AI-based Automatic Attendance Recording and Monitoring

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Abstract:From these last two decades nearly 1lac students were gone missed while going to the collage or school so its require the collage and school authorities should take the responsibility. It is important to build the system which is automatic and secure. Conventional method of attendance taking is very time consuming task, every time students have sign the attendance sheets of lecture has to call their name it is not easy to maintains attendance. There many digital systems are evolved but they have their own flows. So this face detection attendance management system will solve all existing problems. The attendance is marked by detecting the face which is captured by the CCTV camera; it will compare the extracted face data with the database. Once the faces are detected then it will update the attendance report with time and date. It will mark the present for recognized students and it will mark absent for other students who data is present in data base but not recognized.

Keywords: - Artificial Intelligent, Machine learning.

I. INTRODUCTION

Now a Studies show that a significant amount of time is spent on taking attendance in the classroom; it is found that nearly 15% of the total time in one hour lecture is consumed for taking attendance manually. There are some chances of proxy attendance by the student. To make the productive use of time inside the classroom, automated attendance tracking systems were proposed. Therefore, many institutes started deploying many other techniques for recording attendance like use of Radio Frequency Identification (RFID) [13], Iris recognition [6], fingerprint recognition, and so on. However, these systems are queue based which might consume more time and are intrusive in nature.

The Face recognition is a technique replacing biometrics effectively. It is novel of all as it uses the facial features of the person for identification. It can be attributed as a technique with minimum flaws as the facial features of every human being are unique. Face recognition can effectively be used for security systems but has not been pursued due to evident flaws. Attendance marking through the conventional method i.e. attendance marked manually on a paper by the in charge had its own pros and cons. Method of manual attendance marking in question is vulnerable and time consuming which usually results in a setback to the students. Addressing this issue, innovations have ended up at wide-ranging use of the biometrics. Attendance Management through biometrics had awkward cost of extra effort and personal time at the user end. After the outbreak of face recognition as a useful method, techniques were evolved to incorporate it in attendance management systems.

Human face contains the unique features which will be specified to that particular person those features can be extracted by using the algorithm to detect the particular person. System consists of the algorithm which only detect the face of the student from the rest of the spaces and body parts and then matching this recognized image from the pre feed data, this data will be fetching while students enrol in the college or in a particular class .The system will work in three different sections first is to feed the images of the students who will be attending the classes, it is extremely important to get all the images of the students captured. The second phase of the attendance monitoring system using face recognition is the detecting the faces this is the dynamic phase where the camera will capture the images of the faces only and with the help of the pre feed data this image which was being captured will be detected. The last phase of this system is updating the attendance sheet. The recognized faces will be marked as present and the rest of the students will be marked absent.

II. LITERATURE SURVEY

A. G. Waghade et al. [1] gives overview of attendance management system which is based on the Web Server. The web based attendance management system is developed using PHP server-side scripting language and CSS, HTML,

Javascript, fordesigning which is fully meet the system's goals. The proposed system offers the process of monitoring attend students, it aims to help the teacher in the classroom or laboratories to manage and record students' presence electronically and directly without the need to list on paper so it will save time and effort. But there will still the chances of proxy attendance through students.

Fatai I. Sadiq et al. [2] this help to monitor attendance of students and lecturer in the classroom to manage and record students' presence in real-time through the smartphone devices. This is done without the need to use paper hence it will save time and effort. The developed ontology-based smart attendance (OBSA) can analyze and present students' attendance report. It is easy to use and is accessible to lecturer without permission to unauthorized users. Finally, OBSA application can be extended to any organization where attendance is mandatory.

Anand S, Kamal Bijlani et al. [3] this paper showed that it is possible to achieve an affordable, fast and secure automated attendance marking system in classroom using smartphone and Wi-Fi Fingerprinting technique that incorporates a controlled RSSI acquisition procedure and a simple k-NN algorithm. Further scope of this research will be to look into delivering Location Based Services (LBS) for teachers and students using this tool, and further increase of positioning accuracy using probabilistic algorithms, such as the Bayesian filter.

