

THE NEED FOR A BIOMETRIC SYSTEM FOR CLASSROOM ATTENDANCE

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ABSTRACT

Biometric is an electronic device for detecting and recording a person's unique physical and other traits or system as a means of confirming an individuals' identity. It is also use to identify physical and biological characteristics of an individual. In this paper, a biometric which uses a facial recognition method in the software development is developed. A face recognition system is a computer application capable of recognizing or verifying a person from a video frame from a video source is employed. This system eliminates errors in the manual method of students' class attendance. Identification is chosen due to its enviable features over the traditional method which is time consuming, error prone, missing sheet and damage, which fosters laziness on the part of students, nonchalance attitude to classroom learning activities, students lecture skipping which may likely prevent students from good academic performance. In this paper we employ a computerized facial recognition attendance monitoring technique which will enable the department to properly ascertain the academic strength of each student in terms of student regularity to classroom lectures and commitment to classroom learning, and generate reliable student attendance report stored in a secured database. The software was developed using Visual Basic.Net which connects the text field to database and MySQL was used for the database design.

KEYWORDS: Biometric, Facial recognition, Manual method, Identity, Attendance

INTRODUCTION

The term "biometrics" is derived from the Greek words "bio" (life) and "metrics" (to measure). Automated biometric systems have only become available over the last few decades, due to significant advances in the field of computer processing. Many of these new automated techniques, however,

are based on ideas that were originally conceived hundreds, even thousands of years ago. One of the oldest and most basic examples of a characteristic that is used for recognition by humans is the face. Since the beginning of civilization, humans have used faces to identify known (familiar) and unknown (unfamiliar) individuals.

According to (Mathana *et al.*, 2015) Attendance records are a vital asset to all learning institutions and organizations in our modern networked world. Maintaining employee attendance in organizations and students class attendance in all universities is very essential for checking the academic performance of students and work performance of employees. Improper and inaccurate attendance records make it very difficult to ascertain the level of seriousness and commitment to work of both staff and students when the need arises for comparison of both individual and team work performances in any learning establishment. Certain students are lazy and lack academic will as a result do not deem it necessary to attend lectures which is an indispensable prerequisite and aiding tool towards achieving a great academic performance due to the above-mentioned reasons that stop them from performing well in their examination following frequent absence in the lectures, thus, there is the need to monitor student attendance in the classroom to enhance their academic performance. Students are expected to attend 70-75 percent of their various classes before they are allowed to participate in any of their sectional examination exercises.

Prior the advent of Attendance Management System using Biometric Face Recognition System and Camera, in most learning institutions, students class attendances are conventionally taken by the use of attendance sheets issued by the various department heads as part of regulation. The students sign in or tick on these attendance sheets as indication of their presence which are

thereafter filled or conventionally entered in to a computer for future analysis and usage. This conventional method is tedious, easily manipulated, time consuming and inaccurate as some students often check in or sign in for their absentee friends or colleagues. This method also makes it difficult to keep accurate class attendance of individual students in a large classroom environment. Other biometric methods of verification (such as fingerprints, iris verification and Radio Frequency Identification-RFID tag) etc., can be more accurate than the traditional method but have their own weaknesses as students usually have to queue in lines for long at the entrance or at the time they enter the classroom for verification. All these methods also waste time because students have to make a queue to touch their thumb on the scanning device and other involvements.

This paper shows the feasibility of employing biometric facial recognition as a means to keep student classroom lecture attendance. Since the most common student course attendance taking methods are monotonous, easily manipulated and time consuming. Therefore, the use of Biometric Face Recognition and verification in a real-time scenario for marking students course attendance becomes very indispensable. This system continuously captures face images of students in the class and compares these captured face images with the already existing students' face images in the centralized or designated database images system of the students and marks attendance of present students automatically. The student database

includes name of the students, their images, gender, mats number and course id. A report of absentee student classroom attendance information will be sent to their parents/guidance via email at the termination of each class event. Finally, this system offers a more detailed attendance reporting system which shows student attendance and participation in a classroom. This guarantees easy access to the right and very accurate attendance records of various students in the classroom, thereby allowing lecturers to spend little or no time in computing students' attendance records. In this paper, a student class attendance management system that uses a biometric face recognition was developed, it provides a flexible, accurate and reliable class attendance records of students, it also ensures that students are punctual and commitment to classroom lectures, the technology works in a standalone system.

