Dijlah Journal of Engineering Sciences (DJES) **Vol. 1, No. 3, Dec., 2024, pp. 11-21**
ISSN: Printed: 3078-9656, Online: 3078-9664, paper ID: 012

Attendance System using Face Recognition Techniques and GSM

Mohammed Wajeeh Hussein Alameen, Yasmeen M. Hussein, Ali Mohammed Kadhim**,** Fawzi M. Mustafa
[1,2,3]Department of computer engineering techniques, University of Dijlah, Baghdad, Iraq
Mohammed.alameen@duc.edu.iq, Yameen.mahmood@du.edu.iq, ali.alsalihy@duc.edu.iq,

Article Info

Article history:

Received Sep. 12, 2024
Revised Nov., 15, 2024
Accepted Dec., 15, 2024

Keywords:

First keyword
Second keyword
Third keyword
Fourth keyword
Fifth keyword

ABSTRACT

This paper presents the face recognition techniques under c-sharp language that used to simulate the proposed design to use several applications in attendance management systems and security systems. A time period is settled for taking the attendance and after completion of time period attendance will directly stores into storage device mechanically without any human intervention. A message will send to absent student parent mobile using GSM technology. For avoiding the sheet problem, we used face recognition techniques technology. The input image goes through the recognition system for facial identification. In some cases where the input image from the web-cam does not exist in the database, the user will get some error. However, in cases where the image exists in the database, that image will be computed for similarity measurement using distance between control point measures from the input image. The result of our experiment indicates that the recognition process of number of images in the database and some images from the web-cam provides 100% accuracy in terms of recognition. This system is most effective, easy and less time taken for tracking attendance in organizations with period wise without any human intervention.

Keywords- Attendance System, Face Recognition, GSM

Corresponding Author:

Mohammed Wajeeh Hussein Alameen
Department of Computer Engineering Techniques, University of Dijlah
Almasafi street, Baghdad, Iraq
Email: Mohammed.alameen@duc.edu.iq

1. INTRODUCTION

Attendance as defined by the Merriam-Webster dictionary is the number of people present at an event, meeting, etc. the act of being present at a place or a record of how often a person goes to classes, meetings, etc.. Companies with large employee numbers might need to install several time clock stations in order to speed up the process of getting all employees to clock in or out quickly or to record activity in dispersed locations. Depending on the supplier, identification method and number of clocking points required, prices vary widely. A time and attendance system protects a company from payroll fraud and provides both employer and employees with confidence in the accuracy of their wage payments all while improving productivity. Many time and attendance software is now provided through cloud-based software as a service (SaaS) hosted solutions. Web-based solutions offer a number of advantages to organizations of all sizes, including reduced implementation costs, fewer maintenance and support concerns, as well as instant updates and upgrades. Manual systems rely on highly skilled people laboriously adding

up paper cards which have times stamped onto them using a time stamping machine such as the Boundary Clock. Time stamping machines having been in use for over a century are still used by many organizations as a cheaper alternative to time and attendance software. Automated time and attendance systems can use electronic tags, barcode badges, magnetic stripe cards, biometrics (vein reader, hand geometry, fingerprint, or facial), and touch screens in place of paper cards which employees touch or swipe to identify themselves and record their working hours as they enter or leave the work area. The recorded information is then ideally automatically transferred to a computer for processing although some systems require an operator to physically transfer data from the clocking point to the computer using a portable memory device. The computer may then be employed to perform all the necessary calculations to generate employee timesheets which are used to calculate the employees' wages. An automated system reduces the risk of errors that are common in a manual system, and allows the workforce to be more productive instead of wasting time on tedious administrative tasks. We know that different businesses have diverse time-and-attendance system needs. We have researched and reviewed dozens of time and attendance systems and came up with the ones we think are best for a variety of business types. Here is a roundup of our best picks and an explanation of how we chose them.**.** This mode offers everything a small business needs in a time and attendance system. The cloud-based system has the most comprehensive time-tracking options we found, as employees can clock in and out via traditional time clocks, computers with Internet access, mobile devices and telephones. The system also manages paid time off, generates employee schedules, monitors overtime hours and integrates with a wide range of payroll services. We were also very impressed with the system's easy-to-use online portal, the company's customer service and the system's affordable monthly cost. The mode works perfectly for a very small business. A Web-based system, it requires no special software to load or hardware to install, and is very flexible, letting employees clock in with time clocks, Web browsers, mobile devices and telephones. Attends time clocks are plug-and-play ready, send data in real time to the system, include lifetime guarantees, and are among the cheapest we found. Besides being able to log when employees come and go each day, small businesses will appreciate that the system also manages paid time off, can track how long employees work on specific projects and can create office-wide schedules. This mode provides just what businesses with a mobile workforce need from a time attendance system. Besides being able to clock employees in and out with laptop computers, smartphones, telephones, text messages and Twitter, the system also records exactly where workers start and end their shifts, as well as their locations throughout the day. These are critical tools that allow businesses to easily monitor and track their mobile employees. The pricing is extremely affordable, and the customer service is among the best we encountered. To determine the best time and attendance systems, we started by listing all of the vendors that have a good reputation online (i.e., services that were favorably and consistently reviewed by other websites). Then, we interviewed small business owners to discover new ones to add to our list.

