



Face Recognition Based Attendance System

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Abstract: A Face Recognition System is an application of computer vision and Image processing which is capable of performing two major tasks of identifying and verifying a person. The system proposes a solution for implementing a face recognition-based attendance system using Python, OpenCV and KNN. A GUI for the project is also designed using PyQt, which is a Platform to create GUI based Programs. It is designed to capture the images from live camera feed within a given time frame and recognize known faces from the images and mark their presence. It uses CSV file to store the attendance report for the session which can then later be exported. By automating the attendance process the system thereby reduces the time taken and manual work involved in traditional attendance methods.

I. INTRODUCTION

Attendance is considered as an important factor for both students in Educational institutions as well as employees in a workplace. Maintaining an attendance report is the standard and most common way of keeping track of an individual's presence and overall punctuality. A person's attendance may also be an indicator of their interest or Involvement in a particular field. The process of marking and maintaining attendance reports can be made easy by automating them. Face Recognition technology finds major application in the field of education to efficiently automate and manage Attendance System. As the number of students or employees increases it is difficult to maintain and manage the attendance. Therefore, the system proposes a method to effectively handle this issue by automatically recognizing and marking the attendance for the students or employees and thus reducing the time and effort it would've taken if the process had been carried out using traditional Attendance marking methods.

II. LITERATURE SURVEY

[1] An android based course attendance system using face recognition was proposed by Dwi Sunaryono, Joko Siswanto and Radityo Anggoro. They stated that Student attendance system is needed to measure student participation in a course. Several automated attendance systems have been proposed based on biometric recognition, barcode, QR code, and near field communication mobile device. However, the previous systems are inefficient in terms of processing time and low in accuracy. This paper aims to propose an Android based course attendance system using face recognition. To ensure the student attends in the course, QR code containing the course information was generated and displayed at the front of classroom. The student only needed to capture his/her face image and display the QR code using his/her smartphone. The image was then sent to server for attendance process. The experimental result shows that the proposed attendance system achieved face recognition accuracy of 97.29% by using linear discriminant analysis and only needed 0.000096s to recognize a face image in the server.

[2] RFID-Based Students Attendance Management System proposed by Arulogun O. T., Olatunbosun, A., Fakolujo O. A., and Olaniyi, O. M. They stated that there has been a rise in the number of applications based on Radio Frequency Identification (RFID) systems and have been successfully applied to different areas as diverse as transportation, health-care, agriculture, and hospitality industry to name a few. RFID technology facilitates automatic wireless identification using electronic passive and active tags with suitable readers. In this paper, an attempt is made to solve recurrent lecture attendance monitoring problem in developing countries using RFID technology. The application of RFID to student attendance monitoring as developed and deployed in this study is capable of eliminating time wasted during manual collection of attendance and an opportunity for the educational administrators to capture face-to-face classroom statistics for allocation of appropriate attendance scores and for further managerial decisions.

[3] Face Detection System for Attendance of Class proposed by Students Muhammad Fuzail, Hafiz Muhammad Fahad Nouman, Muhammad Omer Mushtaq, Binish Raza, Awais Tayyab, Muhammad Waqas Talib stated that Face detection technology has widely attracted attention due to its enormous application value and market potential, such as



face recognition and video surveillance system. Real-time face detection not only is one part of the automatic face recognition system but also is developing an independent research subject. So, there are many approaches to solve face detection. This paper introduces a new approach in automatic attendance management systems, extended with computer vision algorithms. We propose using real time face detection algorithms integrated on an existing Learning Management System (LMS), which automatically detects and registers students attending on a lecture. The system represents a supplemental tool for instructors, combining algorithms used in machine learning with adaptive methods used to track facial changes during a longer period of time. This new system aims to be less time consuming than traditional methods, at the same time being nonintrusive and not interfere with the regular teaching process. The tool promises to offer accurate results and a more detailed reporting system which shows student activity and attendance in a classroom.

[4] Attendance automation using face recognition biometric authentication," 2017 International Conference on Power and Embedded Drive Control (ICPEDC) proposed by V. Soniya, R. S. Sri, K. S. Titty, R. Ramakrishnan and S. Sivakumar state that Attendance automation has become one of the most important needs in educational institutions and work places across the world, since it saves time and accurate too. Face recognition system needs least human cooperation and is viable too. The system automatically detects the student's entry in the class and marks attendance for the particular student periodically. The data collected can be used by the system further for attendance score calculation and other managerial decisions. Arduino is used to create and control the system that could automatically mark the attendance for the students. Thus the system reduces the manual collection of attendance and the time taken for report generation.