Benfano Soewito et al. [4] Proposed system which will mark the attendance using voice recognition technique and fingerprint recognition through mobile phone. Attendance system in this study using fingerprint and voice as a method of identifying and recording the coordinates GPS to ensure the user's location when do attendance. The attendance system use smartphone or mobile devices can prevent the queue as when using other attendance system, especially at peak hours (at the time come to office and out of office) where the number of users and the number of devices attendance system has a ratio that is not balanced. With the attendance system based smartphone or mobile device, each person have android-based mobile device can be mounted absences application so no need to queue in electronic attendance device or the manual system provided by the company

Mahesh P Potadar et al. [5] Beginning of lecture is authenticated by fingerprint of respective subject teacher, then students will enroll their attendance, end of lecture is also authenticated by fingerprint of subject teacher, so system is much reliable and accurate. It also indicates the total time for which teacher has conducted the lecture. Communicating with PC will help to produce attendance in required formats. Communicating through GSM module will update all details to higher authorities and is proposed to send the data to all parents weekly. But this system need more time to capture the fingerprint of all the students. And some time class will be disturbed by students while giving the fingerprint.

Kennedy O Okokpenjie et al. [6] An Iris Scanner was use to get the image of the iris. The (webpage) was made using HTML, JavaScript, and CSS. The graphical interface enabled effective and easy communication between users and the designed system. The database was created using MySQL language. Students are identified when a match is found in the database for the iris image of each student just acquired. The designed system returns an integer value of (1) if there is a match and an integer value of (0) if there is no match. These results are stored in the database along with the time, date, month, and year the attendance was taken. The main aim of this paper is to propose a cheap and feasible automated attendance system using the iris as the biometric for enrolment and identification. The attendance system proposed by this paper is web based. The designed prototype showed a lot of promise. And need more security.

Sadat Duraki et al. [7] The Wireless Fingerprint Attendance System used for the identification of students is faster than most fingerprint identification systems in practice. The teacher is also able to start the system in two ways (APP, WFT) and can download the attendance list as a PDF. Furthermore, the entry and exit times of the students and teachers are recorded. But this system also have their own drawback it also required some time to mark the fingerprint.

Dr. A. Babu Karuppiah et al. [8] This approach aims to solve the issues by integrating face recognition in the process. Even though this system still lacks the ability to identify each student present on class, there is still much more room for improvement. Since they implement a modular approach that can improve different modules until they reach an acceptable detection and identification rate.

Nilofer Tamboli, M. M. Sardeshmukh et al. [9] The group image of the students is captured and stored in the database. The individual faces of every student are recognized by face detection algorithm. Face regions are preprocessed to convert RGB image into gray scale image. It is followed by applying DRLBP for texture extraction and DRLTP for obtaining face shape values. The face features values are then calculated to match the images in the database.

Denijel Mijic et al. [10] When compared to similar solutions available in the literature, the EON lacks features for biometric identification that are often seen in other recently proposed systems, like fingerprint or face recognition. However, we find it unnecessary for this use case because the use of low-cost passive RFID tags and low-frequency RFID readers reduces costs and simplifies the complete solution. The total cost of the RFID reader was around 50 EUR at the time of development. In a few cases, we noticed that students bring RFID tags of other students to register their attendance even if they were not present in the class, since the attendance has an influence on the final grade, especially for the subjects in the first two years of study.

Qi Xia et al. [11] the proposed design is composed of three main components, where BLE beacons serve as landmarks periodically transmitting data that is caught and recorded by the mobile application, and finally delivered to the web service for processing and management. This opens the possibility of integrating sophisticated data analysis procedures. Such a module could be used to reveal insight into the behavior of students during lectures and exams. In that sense, attendance ratings on particular lectures could be calculated, attendance rates on a daily or weekly basis could be discovered.

Parvathy Arulmozhi et al. [12] proposed Applications are being taken to cloud environments in order to reap the originally envisaged benefits of the cloud idea. Through this experiment, it is proven that when the fingerprint database is also with the cloud application, the real-time performance is being achieved. It uses the LiFi technology. It is clear from the experimentation that the cloud access and usage times will be substantially less with the Li-Fi technologies.

Khawla A, Alnajjar et al. [13] in today's world many automated attendance systems have been implemented. The aim of the paper is to implement an automated attendance system to replace the classical attendance method in a university. Biometrics and RFID based system was proposed. Both software and hardware designs were addressed. This paper explained about both RFID and Biometric attendance system where students can mark their attendance using either RFID tags or Biometric. But this time of system required more hardware devices, maintaining these hardware is not so easy.

