IOSR Journal of Engineering (IOSRJEN) **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
Volume 4, PP 23-27

Rfid Based Attendance System Using Face Recognition

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Abstract : *Face is the identity of a person. The methods to exploit this physical feature have seen a great change since the advent of image processing techniques. Traditional approach for attendance is professor calls student name & record attendance. Students attendance in the classroom is very important task and if taken manually wastes a lot of time. This system consists of five phases- RFID tag detection, face database, face detection, face recognition and marking attendance. This attendance is recorded by using a RFID card and camera attached in the system that is capturing images of students. The system first registers student's information , in that student's RFID tag number, stores the faces in database, and then face detection is done . The detected faces are compared with faces stored in database. If system recognizes the face then attendance will be marked.*

Keywords - *biometric, face database, face detection, face recognition , RFID tag detection*

I. Introduction

Maintaining the attendance is very important in all the institutes for checking the performance of students. Every institute has its own method in this regard. Some are taking attendance manually using the old paper or file based approach and some have adopted methods of automatic attendance using some biometric techniques. There are many automatic methods available for this purpose i.e. biometric attendance. All these methods also waste time because students have to make a queue to touch their thumb on the scanning device. This system uses the face recognition approach for the automatic attendance of students in the classroom. This attendance is marked by using a RFID tag and camera. Camera will capture the faces of students and detect the faces in images and compare the detected faces with the database and mark the attendance.

EXISTING SOLUTIONS :

The traditional method for taking attendance is manual work but this method takes a lot of time.To reduce this manual work and save time attendance system with RFID was introduced[1]. The second method is fingerprint recognition [2] for some people it is intrusive, because it is still related to criminal identification. Another disadvantage of fingerprint recognition is that it can make mistakes with the dryness or dirt of the finger's skin. The another method for taking attendance is iris recognition[3]. The disadvantage of this method is that it is also intrusive and a lot of memory is required for data storage. There are various methods for facial recognition like eigenface method[4]. Various extensions have been made to the eigenface method such eigen features. This method combines facial metrics (measuring distance between facial features) with the eigenface representation. Thus from above approach if face recognition combines with RFID attendance system then it will increase the security of the system, reduces searching domain and saves time for operation.

II. Block diagram of system

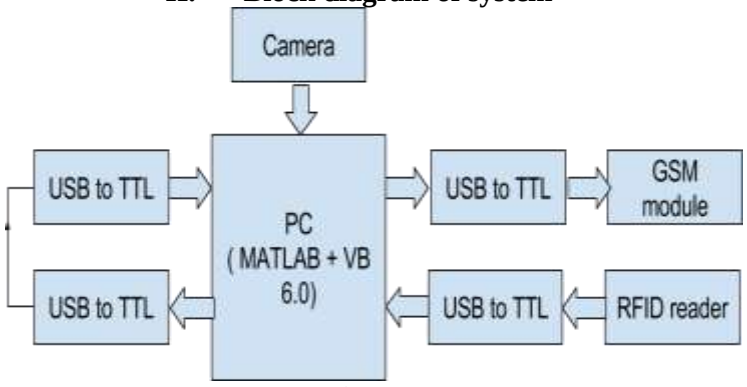


Figure 1

1) PC- Pc contains the two main parts of the system MATLAB and visual basics. MATLAB uses Viola Jones algorithm for face detection and face recognition. Visual basic is used to create a GUI.
2) Camera- Camera is used to capture the students face.
3) USB to TTL -USB to TTL is use for serial communication. It connects the visual basics to GSM, the RFID reader to MATLAB, MATLAB to visual basics both software's run independently.
4) GSM module -It is used to send students attendance to parents.
5) RFID reader- RFID reader is connected to MATLAB through USB to TTL to start the system.