2. METHOD

In this section, we introduce the system of face recognition project .we talk about how run of the program and its parts and any programming language we used it and the specification of it , and we used GSM to send results to the department and parents of students . The software is to provide employers an easier and fool-proof way to mark attendance of the employees. The software will allow administrators enroll employees. The software will allow employees have their face captured for attendance marking purposes. Only administrators will have direct manipulation rights to the system. Employees will have no other interaction with the system except for having their faces captured whilst they are entering the office. It will be a console application and would require maximum uptime due to its sensitive purpose. In software engineering, a software development methodology (also known as a system development methodology, software development life cycle, software development process, software process) is a division of software development work into distinct phases (or stages) containing activities with the intent of better planning and management. It is often considered a subset of the systems development life cycle. The methodology may include the pre-definition of specific deliverables and artifacts that are created and completed by a project team to develop or maintain an application.

2.1 Functional Requirements

- System must capture faces
- System must store faces in a DB attached to the employee’s ID
- System must recognize the employee to enable attendance marking

2.2 Non-functional Requirements

- System shall be error-free
- System shall operate in real-time
- System should prevent data manipulation
- System should have a maximum uptime

2.3 Hardware Requirements

- Camera
- Using system Computer System
- Screen
- GSM Modem

2.4 Software Requirements

First of all we have to setup the Visual studio program in our computer.

For proposed project we have to use long or big c-sharp program, but we will provide it in a brief and adequate manner with the all details.

C-sharp for Mean Window

We take picture of any person's face and compare it in the database if the person is stored in the database appears him and appears his name. But if the person was new or not stored in it shows the closest features that are stored in it for another one was stored in it. Figure 1 show the first identifies steps of window 1 (main window). The c sharp code is illustrated in subsequent steps.

