ISSN (Online) : 2278-1021
ISSN (Print) : 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 3, Issue 11, November 2014

Implementation of Attendance Management System using SMART-FR

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Abstract: Attendance Management System (AMS) is the easiest way to keep track of attendance for community organizations such as school clubs, scouting units, church groups, business organizations and volunteer groups. Among the person identification methods, face recognition is known to be the most natural ones, since the face modality is the modality that uses to identify people in everyday lives. Although other methods, such as fingerprint identification can provide better performance, those are not appropriate for natural smart interactions due to their intrusive nature. This face detection differentiates faces from non-faces and is therefore essential for accurate attendance. The other strategy involves face recognition for marking the student's attendance. The Raspberry pi module is used for face detection & recognition. The camera will be connected to the Raspberry pi module. The student database is collected. The database includes name of the students, there images & roll number. This raspberry pi module will be installed at the front side of class in such a way that we can capture entire class. Thus with the help of this system, time will be saved. With the help of this system, it is so convenient to record attendance. We can take attendance on any time. And the details of the student will be sent to the corresponding department and their parents using GSM technology.

Keywords: GSM, Face recognition, Raspberry Pi, Open CV, Attendance

I. INTRODUCTION

Now days the entire period attendance is stored in register and at the end of the gathering the reports are generated. staff are not concerned in creating report in the intermediate of the session or as per the prerequisite because it takes more time in calculation. Face recognition is used to mark the attendance of the students. Smart Attendance using Real Time Face Recognition (SMART-FR) provides flexibility to identify student one by one. To increase the accuracy, efficiency and reliability of the recognition, algorithms are needed. If the attendance of a student of classroom lecture is attached to the video streaming service, it is possible to present the video of the time when he was absent.

It is important to take the attendance of the students in the classroom automatically. ID tag or other identifications such the record of login/ out in most e-Learning systems are not sufficient because it does not represent students' context in face-to face classroom. It is also difficult to grasp the contexts by the data of a single moment. Face detection and recognition module detects faces from the image captured by the camera, and the image of the face is cropped and stored.

The module recognizes the images of student's face, which have been registered manually with their names and ID codes in the database. Face detection data and face recognition data are recorded into the database. Using the stored database, number of absentee will be calculated and information will be sent to their parents using GSM technology. Assuming that a person framed in any random photographs not an attendee at the Renaissance Fair or Mardi grass, it can be assumed that the face is not white, green, red, or any unnatural color of that nature. While different ethnic groups have different levels of melanin and pigmentation, the range of colors that human facial skin takes on is clearly a subspace of the total color space. With the assumption of atypical photographic scenario, it would be clearly wise to take advantage of face-color correlations to limit our face search to areas of an input image that have at least the correct color components. In pursuing this goal, we looked at three color spaces that have been reported to be useful in the literature, HSV and YCrCb spaces, as well as the more commonly seen RGB space.[5] While RGB may be the most commonly used basis for color descriptions, it has the negative aspect that each of the coordinates (red, green, and blue) is subject to luminance effects from the lighting intensity of the environment, an aspect which does not necessarily provide relevant information about whether a particular image "patch" is skin or not skin.

The HSV color space, however, is much more intuitive and provides color information in a manner more in line how humans think of colors and how artists typically mix colors. "Hue" describes the basic pure color of the image, "saturation" gives the manner by which this pure color (hue) is diluted by white light, and "Value" provides an achromatic notion of the intensity of the color. It is the first two, H and S that will provide us with useful discriminating information regarding skin. Face detection and recognition module detects faces from the image captured by the camera, and the image of the face is cropped and stored. The module recognizes the images of student's face, which have been registered manually with their names and ID codes in the database. Face detection data and face recognition data are recorded into the database.

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II. EXISTING SYSTEM

A) RFID:

Radio Frequency Identification (RFID) methods and have been efficaciously pragmatic to different areas as miscellaneous as transportation, health-care, agriculture, and hospitality production to name a few. RFID technology simplifies programmed wireless documentation using electronic passive and active tags with proper readers. In this paper, an attempt is made to solve frequent lecture attendance monitoring problem in developing nation state using RFID technology[2]. The solicitation of RFID to student attendance observing as advanced and ordered in this study is capable of eradicating time wasted during manual gathering of attendance and an opportunity for the didactic administrators to capture strict classroom information for allocation of appropriate attendance tallies and for further administrative decisions.