Prof. Vinay Suryawanshi et al. [14] the proposed system is Fingerprint attendance system is elegant and efficient way to monitor the presence of students in the class over an entire semester for various courses. With the help of this attendance system, every faculty can get the attendance of a particular student for entire year in a tabular form within few seconds, Also it is concluded from the above proposed system that a reliable, secure, fast and an efficient system has been developed replacing a manual and unreliable system. Results have shown that this system can be implemented in academic institutes for better results regarding the management of attendance.

Dulyawit Prangchumpol et al. [15] proposed a the system which will to solving the problem of forgetting on checking attendant, the students could not hear their name or the waste of time on checking, this research developed the checking system with face recognition to reduce those problems. The developed system used OpenCV library to catch and identify real-time person and also used Google Cloud so that student could edit their information. This research had examined the way of how face recognition work properly by using Android Face Recognition with Deep Learning. As a result, Android Face Recognition with Deep Learning gives the most correct one which could increase the accuracy on identifying of the system.

Louis Mothwa et al. [16] this paper proposes the front and the back ends of the smart attendance monitoring system using face. It demonstrates how a multi- camera installation reduces the effect of occlusion in the process of face detection, since better face detection increases the accuracy of class attendance monitoring. Periodical face recognition produces updated data within a specified time interval. The system architecture with multi-positioned cameras is presented. Cameras from different positions are connected to a computer. Scenes of the class are captured at different time instants and sent to the computer where faces are extracted and information on the attendance is updated

Ms. Urvi Varma, Ms. Aria et al. [17] presented a location based attendance monitoring system. The system records individual student's location in real time and calculates their distance from the teacher to mark the attendance. There are a lot of advantages for this system like time saving, economical efficiency, reduce personnel usage, user friendly and protected program.

Ramandeep Kaur et al. [18] proposed the method to implemented the face recognition system using Principal Component Analysis and Eigen face approach. The system successfully recognized the human faces and worked better in different conditions of face orientation. The Eigen face approach thus provides a practical solution that is well fitted to the problem of face recognition. It is fast, relatively simple and has been shown to work well in constrained environment. This system only works on image database it fails to work with video database.

Muthu Kalyani. K et al. [19] proposed the 3D face recognition module. Recognition of faces from still images is a

difficult problem, because the illumination, pose and expression changes in the images create great statistical differences and the identity of the face itself becomes shadowed by these factors where the 3D face recognition has the potential to overcome feature localization, pose and illumination problems, and it can be used in conjunction with 2D systems.

Shobha Hiremath et al. [20] proposed a system which is based on IoT. Through the proposed IoT based smart attendance system using RFID the existing manual system of registering the attendance can be transformed into an efficient and error-free attendance management system. By employing this system information can be conveyed without a hitch.