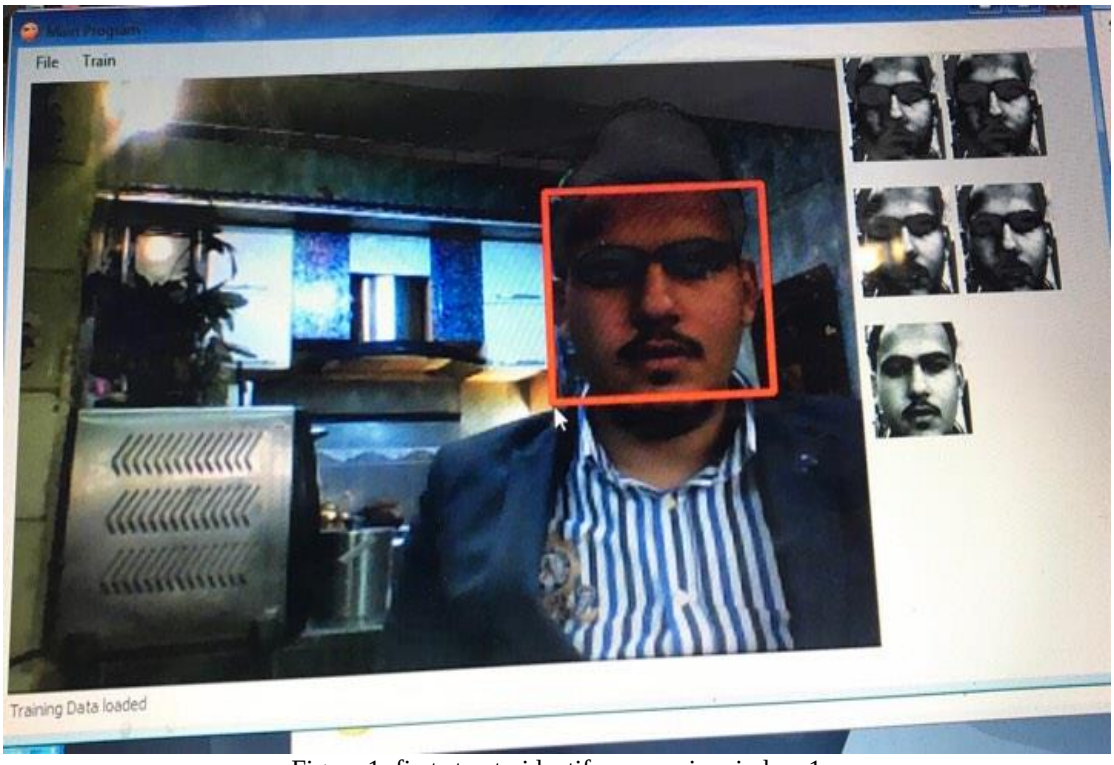

Figure 1: first step to identify person in window 1

```
using System;
usingSystem.Collections.Generi;
usingSystem.ComponentModel;
usingSystem.Data;
usingSystem.Drawing;
usingSystem.Linq;
```

```
usingSystem.Text;
usingSystem.Windows.Forms;
usingEmgu.CV.UI;
using Emgu.CV;
usingEmgu.CV.Structure;
usingEmgu.CV.CvEnum;
using System.IO;
usingSystem.Xml;
usingSystem.Runtime.InteropServices;
usingSystem.Threading;
usingSystem.Security.Principal;
usingSystem.Threading.Tasks;
using Microsoft.Win32.SafeHandles;
namespaceFace_Recognition
{public partial class Form1 : Form {
 #region variables Image<Bgr, Byte>currentFrame;
Image<Gray, byte> result, TrainedFace = null;
 Image<Gray, byte>gray_frame = null;
 Capture grabber;
public HaarCascade Face = new HaarCascade(Application.StartupPath
 "/Cascades/haarcascade_frontalface_alt2.xml");//haarcascade_frontalface_alt_tree.xml");
MCvFont font = new MCvFont(FONT.CV_FONT_HERSHEY_COMPLEX, 0.5, 0.5); intNumLabels;
public Form1()
 { InitializeComponent();
//Load of previustrainned faces and labels for each image
if (Eigen_Recog.IsTrained) { message_bar.Text = "Training Data loaded";}
When camera begin to take pictures:
//Camera Start Stop public void initialise_capture()
 { grabber = new Capture();
grabber.QueryFrame();  //Initialize the FrameGraber event Application.Idle += new
EventHandler(FrameGrabber_Parrellel);
And  stop the camera after taking the shot:
private void stop_capture()
{ Application.Idle -= new EventHandler(FrameGrabber_Parrellel);
if(grabber!= null)
 { grabber.Dispose(); }
this icon is the data of the detected faces;
voidclear_faces_found()
{This.faces_found_panel.controls.clear();
Faces_count=0;
Faces_panel_y=0;
Faces_panel_x=0;}
Void ADD_Face_Found(Image<Gray,Byte>img_found,stringname_person)
```

C-sharp of Second Window

After we click on the word (train)we will take a picture for any person .by the same way we will take more than one picture and save it for the same person(10 shots)in another expression of his face. In this window, we specially take several shots of a person and his name and save them in the database to be identified later. And we can add several faces to many people to train the database. The second window for faces store is illustrated in Figure 2.

