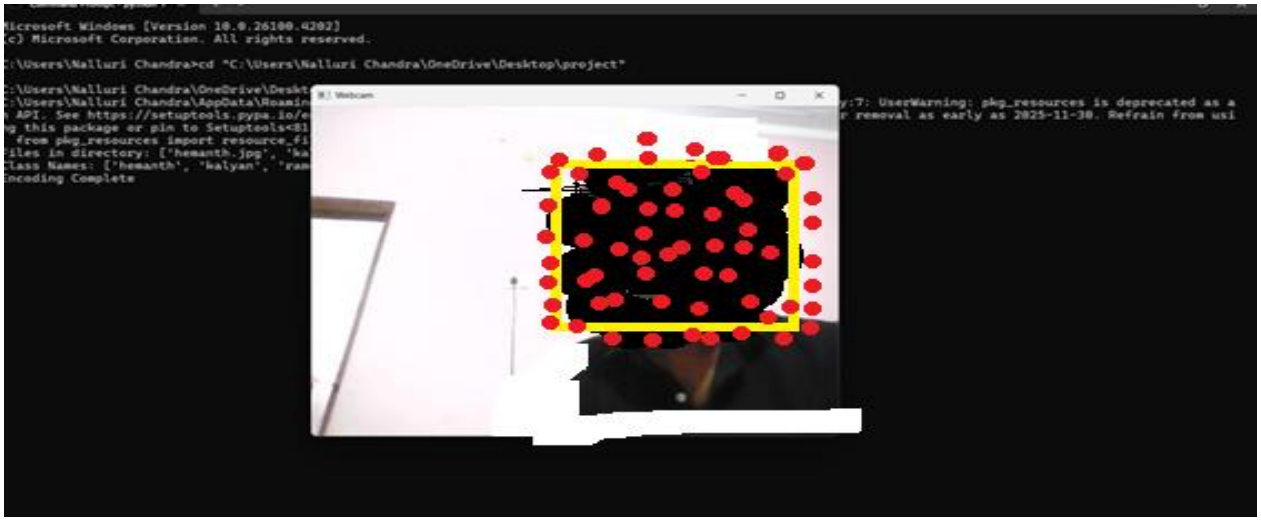

Fig 8. Using Camcorder pupil countenance captured.



Fig 9. Individual countenance attributes are recorded in the database

.**Pseudocode-1 for image attribute capture:**

Initiate the Countenance surround space.
countenance= Countenance. Countenance location (redgreenblue surround space)
Countenance secrete code= Countenance. Countenance secrete code (redgreenblue surround space, Countenance positions)
Check Countenance secrete code in Countenance secrete code then
Found resemble = Countenance acceptance. Check Countenance (Countenance secrete code)
Pupil name = "Match" else "Not found"
Success if match found
Pupil. Match. Index= Matches. Index (True)
Pupil name= Authorized Countenance (true0
Mark= Countenance. Successfully and store

Generate coded message database.

Initially, the system operates using two different mechanisms. The first involves users who extract and generate reports using the system. The second group consists of administrators who are responsible for system maintenance, such as creating ward countenance properties, managing standard databases for daily activities, and overseeing overall system maintenance. Compared to previous systems, this mechanism operates fully in automatic mode, with no user interference required after the initial setup. The system automatically records and generates the required outputs after validation. Although the initial implementation may be expensive and time-consuming, once established, it offers long-term benefits.

The main benefit of the scheme is that it automatically records and stores information, and the source data is also stored in a secure coded format. This means that even authorized personnel cannot read or recognize the records without the proper key. The information in the database is stored in an unreadable format and can only be converted into a readable format using the appropriate key mechanism. Thus, the system not only stores information automatically but also converts and stores it in a highly secure coded form. The stored information can be retrieved using queries from anywhere at any time. Clients can access the information in a ready-to-use format whenever required. For administrators, the information can be analysed on a daily, weekly, or session-wise basis. Therefore, for both users and administrators, the system is highly efficient compared to existing techniques.

Pseudocode -II for table creation

CREATE TABLE user (id set as INT , primary key(Name)
pupil name,
pupil name = Not Empty
Secrete key Not Empty



Fig 10. Creation of pupil data base

Recordid	pupil name	pupliidentifier	secretekey	date of creation	time	remarks
1000	*******	A1010	$$%%$$	10-**-20@@	10.00	Success
1001	*******	A1010	$$%%$$	10-**-20@@	10.01	Success
1002	*******	A1010	$$%%$$	10-**-20@@	10.01	Success
1003	*******	A1010	$$%%$$	10-**-20@@	10.02	Success
1004	*******	A1010	$$%%$$	10-**-20@@	10.02	Success
1005	*******	A1010	$$%%$$	10-**-20@@	10.22	Success
1006	*******	A1010	$$%%$$	10-**-20@@	10.22	Success
1007	*******	A1010	$$%%$$	10-**-20@@	10.23	Success
1008	*******	A1010	$$%%$$	10-**-20@@	10.23	Success
1009	*******	A1010	$$%%$$	10-**-20@@	10.24	Success
1010	*******	A1010	$$%%$$	10-**-20@@	10.24	Success
1011	*******	A1010	$$%%$$	10-**-20@@	10.25	Success
1012	*******	A1010	$$%%$$	10-**-20@@	10.25	Success
1013	*******	A1010	$$%%$$	10-**-20@@	10.26	Success
1014	*******	A1010	$$%%$$	10-**-20@@	10.27	Success
1015	*******	A1010	$$%%$$	10-**-20@@	10.27	Success

Table 1. Generate coded message database

Generate reports:
The final phase of the proposed work involves the system storing the necessary information in the created database. From this stored information, users can extract any required data at any time.
The main advantage of the proposed work is that it operates without user interference, as the information is automatically captured and stored. The day-to-day presence of pupils is recorded and maintained in the database. At any time, either the administrator or the client can retrieve their respective information from the stored database. Another advantage is that the information is available for download in specific formats, which supports users in analysing the data easily and effectively.

7.CONCLUSION AND FUTURE ENHANCEMENT

The traditional model still exists in many institutions. However, the whole system is complicated and very inefficient for many reasons. The major concern is the security in the fact that the physical copies of the attendance are not maintained properly and is subject to easy alteration. Further, there is an issue of proxy attendance. Conventional methods (either manual or semi-digital through swipe card or fingerprint) are tedious and inconvenient for the users and subject to technical limitations. The FACE recognition-based attendance system has now emerged as a safer, contactless, and convenient solution. The input from the camcorder is checked with the pre-existing countenance properties. The system allows the user entry only if all the credentials are authenticated. If an unknown entry is found, the system declines it, and the data is not entered into the database. The main advantage of the scheme is that it automatically logs and stores information and the source data is stored in coded form, which is unreadable and unrecognizable even to the authorized personnel without the key. The second advantage is that the information's are made available in selectable formats for download which helps the users in more accurate and efficient analysis. Further, the system is very user-friendly and runs on various types of electronic devices. The improved model of the proposed system is system-oriented meaning that information is first stored in specific system that later can be expanded to online-based model (cloud). Thus, the information can be easily and conveniently stored and retrieved.

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