III. SYSTEM ARCHITECTURE

Figure 1 depicts the system architecture of the proposed system. The method proposed in this paper is marking attendance using face recognition technique. To mark the attendance camera will capture he images and then 68-Dlib function is used to detect the faces in the image frames once the images are detected then face recognition module will comes into picture where it uses the SVM classification algorithm for classifying and recognizing the detected faces. Then attendance record will be updated, and recognized faces are marked as present. At the time of enrolment, templates of face images of individual students are stored in the Face database known as Training Set. Here all the faces are detected from the input image and the algorithm compares them one by one with the face database (Testing Set). If any face is recognized, the attendance is marked on the server from where administrator can access and use it for different purposes. Teachers come in the class and just press a button to start the attendance process and the system automatically gets the attendance without even the intensions of students and teacher. In this way a lot of time is saved and this is highly securing process no one can mark the attendance of other.
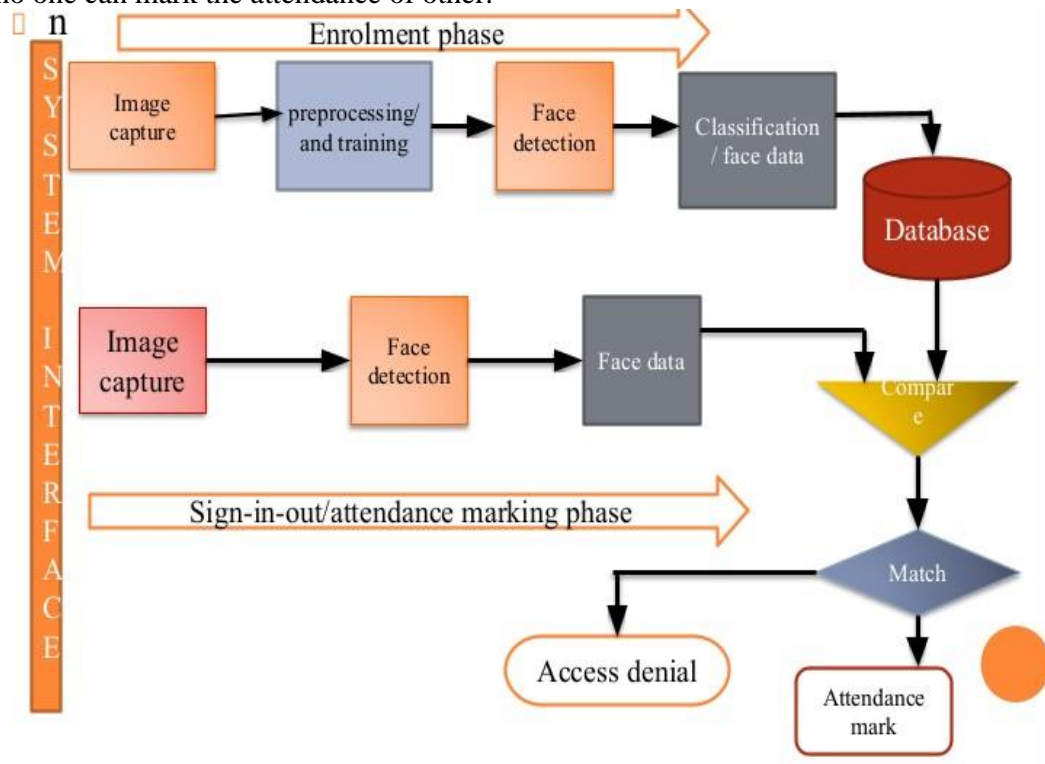

Fig 4.1 Architecture diagram of AI-based automatic attendance management system**.**

IV. METHODOLOGY & IMPLEMENTATION

LIST OF MODULES

➢ Image capturing module

- ➢ Data base creation
- ➢ Pre-processing
- ➢ Face detection module
- ➢ Face recognition module
- ➢ Admin function module
- ➢ User function module
- ➢ Reporting module

1. Image capturing module
This module is developed for capturing images of person so that which can be used for further processing. This module can be used while creating the and updating the database and while marking the attendance of the student. Images will be captured using the webcam.

2. Data base creation
This module will explain how the data base is will be created. The data base is created by capturing images of 5 to 8 person. To get the good accuracy the person should make different expression and can looking at different direction while capturing the image.

3. Pre-processing
Pre-processing is the important part of every proposed system. Created data set is pre-processed to get the good accuracy in the result. Preprocessing is mostly used to minimize noise, lighting differences, colour intensity, backdrop, and orientation. Here captured images are resized into 96*96 pixel size, "cv2 resize" function is used for resizing purpose. Cv2.cvtcolor(frame.COLOR-BGR2GRAY) function is used for converting the colored image frames into gray color

4. Face detection
Face detection is a computer technology being used in a verity of applications it will detect faces in image/videos frames. Then detected images are further used for comparison and recognition process. 68-Dlib module is used for detection the faces in the images. 68-Dlib is pre-trained landmark based facial detection module. The Dlib is used to estimate the location of 68 co-ordinates (x,y) that will map the facial pointson a person's face. These facial land marks are used to localize and represent salient region of face like eyebrows, Eyes, Nose, Mouth, Jaw line.

5. Face recognition
Face recognition is a method of identifying or verifying the identity of an individual using their face. Face recognition systems can be used to identify people in photos, video, or in real-time. Law enforcement may also use mobile devices to identify people during police stops. Face recognition software use computer algorithms to identify specific, distinguishing features on a person's face. These features, such as eye distance or chin shape, are then transformed into a mathematical representation andcompared to data from other faces in a face recognition database. A face template is data on a specific face that differs from an image in that it is designed to only include certain traits that can be used to recognize one face from another. In this project Support Vector Machine algorithm is used for classification and recognition purpose. The "Support Vector Machine" (SVM) is a supervised machine learning technique that can be applied toclassification and regression problems. It is, however, mostly employed to solve categorization difficulties. Support Vectors are simply the coordinates of individual observation. The SVM classifier is a frontier that best segregates the two classes (hyper-plane/ line).

6. Admin login module
Registration of new students is main function of this module. Adding and updating the student information, cancel the user registration, manage the user account are main functionality of this module.