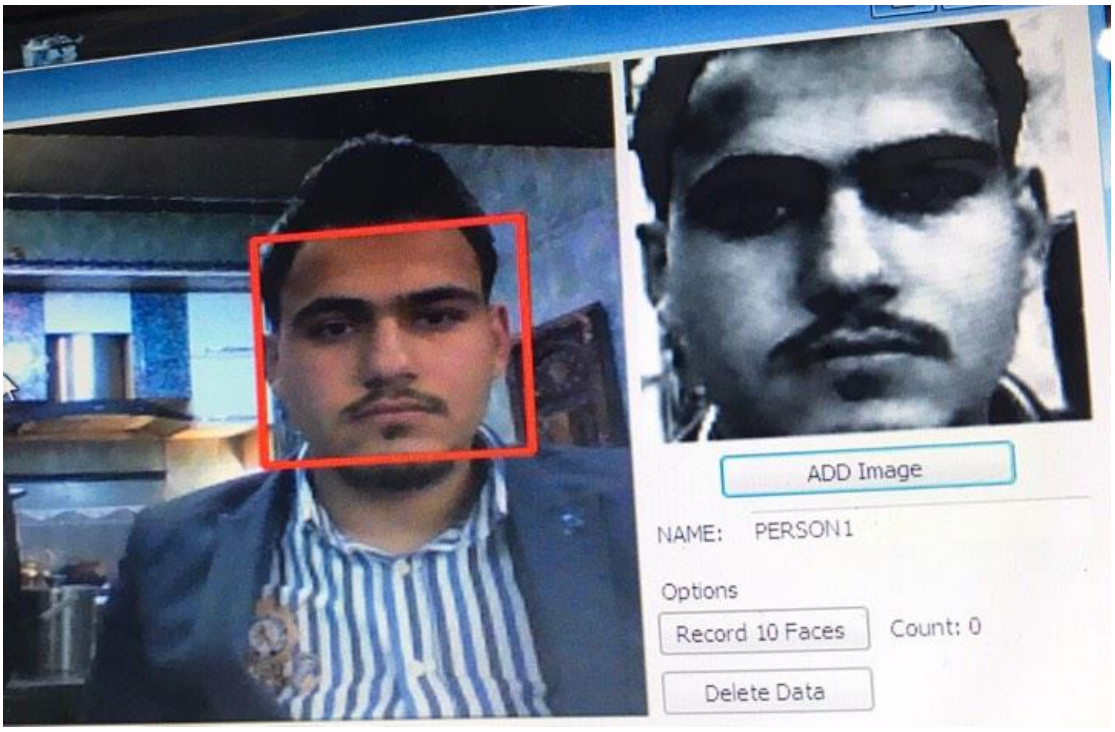

Figure 2: second window view

Usingsystem.Collections.Generic;
Usingsystem.componentmodel;
Usingsystem.Data; using System.Drawing;
Usingsystem.Linq; using System.Text;
Usingsystem.Windows.Forms;
Usingemgu.CV.UI;
Using Emgu.CV;
Usingemgu.CV.Structure;
Usingemgu.CV.cvenum;
Using System.IO;
Usingsystem.Drawing.Imaging;
Usingsystem.Xml;
Usingsystem.Threading;
Namespaceface_Recognition
{Public partial class Training_Form : Form {
#region Variables //Camera specific Capture grabber;
//Images for finding face Image<Bgr, Byte>currentframe;
Image<Gray, byte> result = null;
Image<Gray, byte>gray_frame = null;
//Classifier haarcascade Face;
//For aquiring 10 images in a row
List<Image<Gray, byte>>resultimages = new List<Image<Gray, byte>>();
Intresults_list_pos = 0;
Intnum_faces_to_aquire = 10;
Bool RECORD = false;
Toconvert the picture to grey scale is as follow :
//Convert it to Grayscale
If (currentframe != null)

{ Gray_frame = currentframe.Convert<Gray, Byte>();
To detect the face, the below code should be used :
//Face Detector
Mcvavgcomp[][] facesdetected = gray_frame.detecthaarcascade(Face, 1.2, 10
Emgu.CV.cvenum.HAAR_DETECTION_TYPE.DO_CANNY_PRUNING, new Size(20, 20));
//Action for each element detected
Foreach (mcvavgcompface_found in facesdetected[0])
{Result = currentframe.Copy(face_found.rect).Convert<Gray, byte>().Resize(100, 100
Emgu.CV.cvenum.INTER.CV_INTER_CUBIC);
Result._equalizehist(); face_PICBX.Image = result.tobitmap();
//draw the face detected in the 0th (gray) channel with blue color currentframe.Draw(face_found.rect, new Bgr(Color.Red), 2);
To Taking 10 pictures for every person to train, the below code have to used:
//Get 10 image to train private void RECORD_BTN_Click(object sender, eventargs e)
{If (RECORD)
{ RECORD = false;}
Else
{If (resultimages.Count == 10)
{Resultimages.Clear();
Application.Idle += new eventhandler(framegrabber); }
RECORD = true;
ADD_BTN.Enabled = false; }