B) FINGER PRINT:

Biometric time and presence system is one of the most effective solicitations of biometric technology. Impression recognition is an established field today, but still identifying individual from a set of enrolled fingerprints is a time taking process. Most fingerprint-based biometric systems store the finger points template of a user in the database [1]. It has been usually assumed that the minutiae pattern of a user does not reveal any information about the original fingerprint. This belief has now been shown to be false; several algorithms have been proposed that can renovate fingerprint images from minutiae templates. a reconstruct the segment image, which is then converted into the gray scale image**.**

III METHODOLOGY

The proposed system provides solution to lecture attendance problems through the use of attendance management software that is interfaced to a fingerprint device. The student bio-data (Matriculation number, Name, Gender and Date of Birth) and the fingerprint is enrolled first into the database.
This section describes the software algorithm for the system.
The algorithm consists of the following steps

- Image acquisition
- Noise removal
- Face detection
- Face recognition
- Attendance

In the first step, image is captured from the CCTV camera. There are illumination effects in the captured image because of different lighting conditions and some noise which is to be removed before going to the next steps. Histogram normalization is used for contrast enhancement in the spatial main. Wiener filter is used for removal of noise in the image. There are other techniques like FFT and low pass filter for noise removal and smoothing of the images but Wiener filter gives good results[3].

a) LOCAL BINARY PATTERN:

Face recognition has recently received momentous attention, especially during the past several years. At least two reasons account for this trend: the first is the eclectic range of commercial and law enforcement applications, and the second is the accessibility of feasible technologies after 30 years of research. Straight though up-to-date machine recognition systems have reached a certain level of maturity; their success is imperfect by the circumstances imposed by many real applications .In the LBP approach for surface classification, the happenings of the LBP encryptions in an image are composed into a histogram. The ordering is then performed by computing simple histogram similarities. However, in view of a similar slant for facial image representation results in a loss of altitudinal information and therefore one should codify the texture information while retaining also their locations. Such indigenous explanations have been gaining interest recently which is fathomable given the restrictions of the all-inclusive representations.[7]

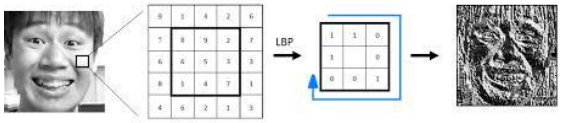

Fig1: Face description with local binary patterns.

This histogram efficiently has a explanation of the face on three different levels of locality: the LBP labels for the histogram contain information about the patterns on a pixel-level, the labels are summed over a small region to produce information on a regional level and the regional histograms are concatenated to build a global description of the face. It should be noted that when using the histogram based methods the regions do not need to be rectangular. Both do they need to be of the same size or shape, and they do not necessarily. have to shelter the whole image. It is also possible to have incompletely overlapping regions. The two-dimensional face description method has been extended into spatio-temporal domain. Admirable facial expression recognition performance has been obtained with this approach. Since the periodical of the LBP based face description, the system has already attained an established position in face analysis research and applications.

b) WIENER FILTER:

In Image processing, the Wiener filter is a filter used to produce an estimate of a desired or target random process by linear time-invariant filtering of an observed noisy process, assuming known stationary signal and noise

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spectra, and additive noise. The Wiener filter minimizes the mean square error between the estimated random process and the desired process. The goal of the Wiener filter is to filter out noise that has corrupted a signal. It is based on a statistical approach, and a more statistical account of the theory is given in the MMSE estimator article. However, the design of the Wiener filter takes a different approach. One is assumed to have knowledge of the spectral properties of the original signal and the noise, and one seeks the linear time-invariant filter whose output would come as close to the original signal as possible. Wiener filters are characterized by the following:

1. Assumption: signal and (additive) noise are stationary linear stochastic processes with known spectral characteristics or known autocorrelation and cross-correlation
2. Requirement: the filter must be physically realizable/causal (this requirement can be dropped, resulting in a non-causal solution)
3. Performance criterion: minimum mean-square error (MMSE)

b) VIOLA-JONES ALGORITHM:

The Viola–Jones object detection framework is the first object detection framework to provide competitive object detection rates in real-time proposed in 2001 by Paul Viola and Michael Jones[6]. Although it can be trained to detect a variety of object classes, it was motivated primarily by the problem of face detection. This algorithm is implemented in OpenCV. the object detection framework employs a variant of the learning algorithm to select the best features and to train classifiers that use them.