[5] Arduino Based Smart RFID Security and Attendance System with Audio Acknowledgement proposed by Yashi Mishra, Gaganpreet, Kaur Marwah and Shekhar Verma states that there has been emerging demand for secure system that must be reliable and fast responded for the industries and company. RFID (Radio Frequency Identification) is one of the reliable and fast means of identifying any material object. Their significant advantage are that they can read wirelessly, contain more information than barcode and more robust in nature and based on non-line-of-sight technology. RFID tags can read in any environmental challenging conditions where other read technology likes barcode or optical card reader useless. In this paper we purposed a secure system that provides information about authorized and unauthorized persons. In this system when card brought near to the RFID module it reads the card information and it compare with the data in the program memory and displays authorized or unauthorized entry. The door opens for authorized entry and marked the attendance corresponding to that code id and save in excel sheet format in SD card and after that display it's all information on the LCD like name and employee code number that link with authorize entry and welcome message with audio greetings by taking their name which is already saved into SD card and for unmatched entry the gate remain closed and alerts the security person through SPEAKERS by playing the separate audio file saying entry is unauthorized.

[6] Face Detection Algorithm Based on Deep Residual Network by Tao Shifan, Li Yufeng, Huang Yufeng and Lan Xiaoyu states that with the rapid development of artificial intelligence, face detection technology is widely used in our daily lives, such as mobile payment, video conferencing and personal identification. However, face the scenario while the face been blocking or crowding, the face detection accuracy would be greatly reduced. Therefore, in this paper, a high-precision face detection algorithm based on deep residual network has been proposed to solve this issue. Firstly, adding neural framework branches based on the Resnet-50 to improve the detection accuracy. Then import the soft-NMS method to enhance the robustness of algorithm. Experimental test on the public data set FDDB, the results indicate that the accuracy of this algorithm can reach 94.2% with good robustness, both accuracy and speed are better than the previous algorithm.

[7] Face Recognition on a Smart Image Sensor Using Local Gradients by Valenzuela Wladimir, E Soto Javier, ZarkeshHa Payman and Figueroa Miguel. They present the architecture of a smart imaging sensor (SIS) for face recognition, based on a custom-design smart pixel capable of computing local spatial gradients in the analog domain, and a digital coprocessor that performs image classification. The SIS uses spatial gradients to compute a lightweight version of local binary patterns (LBP), which they term ringed LBP (RLBP). Our face recognition method, which is based on Ahonen's algorithm, operates in three stages: (1) it extracts local image features using RLBP, (2) it computes a feature vector using RLBP histograms, (3) it projects the vector onto a subspace that maximizes class separation and classifies the image using a nearest neighbor criterion. We designed the smart pixel using the TSMC 0.35 μm mixed-signal CMOS process, and evaluated its performance using postlayout parasitic extraction. We also designed and implemented the digital coprocessor on a Xilinx XC7Z020 field-programmable gate array. The smart pixel achieves a fill factor of 34% on the 0.35 μm process and 76% on a 0.18 μm process with $32 \mu\text{m} \times 32 \mu\text{m}$ pixels. The pixel array



operates at up to 556 frames per second. The digital coprocessor achieves 96.5% classification accuracy on a database of infrared face images, can classify a 150×80-pixel image in 94 μ s, and consumes 71 mW of power.

[8] The Application of Face Recognition System by Sai Wang states that with the rapid development of computers and the internet, information security is particularly important. In the past, identification is mainly used with passwords or ID cards, but it is easy to be stolen or forgotten. However face recognition systems can quickly and simply solve the problem, so currently, it begins to be widely used in various field.