When we open the program again and the same person comes in front of camera , the program only once identified features will show us his name stored in the database. Figure 3 shows the person identify with his name as saved before.

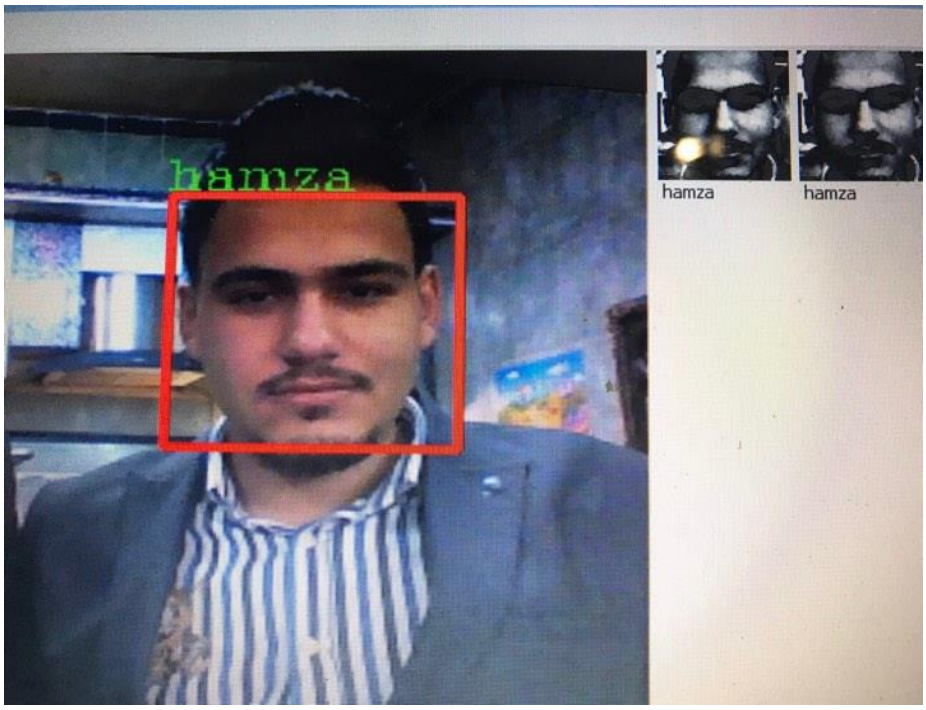

Figure 3: person identification in proposed project

We can also take photos of other people and take shots of them and save them and their names in the database to be identified later. This is the database of program .Here we can find the images of people who have been photographed by the program and their names saved in the data base this is another person whose picture was later taken and stored in the database as show in Figure 4. When the program opens again, it knows him at once and appears his name to us.