LITERATURE REVIEW

There are different implemented existing techniques to detect and recognize object of any type. Object detection and recognition is the technique or process of detecting and recognizing the specimen of real world objects such as faces, bottles, traffic signs, buildings and many more things in images or videos. These object detection and recognition algorithms are basically used to extract the features of the objects and learn from those features to recognize the objects. There is a great diversity in the way facial appearance is interpreted for recognition by an automatic system. Currently a number of different systems

are under development, and which is most appropriate may depend on the application domain. A major difference in approaches is whether to represent the appearance of the face, or the geometry.

Advent of Face Recognition

According to Kanade, (1970's), he makes the first attempts to employ face recognition which started with a semi-automated system. Marks were made on photographs to locate the major face features; it employed features such as eyes, ears, noses, and mouths. Then distances and ratios were computed from these marks to a common reference point and compared to reference data. Goldstein *et al.* (1971), then create a system of 21 subjective markers such as hair colour and lip thickness. The issue with this system proved even harder to automate due to the subjective nature of many of the measurements that were still made fully by hand.

In the year 1988 at Brown University, eigenface approach for face recognition was introduced by Kirby and Sirovich. Turk and Pentland (1991), improved Face Recognition using Eigen Faces technique. This system works by analyzing face images and computing eigenface which are faces composed of eigenvectors.

Face Recognition Attendance Monitoring System

Yohei *et al.* (2005), proposed an application where the attendance is monitored by continuous observation. Continuous observation is the method of using video streaming so that the students sitting position, presence, status and other information is collected. Active Student Detecting

(ASD) approach is used to estimate the existence of a student sitting on the seat by using the background subtraction and inter-frame subtraction of the image from the sensing camera on the ceiling.

Chintalapati and Raghunadh (2013), develop an Automated Attendance Management System based On Face Recognition Algorithm. This system is based on face detection and recognition algorithm that automatically detects the student when he enters the class room and mark the attendance by recognition him. This technique is to be use in order to handle the threats like spoofing. The problem with this approach is that it captures only one student image at a time when he enters the classroom thus it is time consuming and may distract the attention of the student.

Mashood *et al.* (2014), came up with a Conceptual Model. Their model captured the image from a fixed camera in the classroom. The noise from the image is reduced and Gabor Filters or jets are used for extracting the facial fiducially points of every detected face. Calculated facial measurements are matched or verified with the data stored in the database. This all computation will be headed on the server. Humans have a diverse set of facial expressions which can reduce the accuracy of facial recognition software.

Senthamil *et al.* (2014), Face recognition based Attendance marking system. In this projected work, the team sort to find the attendance, positions and face descriptions in classroom lecture, by projecting the presence administration system based on face detection in the classroom lecture. The system estimates the presence and the location of each student by continuous

inspection and footage. The result of our beginning experiment shows continuous inspection improved the performance for estimation of the attendance.

Patil *et al.* (2014), Student Attendance Recording System Using Face Recognition with GSM Based Student footage system using face validation was considered and implemented. It was tested with dissimilar face images. This idea is working properly with different panel. All windows are running separately and equivalent. If appreciation is to participate as a viable biometric for validation, then a further order of improvement in detection score is necessary. Under controlled condition, when lighting and pose can be controlled, this may be possible. It is more likely, that future improvement will rely on making better use of video knowledge and employing fully 3D face models.

Fuzail *et al.* (2014), Face Detection System for Attendance of Class' Students. A regular attendance supervision system is an essential tool for any LMS. Most of the existing system are time taking and necessitate for a semi instruction manual work from the instructor or students. This approach aims to explain the issues by integrates face detection in the procedure. Even though this method still lacks the capability to identify each student in attendance on class, there is still much more room for enhancement. Since we implement a modular approach we can get better different module until we reach an acceptable detection and identification rate. Another issue that has to be taken in consideration in the

opportunity is a process to ensure users privacy. Whenever you like a representation is stored on servers, it must be impossible for a person to use that image.

Gopala *et al.* (2015), Implementation of Automated Attendance System using Face Recognition”, automated presence System has been envisioned for the purpose of falling the errors that occur in the conventional (manual) attendance taking system. The aim is to computerize and make a system that is useful to the institute such as an organization. The efficient and exact method of attendance in the office atmosphere that can reinstate the old manual methods. This technique is secure enough, reliable and available for use. No need for dedicated hardware for installing the system in the office. It can be constructed using a camera and computer.