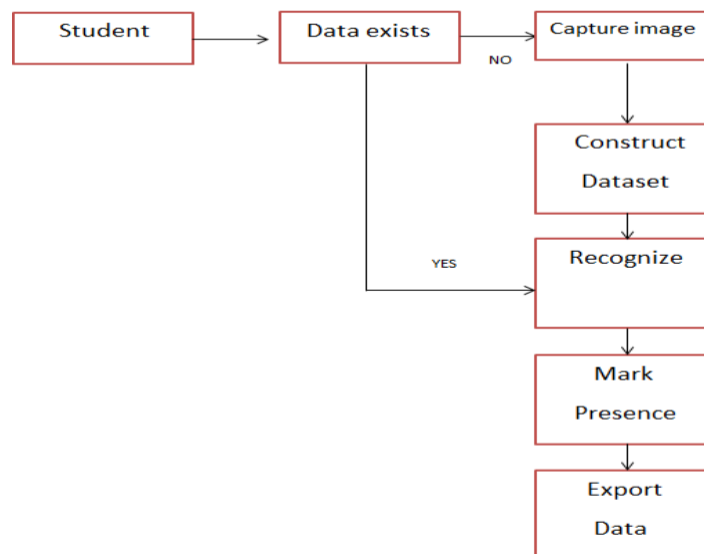
III. PROPOSED SYSTEM

An effective real-time face recognition-based attendance system would find large area for application among educational institutions. To deliver the best, this project proposes an approach to recognize faces in real time and log attendance for a person if they are identified. This can be done with Deep Learning methods, by training the classification model with the face encoding values of every student in the classroom. With this the system is able to identify a known individual in real time and mark their presence. The system proposes a solution for implementing a face recognition-based attendance system using Python, OpenCV and KNN. A GUI for the project is also designed using PyQt, which is a Platform to create GUI based Programs. It is designed to capture the images from live camera feed within a given time frame and recognize known faces from the images and mark their presence. It uses K Nearest Neighbours classification algorithm to find the closest match to a face in any given frame of the video feed. The algorithm should be trained with the face encoding values of the students. The system provides the functionality to export the attendance report as spreadsheets which are temporarily stored in databases with the help of SQLite.

Advantages:

- Real time recognition.
- Less storage overhead.
- Faster Detection time.
- Less number of training images per person.

System Architecture:

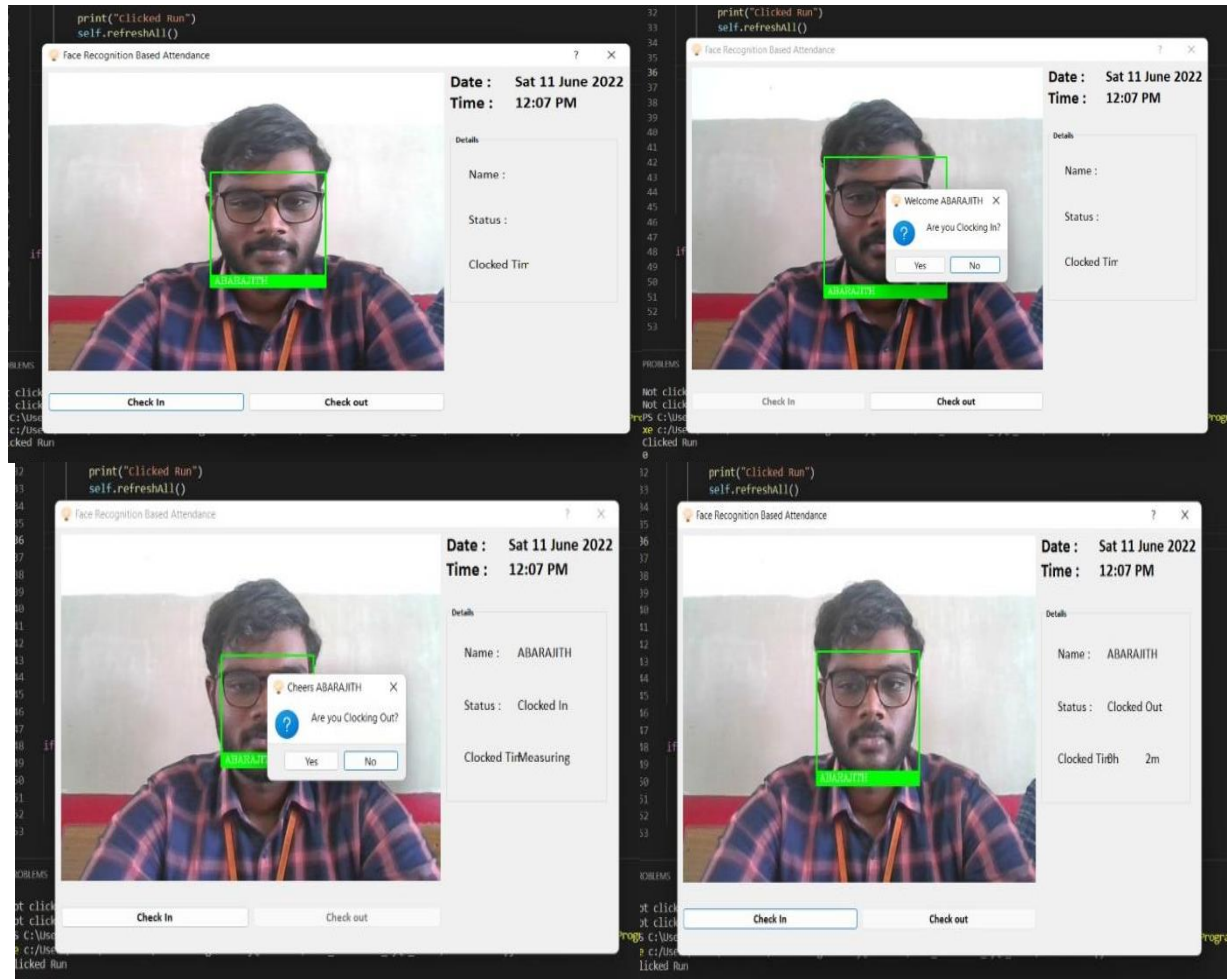


A system architecture or systems architecture is the conceptual model that defines the structural, behavioural, and more dimensions of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviours of the system. A system architecture can comprise system components, the expand systems developed, that will work together to implement the overall system languages used to describe are called Architecture Description Languages. The system proposes an approach wherein the



application captures live images through the camera, then relays them in real-time to the classifier. The classifier takes it further by comparing it to the already existing trained datasets and gives the text result. The result is then used to mark the attendance which can later be exported.

IV. METHODOLOGY AND DISCUSSION



The above images represent the implementation of the system. There are four images. In the first image, the face of the user gets recognized which is denoted by a rectangular box around the face labeled with the name of the user. The face of the user will be recognized only if the data of that corresponding user already exist in the system. If not, face will not be recognized. We can see there are few buttons which helps in the clock in and clock out activities of the user. The clock in button can only be clicked, only the face of the user gets recognized. The second image represents the actions that occur after the clock in button is clicked. Here the face of the user gets recognized and the clock in button is clicked. After is a small dialog box appears stating that 'Are you Clocking in?', checking the users confirmation if the user is ready to clock in. If the user click yes the users status, time and date will start getting recorded. After the work of the user here is done, the user may click clock out. After is a small dialog box appears stating that 'Are you Clocking out?', checking the users confirmation if the user is ready to clock out. This is shown in the third image. With this the Attendance process ends and the corresponding data, elapsed time will be gets stored in a .csv file format.

V. RESULT

The Recorded data can be viewed in the spreadsheet. The screenshot of the data stored in the spreadsheet is displayed below.



A1		ABARAJITH			
	A	B	C	D	E
1	ABARAJITH	22-06-2011 12:09	Clock In		
2	ABARAJITH	22-06-2011 12:11	Clock Out		
3	ABARAJITH	22-06-2012 12:13	Clock In		
4	ABARAJITH	22-06-2012 12:13	Clock Out		
5	OBAMA	22-06-2013 09:27	Clock In		
6	OBAMA	22-06-2013 09:28	Clock Out		
7	ABARAJITH	22-06-2014 21:33	Clock In		
8	ABARAJITH	22-06-2014 21:34	Clock Out		
9					
10	ABARAJITH	22-06-2017 19:32	Clock In		
11	ABARAJITH	22-06-2017 19:33	Clock Out		
12	ABARAJITH	22-06-2017 19:36	Clock In		
13	ABARAJITH	22-06-2017 19:36	Clock Out		
14					

VI. CONCLUSION

In this project, an approach is proposed to automate the attendance system in educational institutions. Based on the experimental results, it is shown that the system is working fine and produces desired results such as

- Capturing the live feed from a camera seamlessly.
- Detecting the faces in any given frame of the feed.
- Classifying the faces in the frame based on known faces.

VII. REFERENCES

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