7. User login module
Register their information creates their account with the help of admin. And they can able to see only their own attendance report.

8. Attendance reporting module

Student attendance management system has been designed to automate the process of registration and automate the process of maintaining the attendance and also automate the process of attendance marking. System can update the daily attendance into the daily bases so that anyone can see their attendance when they needed.

V. CONCLUSIONS & FUTURE ENHANCEMENT

Convention method attendance systems are all time consuming and other digital methods are all required certain care. This Smart attendance system is designed to solve the issues with the existing attendance management system. This system uses the face recognition method to mark the attendance. Through the CCTV camera it will take image as an input and after doing some preprocessing it will classify after classification it will match the image data with the database and it will mark the attendance for matched face and unmatched faces are marked as absent that list will sent to the parents through SMS. It will help the institutes to manage the attendance system without involvement of any extra man power and any hardware. This method is secure, reliable and very easy to use. This may also have application in criminal verification.

The future scope of the work can be captured multiple detailed images of the students and we can store them in cloud. System can be configured and used in ATM machine to detect fraud. System can be used at the time of election to identify the voters

REFERENCES

[1]. Web Service for Student Attendance Management System", Authors:" Anusha V Pai",Year of Publication: ©2017 IEEE.
[2]. "Ontology-Based Student Attendance using Android Mobile", Authors: "Fatai Sidiq, ApkeA C Ehinomen",Year of Publication: ©IEEE 2020
[3]. "Attendance Monitoring in Classroom using Smart Phone and Wi-Fi ", Authors: Dr.ChitraKiran.N , Suchira Suresh , ©2017 IEEE.
[4]. "Smart Mobile Attendance System using Voice Recognition", Authors: Benfano Soewito,Ford Lumban Gaol ©2017 IEEE.
[5]. "Biomatric Attendance Recording and Communication System" ,Authors: Mahesh P Ptadhar, Vaibhav V Marathe © IEEE 2017.
[6]. "Design and Implimentaion of student Attendance Student Attendance Using Iris Biomatric Recognition ", Authors: Kennedy Okokpujei, Etinosa Noma-Osaghae , © IEEE 2019.
[7]. "Attendance Management System using Mobile Device and Web Application", Authors: Jun Lio, © IEEE 2018.
[8]. "Online Attendance System", Authors: Dr. A. Babu Karuppiah, Associate Professor. ©IEEE 2017
[9]. "Facial based Attendance Monitoring System using Discriminative Robust Local Binary Pattern ",Authors: Mahmoud Obaid , Zeki Bayram , Murad Saleh, © IEEE 2018.
[10]. "Improved Version of Standard Management System Based on RFID", Authors: Danijel Miji, Ognjen Bjelica, © IEEE 2017
[11]. "Design and Development of Smart Attendance Management System with Blutooth Low Energy Beacons ", Authors: Bruno Zorić, Dražen Bajer, © IEEE 2017.
[12]. " Design and Implimentation of Hybrid Attendance System Leveraging Twofactor(2f) Authentication (fingerprint-radio-frequency identification)", Authors: Meyliana , Pethuru Raj Chelliah , IEEE 2019
[13]. " Attendance System based on Biomatric and RFID", Authors: Khwala A, Omar Hegy, © IEEE 2018.
[14]. "Attandance System using Finger Print Identication using GUI", Authors: Prof. VinaySuryawanshi, Swapnil Aundhakar, © IEEE 2020.
[15]. "Face recognition for Attendance Management System using Multiple Sensor", Authors:Dulyawit Prangchumpol, © Elsevier 2018.
[16]. "Conceptual Model of the Smart Attendance Monitoring System using Computer Vision", Authors: Louis Mothwa, Jules-Raymond Tapamo , © IEEE 2016
[17]. "SmartDot-Location based Attendance", Authors: Ms. Aria1, Ms. Urvi Verma, Ms.Simran Swamy, © IEEE 2016
[18]. "Face Recognition using Principal Component Analysis", Authors: Ramandeep Kaur, Er.Himanshi, © IEEE 2019.
[19]. "Smart Application for AMS using Face Recognition ", Authors: MuthuKalyani.K,VeeraMuthu.A, © IEEE 2017.
[20]. "IoT based Attendance Monitoring System using RFID ", Authors: Mukund Jakhiya, Dr.Harsh Purohit, © 2020