

Design and Implementation of Attendance System Using C-Sharp Language and GSM

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Abstract: This study presents the design and completion of attendance system by using GSM system and C-sharp language. A new advance technology in programmable attendance organization system comprehensive by means of computer programs has implemented. The proposal use the real time face detection included managements system with automatically detected registers of student's attendance in the class. These systems characterize a software tools for merging a new algorithms inside the machine with adaptive process to truck the facial transforms through specific time band. The main objective here is to consuming less time than the current procedure which uses traditional techniques. These techniques are promising to produce accurate results with more details reporting system to show the students actions and classroom attendance without human interactions.

Key words: Attendance system, face picture recognition, C-sharp, GSM, attendance, managements system

INTRODUCTION

The attendance management system of student and employers play a key factor for salary processing and student tracking and evaluation (Selvi *et al.*, 2014). The electronic attendance environment has a potential benefits in case of implemented in software programs (Patil *et al.*, 2014a, b). The investigation and developing these challenges could eliminate the corresponding limitations in traditional procedure (Fuzail *et al.*, 2014). One could design and develop the student and employers using new technology. Additionally, the essential benefit of electronic presents was highlight now a days and much researcher work in this direction (Krishnan and Balaji, 2015). Hence, more investigation in face recognition need to compensate to solve the distorting challenges when manual attendance is used. The regularly of students attendance to the class is a major factor requirements to develop and improve the education quality because the final semester grade depend on the attending points (Arulogun *et al.*, 2013; Shriwastav and Jain, 2016). The importance of accurate and fast technology in the attending process is to arrange the class and calculate the final grade in modern way. Hence, this presents extra attempt of the lecturer to make sure correctly attendance scholar without wastes time in the class. In addition, one could get process that is more complicated with large group of class. The analysis characteristics of student face image via. camera called

facial recognition (Thakare *et al.*, 2016; Vaishali *et al.*, 2017). The distance between all face parts is measure correctly and retained in the database to use it as comparison stands in front of camera. The face recognition is strongest against traditional techniques due to non-intrusive property. The conformation could be a talented from two feet without waiting long period in front of camera as in traditional techniques by using attendance sheets (Ahmedi and Nandyal, 2015; Patil *et al.*, 2014a, b). Many researchers have been proposing a management system to record the attendance. By using RFID, the automate barcode scanners is produced in Pooja *et al.* (2016). The face recognition has used to detect the position of each student in the class and capture an image for the particular student which is identifying early by Sallawar *et al.* (2017). The traditional attendance systems that use biometrics fingerprint recognition or iris to identify student are spends more time as by Joseph and Zacharia (2013), Alia *et al.* (2013), Patil and Shukla (2014). Hence, the setup of these systems in much class would lose a higher burden factors. Moreover, it will also require to record biometric information to all student which introduce further privacy concerns in this case. Such systems are subjects to physical harm from the user under test. However, additional maintenance cost was need. The proposed techniques introduce a new programmable presence system that integrates computer vision with face recognition by using digital camera installed in the