III. Flow Chart

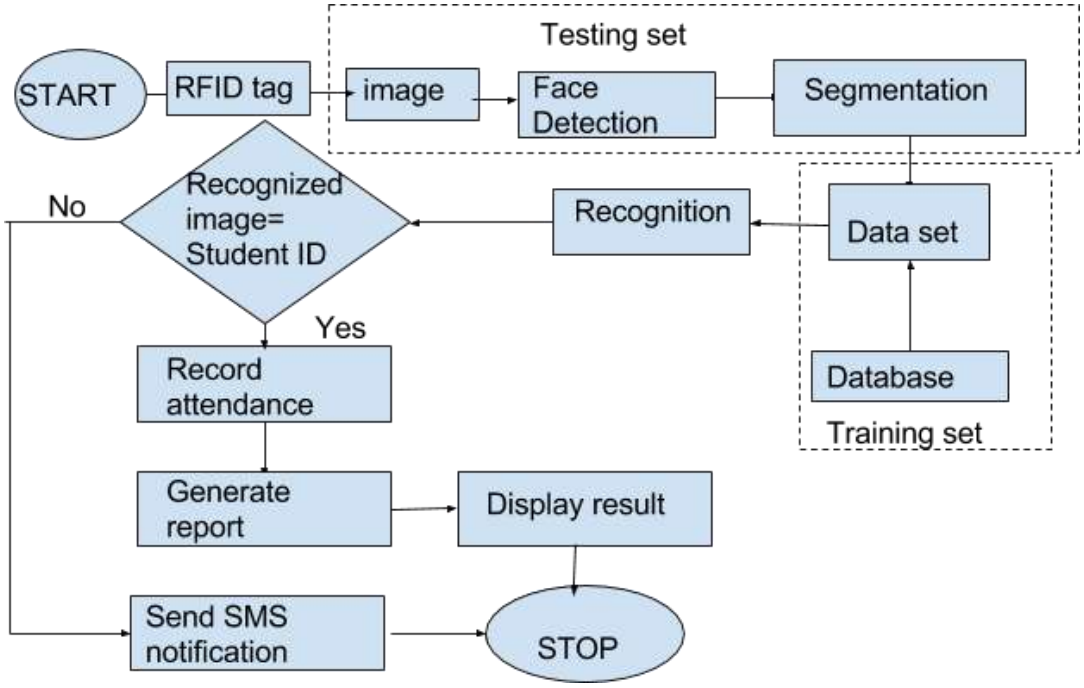


Figure 2

1) The flow of this project is quite simple and understandable .It begins with image capturing as soon as the image is captured it is detected using Viola Jone's face detection technique.
2) The image is then segmented into small regions using local binary pattern.
3) The data sets stored in the database are compared with features of the detected image.
4) The subject will be selected according to the RFID tag number. Thus time required for recognition is reduced abruptly.
5) Once the subject is recognized attendance will be marked and report will get generated. As per Google time and date auto attendance will get mark in particular row and column of excel sheet.
6) An SMS will be sent to the student's guardian and the result will be displayed.

IV. Algorithm And Software Used

For face detection Viola Jones algorithm and for matching input image with the image which is already stored in database Correlation algorithm are used. All the image processing part is done on the MATLAB software by using different API's and toolboxes.

Viola Jones algorithm
The features which make this a good algorithm are robust, real time and face detection only.
It has four stages:
1) Haar Feature Selection
Haar features will detect the face by using 24*24 sub window moving throughout the digital image. It leads to 160,000 features which contains relevant and irrelevant features. If we go for all 160,000 features of image then it is difficult for real time applications.

2) Adaboost Training

Adaboost is a machine learning algorithm which helps in finding only the best features among all this 160,000 features. After these features are found a weighted combination of all these features is used in evaluating and deciding any given window has face or not.

These features are also called as weak classifier. Adaboost construct strong classifier as a linear combination of these weak classifiers.