Fingerprint Attendance Systems

A fingerprint is an impression of the friction ridges of all or any part of the finger. A friction ridge is a raised portion of the epidermis on the palm (palm and fingers) or plantar (sole and toes) skin, consisting of one or more connected ridge units' friction ridge skin. These ridges are sometimes known as “dermal ridges” or “dermal papillae”. There are a number of different strategies through which fingerprint identification can be done, among which verification through minutia points is the simplest and easy Jun, (2010). According to the current most widely used Galton–Henry system, the fingerprint is divided into five classifications.

Josphineleela (2012) proposed one system, in which attendance is being taken using fingerprint. This system can be used for student and staff. In this system the fingerprint is taken as an input for attendance management and it is organized into the following modules Pre-processing, Minutiae Extraction, Reconstruction, Fingerprint Recognition, Report generation. In this system, novel fingerprint reconstruction algorithm is used.

In 2013, Seema and Satoa proposed one new system for employee attendance using fingerprint. In this system, fingerprint verification is done using extraction of minutiae technique and the system automates the whole process of taking attendance. For employee fingerprint checking, it checks one fingerprint template with all templates stored in the database, likewise it checks for all student which will take more time in Neha, (2013) fingerprint recognition based identification system is designed for student identification. This system is being designed for taking attendance in institutes like NIT Rourkela. In this system, fingerprint template matching time is reduced by partitioning database. Fingerprint scanner will be used to input fingerprint of teachers/ students into the computer software.

Weakness of the Present System

The current system of taking student attendance in Benson Idahosa University has been found to have lot of problem, and have considerably slowed down the overall process of student attendance. The problem associated with the present system is listed below:

- a) Irregularities: This happens when students take attendance

for other students not present in school.

- b) Time Spent: The time spent by the lecturer in going to the lecture hall during lectures to take attendance and the time spent in computation.
- c) Assumption: This is the case where lecturers assumes student attendance based on their previous attendance on days they were unable to go to the class to take attendance.
- d) Inaccuracy: This problem is due to human error or mistakes in the case of miscalculation of the student attendance.
- e) Storage: another problem has been largely in the pattern of keeping student register, thus making it appear cumbersome.
- f) Damage: Sometimes the student's attendance register may be attacked by insects and this could destroy the master copies of the attendance register.

Design Process of the Proposed System

This system was designed to be more reliable and robust than the existing system in terms of taking attendance. Here the admin/lecturer accesses the application on the computer system and key in the student data including capturing of their face.

Once this is done, the software will recognize the student based on the biometric (facial) data entered. The software design process was done using a top down approach, which has been the best approach in most engineering designers. This involves the disintegration of the project topic itemed as system into subsets called the subsystem.

In the developing the system, the system is divided into different modules and subsystems. These subsystems perform a particular task. At the end of which the whole system is integrated together in line with stated objectives. The terminals at different locations are connected to the attendance base management system. All the files, user forms, attendance forms and associated programs will be connected. The design will also provide necessary control both manual and automated to help maintain the integrity of the data base files.

Architecture of the System

This is a high level view of the system with the main components of the system and the services it provides and how they communicate. The system is implemented using a three-tier architecture that comprises of user interface, process management and DBMS.