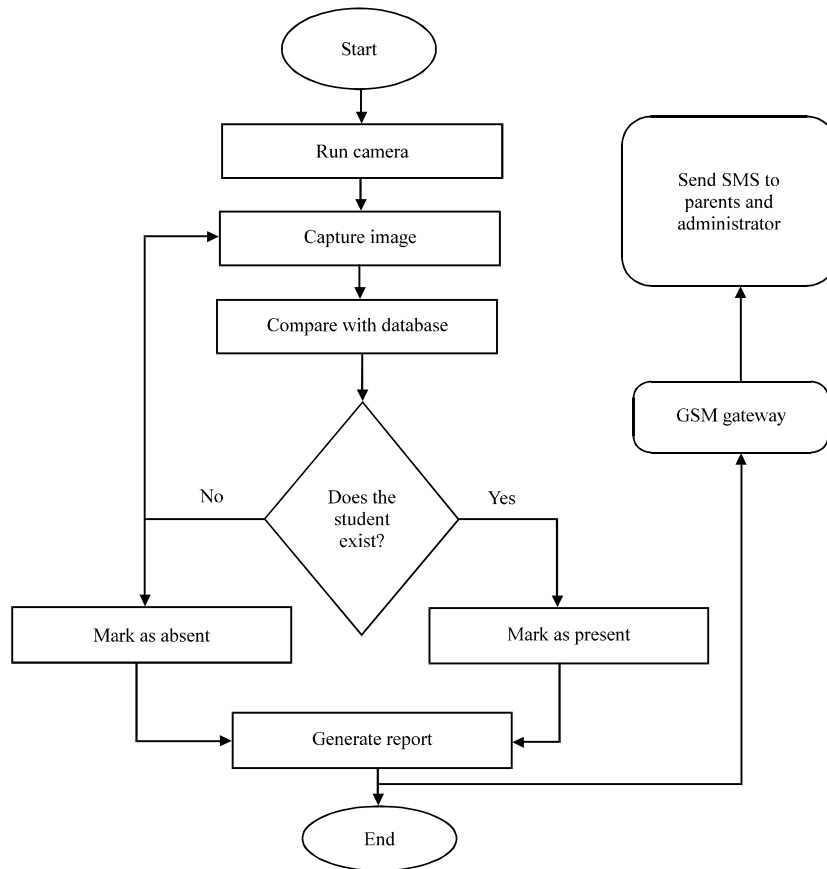


Fig. 1: Conceptual data flow diagram

classroom. This camera is use to scan all student faces and extract all faces from acquired images. Then, the student face image captured by this camera were compared with an existing database to students presence list will generated and saved in specific file daily. The system will generate complete student report and send it to the parents as SMS by GSM gateway. Figure 1 illustrates the proposed idea in conceptual diagram.

The proposed system created in many segments includes image capturing, face detection and recognize. The camera is accomplishes to capture formal images from employer or student in classroom. At the entrance, the camera could use to detect the face individually for everyone will enter to classroom and this research would spend much less time than the traditional methods and more accurate in same time. The students or employers attendance system has been develop in software developer using C-sharp language. All data in different view will store in database to provide the goal in this system in order to compare the exist student and generate the present person report and absent one. Firstly, the software is capture an image to all students and store the information into database and then store all images by

recording it in the face organize construction. Any human face detected in the camera should examine in database of the system with total scanning, this will sign in present side and other is record in absent sheets. The software development strategy is a separation of software work into different stages consist of activity and new management plan. Keeping in mind, this plan contain a subdivision of the system compensating life period. In the methodology of any research, the definition of variables and objects that created and accomplished by research group to maintain and developing the current and traditional application in all field.

System architecture: The design steps will start with system architecture shown in Fig. 2. The presentation level is containing the adaptation of visual studio with widow’s form and second level is consisting of C-sharp which interfaces with Emgu.cv. Microsoft programs represent the final level.

The data and logic describe the different levels in proposed system architecture. With Microsoft, the data level described the unharmed raw and unmodified data consist with the system has been developed and

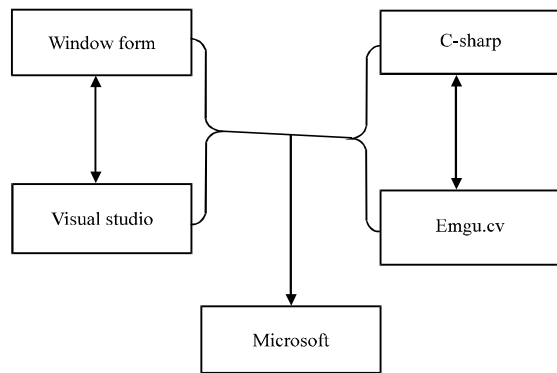


Fig. 2: Proposed system architecture

compensate in this approach. The logic level represent the data used in this system to feed the structure in necessary data to run the module. Hence, by using C-sharp language and Emgu.cv, the attendance marking and payroll calculation is achieve and developed. The visual studio window support this idea to design the system which include interrogating the database files for reports and viewing the connection between all objects.

Development tools: The suggested development uses the tools which consist of software and hardware part. The Visual Studio Version 2014 is an integrated development environment and Microsoft has chosen because it is easy to integrate and communicate with C-sharp language. Additionally, the Eigen face library has integrated with visual studio to help the C-sharp in adaptation the images and face recognition in the attendance system. Finally, the Emgu.cv library is use in this research.