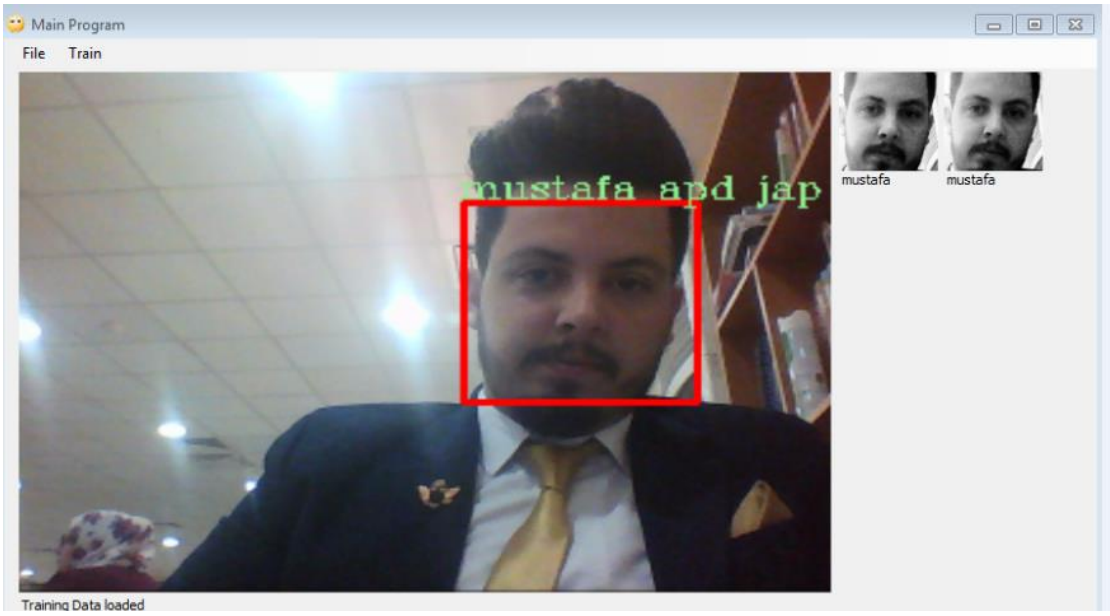

Figure 4: extra shot

3. DISCUSSION

Automated Attendance System has been envisioned for the purpose of reducing theerrors that occur in the traditional (manual) attendance taking system. The aim is to automateand make a system that is useful to the organization such as an institute. The efficient andaccurate method of attendance in the office environment that can replace the old manualmethods. This method is secure enough, reliable and available for use. No need forspecialized hardware for installing the system in the office. It can be constructed using acamera and computer. Student attendance system using face recognition wasdesigned and implemented. It was tested with different faceimage. This study represents a facial detection andrecognition model with different windows working in paralleland independently .If face recognition is to compete as a viable biometric forauthentication, then a further order of improvement inrecognition rates is necessary. Under controlled condition ,when lighting and pose can be restricted, this may bepossible. It is more likely, that future improvements will relyon making better use of video technology and employingfully 3D face models. We hope that this system providessome additional insight into the field of face recognition andcontributes to the development of the field. These ideas will be implemented in future.Experimental results have shown that, the proposed facerecognition method was very sensitive to face backgroundand head orientations. Changes in the illumination did notcause a major problem to the system

4. CONCLUSION

In this system we have implemented an attendance system for a lecture, section or laboratory by which lecturer or teaching assistant can record students' attendance. It saves time and effort, especially if it is a lecture with huge number of students. Automated Attendance System has been envisioned for the purpose of reducing the drawbacks in the traditional (manual) system. This attendance system demonstrates the use of image processing techniques in classroom. This system can not only merely help in the attendance system, but also improve the goodwill of an institution.Student recording system using face authentication was designed and implemented. It was tested with different face images. This idea is working properly with different panel. All windows are running independently and parallel. If recognition is to compete as a viable biometric for authentication, then a further order of improvement in recognition score is necessary. Under controlled condition, when lighting and pose can be restricted, this may be possible. It is more likely, that future improvements will rely on making better use of video technology and employing fully 3D face models. Our proposed project, ―An Automated Attendance System‖ has been envisioned for the purpose of reducing the errors that occur in the traditional (manual) attendance taking system.

The aim is to automate and make a system that is useful to the organization such as an institute. The camera plays a crucial role in the working of the system hence the image quality and performance of the camera in real-time scenario must be tested thoroughly before actual implementation. This method is secure enough, reliable and available for use. No need for specialized hardware for installing the system in the classroom. It can be constructed using a camera and computer. We successfully designed and implemented a e-attendance for NIPLC. The entire system should be studied properly so as to detect the faults of the system and ways of improving it. Research should also be carried out on how to integrate this system into a fully functional employee management system and payroll.specialized hardware for installing the system in the classroom. It can be constructed using a camera and computer. There is a need to use some algorithms that can recognize the faces in well to improve the system performance. This system is used for various application such as security purpose, industry, education, face recognition etc.The project is just a blueprint for implementing a full functional e-attendance system. After this blueprint, a thorough research should be carried out on this system, laying more emphasis on the impact it has on attendance and how it has enhanced company's employee-hour-output. The impact that this system have on the business sector should be studied and compared to that of the manual system. Employee Management Systems should be implemented in real time mode. A leave management system should be implemented also.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. And The future work can be done on server-client application which could hold more number of images in both sides. If the server system fails the same image database can be recovered from the client side. ,. Any alternative algorithm can be used in face recognition to identify the variations of face still more clearly**.**

ACKNOWLEDGEMENTS (10 PT)

Author thanks Dijlah University for all type of support in this work.