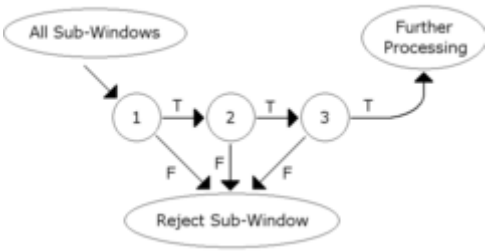

Fig 2.Cascade Architecture

The evaluation of the strong classifiers generated by the learning process can be done quickly, but it isn't fast enough to run in real-time. For this reason, the strong classifiers are arranged in a cascade in order of complexity, where each successive classifier is trained only on those selected samples which pass through the preceding classifiers. If at any stage in the cascade a classifier rejects the sub-window under inspection, no further processing is performed and continue on searching the next sub-window as in fig.2

The cascade architecture has interesting implications for the performance of the individual classifiers. Because the activation of each classifier depends entirely on the behavior of its predecessor, the false positive rate for an entire cascade is:

$$F = \prod_{i=1}^{K} f_i.$$

Similarly, the detection rate is:

$$D = \prod_{i=1}^{K} d_i.$$

Thus, to match the false positive rates typically achieved by other detectors, each classifier can get away with having surprisingly poor performance.

d) OPEN CV:

Advance vision research by providing not only open but also optimized code for basic vision infrastructure. No more reinventing the wheel. Disseminate vision knowledge by providing a common infrastructure that developers could build on, so that code would be more readily readable and transferable[6].Advance vision-based commercial applications by making portable, performance-optimized code available for free with a license that did not require being open or freeing themselves. One of Open CV's goals is to provide a simple-to-use computer vision infrastructure that helps people build fairly sophisticated vision applications quickly.

The Open CV library contains over 500 functions that span many areas in vision, including factory product inspection, medical imaging, security, user interface, camera calibration, stereo vision, and robotics. Open CV is written in C++ and its primary interface is in C++, but it still retains a less comprehensive though extensive older C interface. There are now full interfaces in Python, Java and MATLAB/OCTAVE (as of version 2.5). The API for these interfaces can be found in the online documentation. Ruby has been developed to encourage adoption by a wider audience. All of the new developments and algorithms in Open CV are now developed in the C++ interface.

*e)*RASPBERRY PI*:*

The Raspberry Pi is a credit card-sized single-board computer developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools. It uses a different kind of processor, so you can't install Microsoft Windows on it.[4] But you can install several versions of the Linux operating system that look and feel very much like Windows.

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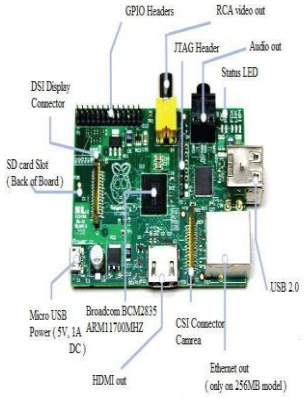

Fig 3: Raspberry Pi

Aside from the need for a custom kernel, there are a couple system configuration changes needed within the image to allow it to boot flawlessly. The changes primarily have to do with the fact that the images assume the root file system is on /dev/mmcblk0p2 and the boot partition is on /dev/mmcblk0p1. QEMU makes no such assumptions so you have to map /dev/sda devices to mmcblk0 devices on boot. With the system image adjusted and the custom kernel built, starting QEMU is something like the following: $ qemu-system-arm - kernel ./zImage -cpu arm1176 -m 256 -M versatile pb -no-reboot -serial stdio -append "root=/dev/sda2 panic=0 rw" - hdaarchlinux-hf-2013-02-11.img Once you have a kernel image (zImage) that is suitable for QEMU you can point it at the new kernel and the RPi system image. Running animage via QEMU.may be significantly faster than working on the RPi, of course, this depends on the computer being used to run QEMU.One of the great things about creating a cluster with ARM-based processors is low power consumption. As discussed earlier, each RPi uses about 2W of power (when running at 700MHz).