Variables used in Management Board: There are two areas called the administrator area which serves the platform to use all functions and the public screen which displays the incoming students with his time and date. The full text code for this step written in C-sharp is illustrate in below code which represents the previous trained used in Management Board (Algorithm 1).

Algorithm 1; Management Board:

```

InitializeComponent ()
//Load of previous trained faces and labels for each image
if (Eigen_Recog.IsTrained) {
message_bar.Text = "Training data loaded"
else
{
message_bar.Text = "No training data found, please train program using
Train
menu option"
}
}
initialise_capture ()
}
//Open training form and pass this
private void trainToolStripMenuItem_Click (object sender, EventArgs e)
{
//Stop camera
stop_capture ()
}
  
```

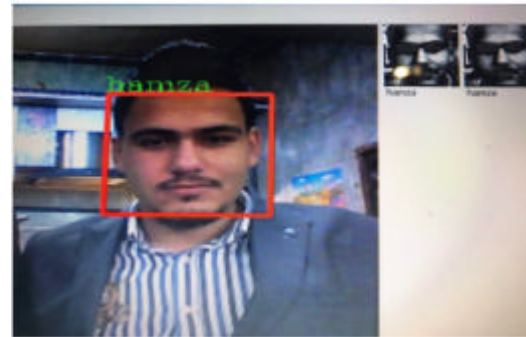


Fig. 3: Face detected inside rectangle

The mostly window application creation has been done using visual studio and the resources from emgue.cv with Eigen library were important to support the work in the facial recognition and images detection.

Face detection and interfacing: To enable the use of the system including a place and time, the application will lunch by press the first window bottom. Because of the processor severe duty in the face detection algorithms, the tools are severd function bases. The face detection is a heart object task in the system and the face is an interest object in this case. Thought, there are many factors could cross the detection algorithms of the human face. These factors include scale, face pose, rotation, light and position could consider in the proposed research. To identify the face, some problems will arise in face detecting process. The multiple faces in the same picture are one of these problems which must be separate firstly. The most student's faces which appear in the camera need a classifier to detect the particular face such as open CV library in this case. Hence, positive face images and negative face image should be use to classify the faces in training model. The desired object represented by human face which is founded in the positive image and this will not contain in the negative image. The detect face is enclosing by rectangle to collect all face features and processed using face recognition system. The face inside rectangle for single face is transfer to the server after being collect and cropped with renamed in GUI as show in Fig. 3.

Recognition of the face: The recognition of any faces denotes to classify this specific face in the group of faces stored in database in the system. However, many pictures has taken and stored in the database to run the system properly. Hence, many algorithms have used to discriminate a specific face from group of feces. The server-based module in this research is use to

programmed and run the system such as python face BlogSpot due to flexibility and reliability which is characterized by this program to recognize the human face with some drawbacks such as limitation of face, features. During face detection step, the captured face is convert into gray scale and send to database to compare with all faces as shown below code (Algorithm 2).

Algorithm 2; Recognition of the face:

```
//Get the current frame from capture device
current Frame = grabber. QueryFrame (). Resize (320, 240,
Emgu. CV. CvtColor. INTER. CV_INTER_CUBIC)

//Convert it to Grayscale
//Clear_Faces_Found ()

If (currentFrame != null)
{
    gray_frame = currentFrame. Convert<Gray, Byte> ()
```

Additionally, the time and date is stored together with the captured face. The new approach in this system is to solve the drastic change on the human face by take multi pictures with many view and various expected movements of the human face. However, the new approach permits to capture many pictures in one time of camera running and stored in database server. The targeted human image is automatically scan and recognized to identify the student attended in the class. The second window used to capture another student face in many ten side and save this entire picture to the database as shown in the below code using C-sharp and Emgu.cv. Figure 4 shows the second window in this system (Algorithm 3).