$F(x) = a1f1(x) + a2f2(x) + a3f3(x) + \ldots\ldots..$

F(x) = Strong classifiers, a = applied weight, f(x) = weak classifiers

3) Creating an Integral Image

In an Integral image the value at pixel (x,y) is the sum of pixels above and to the left of that pixel

1	1	1
1	1	1
1	1	1

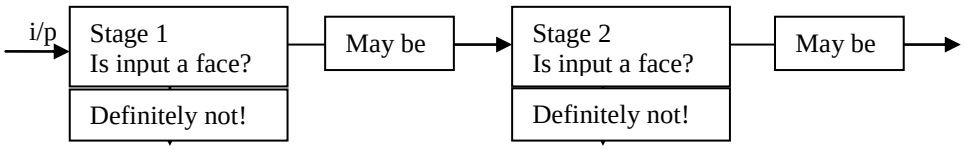
⇒

1	2	3
2	4	6
3	6	9

Input image output image

4) Cascading Classifiers.

A Cascade classifier is used which is composed of stages each containing a strong classifier. So all the features are grouped into several stages where each stage has certain number of features. The job of each stage is used to determine whether a given sub window is definitely not a face or may be a face. A given sub window is immediately discarded as not a face if it fails in any of the stage.



MATLAB

MATLAB and Image Processing Toolbox provide a flexible environment to explore design ideas and create unique solutions for imaging systems.

MATLAB toolboxes used in this project are as follows:

1) Image acquisition Toolbox

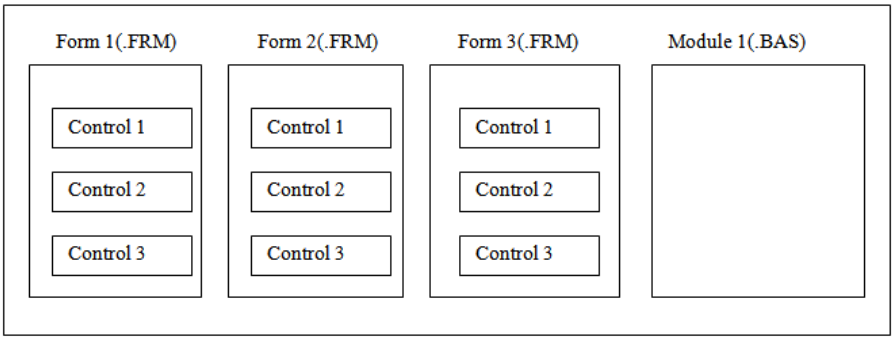
The toolbox supports a wide range of image acquisition operations, including. Acquiring images through many types of image acquisition devices, from professional grade frame grabbers to USB-based Webcam.

2) Image processing Toolbox

Image Processing Toolbox TM provides a comprehensive set of reference-standard algorithms, functions, and apps for image processing, analysis, visualization, and algorithm development. You can perform image enhancement, image deblurring, feature detection, noise reduction, image segmentation, geometric transformations, and image registrations.

Visual Basics 6.0

Visual Basic is a tool that allows you to develop Windows (Graphic User Interface - GUI) applications. The applications have a familiar appearance to the user. · Visual Basic is event-driven, meaning code remains idle until called upon to respond to some event (button pressing, menu selection etc). Visual Basic is governed by an event processor. Nothing happens until an event is detected. Once an event is detected, the code corresponding to that event (event procedure) is executed. Program control is then returned to the event.



Structure of Visual Basic Application

Application (Project) is made up of:
1) Forms - Windows that you create for user interface
2) Controls - Graphical features drawn on forms to allow user interaction
(text boxes, labels, scroll bars, command buttons, etc.) (Forms and Controls are objects.)
3) Properties - Every characteristic of a form or control is specified by a property. Example properties include names, captions, size, color, position, and contents. Visual Basic applies default properties. You can change properties at design time or run time.
4) Methods - Built-in procedure that can be invoked to impart some action to a particular object.
5) Event Procedures - Code related to some object. This is the code that is executed when a certain event occurs.
6) General Procedures - Code not related to objects. This code must be invoked by the application.
7) Modules - Collection of general procedures, variable declarations, and constant definitions used by application.