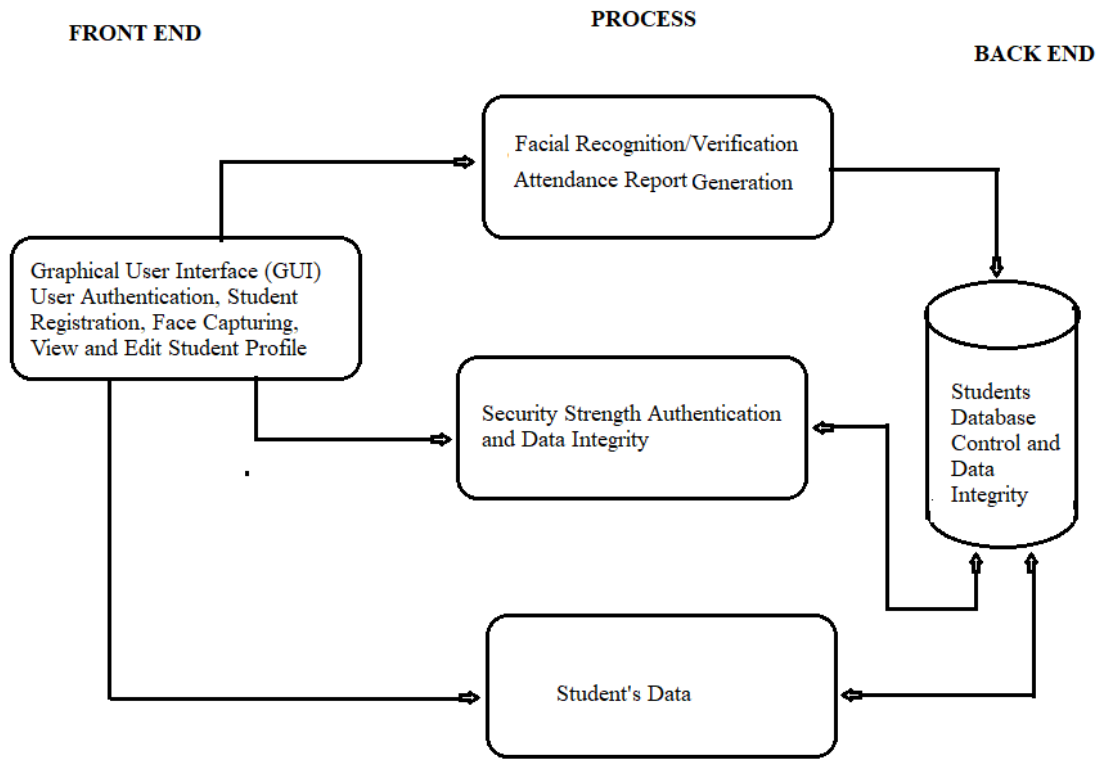


Fig. 1: Architectural of the system

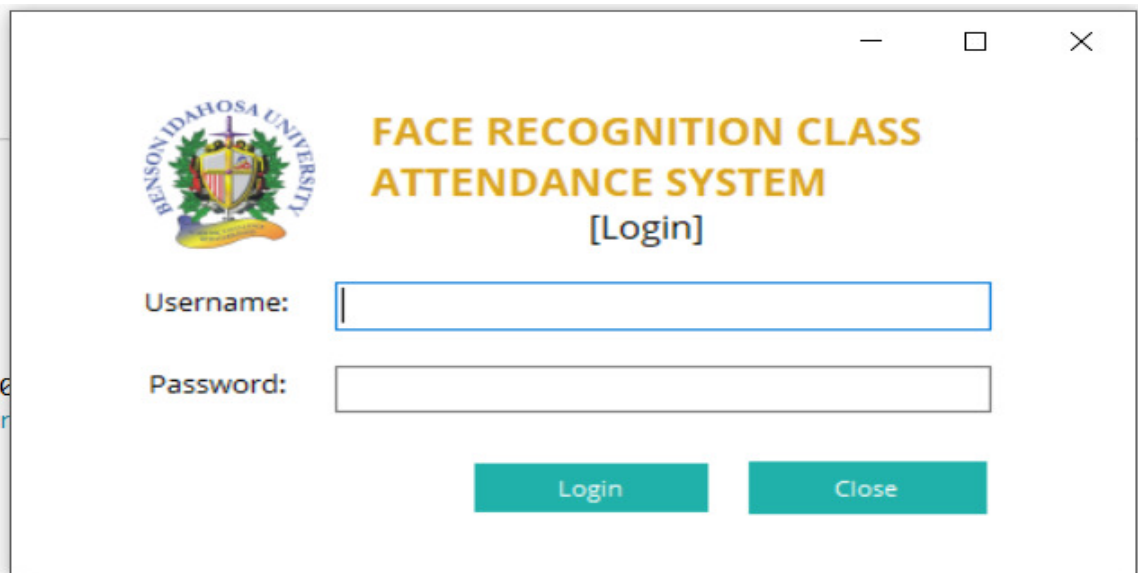


Fig. 2: Login form

The user interface implementation displayed above enable the user to interact with the system in other to gain access to the main menu of the system.

b) Registration Interface Implementation

The registration input interface implementation allows the admin user to input the student.