A number of power measurements were made at the wall with the RPi Cluster in various operational states. This allowed the individual component power usage to be determined without taking each item off-line to measure power draw individually. As I have over clocked the cluster to 1GHz core frequency and 500MHz for SDRAM etc., the power consumption is higher, Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It is used to develop console and graphical user interface applications along with Windows Forms or WPF applications, web sites, web applications, and web services in both native code together with managed code for all platforms supported.

IV SYSTEM OVERVIEW

The block diagram in Fig.4 explains about the overall requirement of the paper. Two plug and play camera were fixed in the entrance of each class, each person enters in the class was viewed in the camera. Using local binary pattern the face was identified.

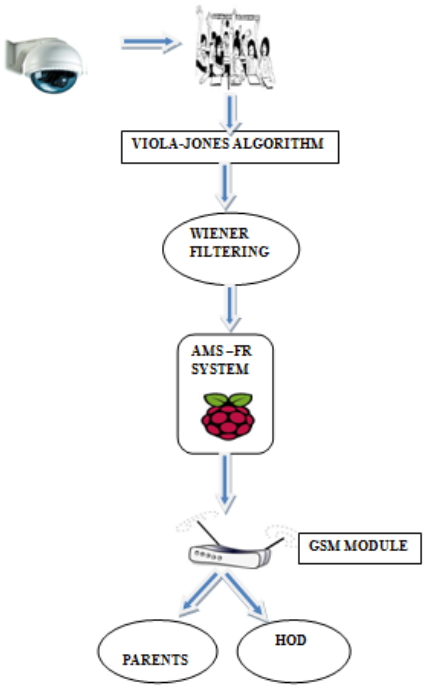

Fig.4 System Design

The total number of students and their faces were stored in the raspberry pi. The raspberry pi board act like a pc. The student details were store[6]d. Each person enters in the class, their image was captured and it will get compared with the stored image, each person enters will be counted in the class. Total number of students will be displayed. And the number of absentee will be counted. Using max232 the absentee detail will be transmitted through GSM technology[5], to the particular department and parents. Using this project we can avoid the manual attendance system where daily hour attendances were taken in colleges

V. OUTPUT AND RESULT:

Fig 5: Rasperry pi

The system proposed is a real-time system. It takes input image through a web camera continuously. The main camera and attendance identification display can be placed at the entrance of the organization to get better result. When the employees are entering through the main camera their attendance will be marked automatically .In

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SMART-FR, there is a facility which allows employees to request leaves via a SMS message. The system could detect faces with 68% of accuracy so far. The accuracy depends on the clarity of the picture. The camera should be installed in a place with good light in the background and free of obstacles. However the system also consists of a component where the student can manually mark attendance by entering the student number in case of a delay or mal functions in the detection system. The output for the AMS using Rasperry pi face recognition technique is shown in fig.5 and Fig.6

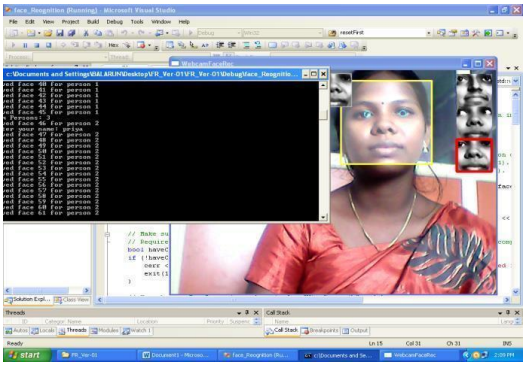

Fig 5: Face recognized and compared

VI CONCLUSION

The attendance management system providing this privilege is crying need for now-a–days. Our attendance system with face recognition provides the accurate attendance information of the students. As all data is uploaded in server, internet connection is a must during attendance taking. Our automated attendance management system is user friendly, easy to use and provides a better security and privacy than manual attendance system. Hence a system with expected results has been developed, but there is still some room for improvement.

VII FUTURE WORK

In the enhanced version of this proposed work, the RAM speed of the raspberry pi processor can be increased. The online updating of the operating system can be reduced. energy saving concepts can also be incorporated to manage the particular classroom intelligently. Mobile application software can be developed in order to track the student using GPS (Global Positioning System) in case of his absence within the institution premises.

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BIOGRAPHIES

G. LAKSHMI PRIYA has completed her B.E in ECE and M.E in Communication System and she has more than 6 years of teaching experience. Her research area interests are image processing and medical images

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