V. Hardware Used

RFID Tags

A tag is also called as transponder. It is composed of semiconductor chip, an antenna and sometimes a battery. There are two types of RFID tags : passive and active. This system consists passive RFID tags. Passive RFID tags contain an integrated circuit that has a basic radio transceiver and a small amount of non-volatile memory. They are powered by the current that the readers signal induces in their antennas. The received energy is enough to power the tag through which it can transmit its data once .The tag and the reader communicate with one another through radio waves. Tags can hold many kinds of information like serial number, time stamps etc

RFID Reader

RFID reader is also called as interrogator. It is made of an antenna, an RF electronic module and a control electronic module. Readers are used to recognize the presence of nearby RFID tags. The tag and the reader communicate with one another through radio waves. The tag sends its information to reader by raising and lowering resistance of the antenna. Once reader has received tags information it is relayed back to the controller. A reader is a system comprised of four distinct subsystems :Readers API,communications ,Event management and antenna subsystem.

GSM module

A GSM module is used to send messages. It consists of a SIM card and can be connected to the computer using any serial communication techniques. This system uses AT commands also called as ATtension commands for communication. Some of the AT commands that will be used in this system are:
1) AT+CMGS – This command is used to send SMS message.
2) AT+CMSS – This command is used to send message from the storage.
3) AT+CMGL – This command is used to list all the messages.
4) AT+CMGR – This command is used to read the message.

VI. Conclusion

Now a days attendance management is a subject of concern in every institute and corporate sector. This paper presence and automated attendance marking system which integrates face recognition with RFID. Integrating both technologies together makes the system more efficient and secured. This system consists of RFID tag, face detection, feature extraction, face recognition, data storing, authentication and sending SMS to the parents without human intervention. This system proves to be beneficial to the institution because it uses a pc and a webcam which makes it a low cost management system.

References

[1]. M.R.V. Venkatesa Vimal Chand1, M.Syed Meeran2- Secured Attendance Management System Using RFID Technology,*International Research Journal of Engineering and Technology (IRJET)* Volume: 02 Issue: 08 | Nov-2015
[2]. Chitresh Saraswat et al.- An Efficient Automatic Attendance System using Fingerprint Verification Technique / *(IJCSE) International Journal on Computer Science and Engineering* Vol. 02, No. 02, 2010, 264-269
[3]. IAmena Khatun, 2A. K. M. Fazlul Haque- Design and Implementation of Iris Recognition Based Attendance Management System,*2nd Int'l Conf. on Electrical Engineering and Infonnation & Communication Technology (ICEEICT)* 2015 Jahangirnagar University, Dhaka-1342, Bangladesh, 21-23 May 2015
[4]. Dr. Ramprasad.P- An Efficient Automated Attendance management System Based on Eigen Face Recognition,*7th International Conference on Cloud Computing ,Data Science and Engineering – Confluence*,2017

[5]. M. A. Fischler and R. A. Elschlager, ―The Representation and Matching of Pictorial Structures,‖ *IEEE Transaction on Computer*, Vol. C-22, pp. 67-92, 1973. [6] B. K. Mohamed and C. Raghu, ―Fingerprint attendance system for Classroom needs,‖ in India Conference (INDICON),*Annual IEEE*. 2012, pp. 433–438.

[6]. T. Lim, S. Sim, and M. Mansor, ―Rfid based attendance system,‖ inIndustrial Electronics & Applications, 2009. ISIEA 2009. *IEEE Symposium on*, vol. 2. IEEE, 2009, pp. 778–782.

[7]. S. Kadry and K. Smaili, ―A design and implementation of a wireless iris recognition attendance management system,‖ *Information Technology and control*, vol. 36, no. 3, pp.323–329, 2007.

[8]. T. A. P. K. K. L. P. M. L. M. P. A. W. G. D. P. J. G.. RoshanTharanga, S. M. S. C.Samarakoon, ―Smart attendance using real time face recognition,‖ 2013.

[9]. P. Viola and M. J. Jones, ―Robust real-time face detection,‖ *International journalof computer vision*, vol. 57, no. 2, pp. 137– 154, 2004.