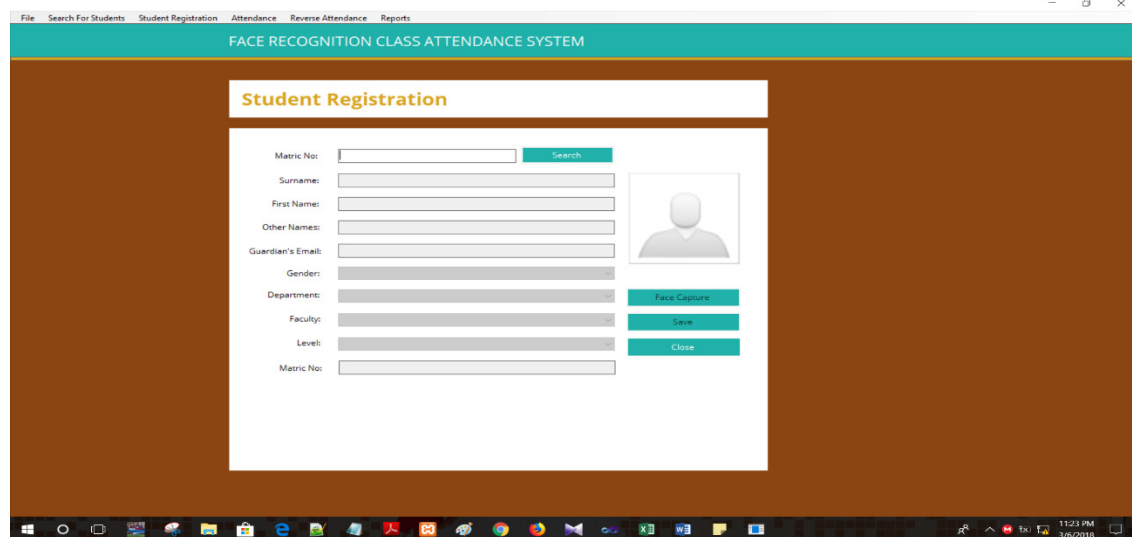


Fig. 3: Registration Input interface

Application Areas

- i. **Commercial Institutes:** In work environments like inside offices, banks, both in private and public business and non-business organizations, etc. for work attendance time and monitoring:
 - a) **Residential Security:** Alert homeowners of approaching unknown personnel.
 - b) **Internet, E-commerce:** Verify identity for Internet purchases.
 - c) **Healthcare:** Minimize fraud by verifying identity.
 - d) **Benefit payments:** Minimize fraud by verifying identity.
 - e) **Voter verification:** Minimize fraud by verifying identity.
 - f) **Payroll:** Eliminate ghost workers by verifying identity.
 - g) **Shopping mall/supermarket:** Minimize shop-lifting
 - h) **Day Care:** Verify identity of individuals picking up the children.
 - i) **Missing Children/Runaways:** Search surveillance images and the internet for missing children and runaways.
- ii. **Educational institutes** (e.g. schools, colleges, universities etc. for work attendance time and monitoring.)

CONCLUSION

As technology is advancing, there is need to put place in the educational institutions a cost-effective and efficient

systems, such as a computerized facial recognition system which can monitor students class attendance, and also monitoring system, which is less time consuming unlike the conventional approach; which distractions of lectures, error prone, student nepotism, student laxity/nonchalant attitude to classes and foster student punctuality, regularity and commitment to lectures; increase security and provide reliable attendance report generation. Biometric Face Recognition System for student attendance provides a convenient way to checkmate students' presence in the classrooms and can bring numerous benefits to the societal institutions beyond attendance tracking. A reliable, secure, fast and an efficient class attendance management system was developed overriding the conventional-unreliable and error prone system. This automated student class attendance management system which employ face recognition system will save time and effort, especially with a lecture of large number of students, reduce the amount of work done by the lecturer or class representative and administrator. The system is a tool for the educational institution to overcome their current attendance taking model, teachers no longer has to worry and waste time tabulating student's attendance and can now turn their attention to more important issues. The system does not do away with the need for vigilance and monitoring. It does help to make this traditional chore easier, and more effective. This enables institution to better utilize their existing resources to enhance their value added to the student body and their parents.

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