Algorithm 3; Second window:

```
using Emgu. CV. CvtColor
using System. IO
using System. Drawing. Imaging
using System. Xml
using System. Threading
namespace Face_Recognition
{
    public partial class Training_Form : Form
    {
        #region Variables
        //Camera specific
        Capture grabber
        //Imaging for finding face
        Image<Bgr, Byte>currentFrame
        Image<Gray, byte>result = null
        Image<Gray, byte>gray_frame = null
        //Classifier
        HaarCascade Face
        //For acquiring 10 images in a row
        List<Image<Gray, byte>> resultImages = new List<Image<Gray,
byte>> ()
        int results_list_pos = 0
```

```
int num_faces_to_acquire = 10
bool RECORD = false
//Saving Jpg
List<Image<Gray, byte>> ImagestoWrite = new
List<Image<Gray, byte>> ()
Encoderparameters ENC_Parameters = new EncoderParameters
(1)
Encoderparameters ENC = new
Encoderparameters (System. Drawing.Imaging. Encoder. Quality, 100)
```

GSM network connection: After the system compellation and the report was generate an SMS message will send to the administration and student parents to track and guide him daily. The important of this activity will offer the enough protection and high security in deed. The communication system represented by GSM network produces simple and high quality data flow equipment by using SDR technology. Figure 5 shows the connection network between classroom and all necessary branches (admin and parents) with GSM network.

The diagram of proposed attendance system with GSM network for particular student picture is stored into

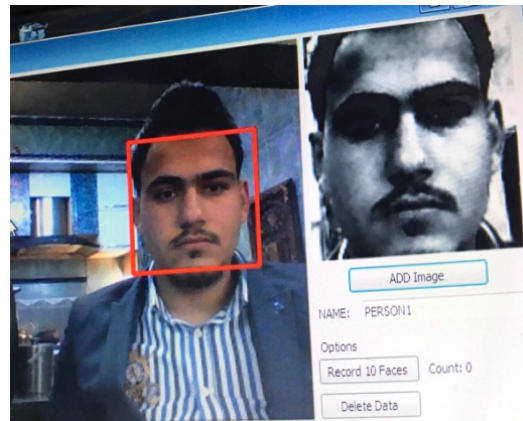


Fig. 4: Second training window

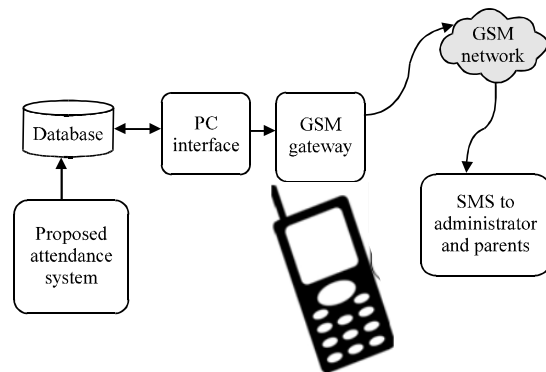


Fig. 5: Proposed attendance system with GSM network connection

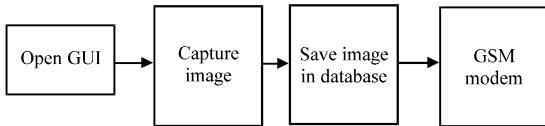


Fig. 6: Input Images to GUI interface

database by using C-sharp language and the pc interface is used to connect between GSM gateway and database. However, when any student was absent, an alarm is sent to the administrator and student parent via. SMS. By using GSM gateway, the possible message could send to any mobile which are stored in the database include parents. The GSM modem available in all market place is easy and cheap enough and the SIM card will setup inside the system. Many equipment were used in the proposed system as illustrated below:

- GSM modem
- Web-cam
- USB converter
- LCD screen
- SIM card
- AVR controller

The GUI interface working for input images processing and database unit as show in Fig. 6. The captured images from classroom and saved to database properly will processing as well otherwise, the system will gave error due to not match the student face.

CONCLUSION

This study presents the automatic attendance system which is required now a days. The most of traditional attendance system consume more time and require manual effort. Hence, the suggested approach is to decipher the subject by using the integrated face in the attendance process reorganization. The suggested approach still needs more capability to classify each human nearby in the time and date. However, there is more development to improve by different modules until found an acceptable face recognition rate and ensure the privacy to protect the personal information. The suggested approach designated the proficient and well accurate structure of automated attendance in classroom to replace the manual and traditional structure. The new method is reliable enough and more secure to the student parents. The old methods need more specialize equipment to install inside classroom while the new software defined

radio offer less hardware and small size devices. The small size pin camera and specific software programs will use to save and consume less power and time with efficient duty. The special algorithms could use to recognize the face recognition and advance the system presentation. Many uses could supported by this system such as security and student tracking as well as wanted people.

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