REFERENCES

[1] Unnati A. Patel1, Dr. SwaminarayanPriya R2, Development of a Student Attendance Management System Using RFID and Face Recognition: A Review, Unnati et al, International Journal of Research in Computer Science and Management Studies, Vol. 2, Issue 8, August 2014.

[2] Joseph Sospeter, Ramadhan S Sinde, ShubiKaijage, A Review on Development of RFID and Mobile Application Based Attendance Management System., Computer Engineering and Intelligent Systems, Vol.6, No.8, 2015.

[3] G.Lakshmi Priya1 , M.Pandimadevi 1 , G.Ramu Priya1 , P.Ramya2, Implementation of Attendance Management System using SMART-FR, International Journal of Advanced Research in Computer and Communication Engineering, Vol. 3, Issue 11, November 2014.

[4] Muhammad Fuzail1, Hafiz Muhammad Fahad Nouman2, Muhammad Omer Mushtaq3, Binish Raza4, Awais Tayyab5, Muhammad Waqas Talib6 , Face Detection System for Attendance of Class' Students , international journal of multidisciplinary sciences and engineering , Vol. 5, No. 4, April 2014.

[5] ShubhiShriwastav, Dinesh Chandra Jain , A Review on Face Recognition Attendance System , International Journal of Computer Applications (0975 – 8887) , Vol 143 – No.8, June 2016.

[6] Dr. Nita Thakare1, Meghna Shrivastava2, Nidhi Kumari3,Neha Kumari4, Darleen Kaur5, Rinku Singh6 , Face Detection And Recognition For Automatic Attendance System , A Monthly Journal Of Computer Science And Information Technology , Vol. 5, Issue. 4, April 2016, pg.74 – 78.

[7] Vaishali M. Bodhe1, Sagar M. Bhakre2, Sneha D. Ikhar3 , Student Attendance System by Face Detection , Copyright to IJIRCCE , International Journal of Innovative Research in Computer and Communication Engineering , Vol. 5, Issue 3, March 2017

[8] 1Aziza Ahmedi,2Dr.Suvarna Nandyal , An Automatic Attendance System Using Image processing , The International Journal Of Engineering And Science (IJES) ,vol.4,Issue11 pages, pp01-08-2015

[9] Ajinkya Patil1, Mrudang Shukla2 , Implementation Of Classroom Attendance System Based On Face Recognition In Class , International Journal of Advances in Engineering & Technology, July,2014.

[10] Fayadh, R. A., Wali, M. K., & Breesam, A. M. (2022, December). Real Time Practical Face Recognition System of Distorted Images Using PCA. In 2022 4th International Conference on Current Research in Engineering and Science Applications (ICCRESA) (pp. 290-295). IEEE.

[11] Pooja G.R, Poornima M, Palakshi S, M. BhanuPrakashVarma, Krishna A N , Automated Attendance System Using Image Processing , International Journal of Advanced Networking & Applications (IJANA) , July.2017.

[12] Navesh Sallawar1, Shubham yende2, Vaibhav padgilwar3, Vishal kale4 , parag gorlewar5 Gaurav Varma6 , Automatic Attendance System By Using Face Recognition , International Research Journal of Engineering and Technology (IRJET) , Vol. 04 Issue 04 ,Apr 2017.

[13] Jomon Joseph1, K. P. Zacharia2 , Automatic Attendance Management System Using Face Recognition , International Journal of Science and Research (IJSR) , Vol. 2 Issue 11, November 2013.

[14] Mohammad A. Alia, AbdelfatahArefTamimi and Omaima N. A. AL-Allaf , Integrated System For Monitoring And Recognizing Students During Class Session , The International Journal of Multimedia & Its Applications (IJMA) , Vol.5, No.6, December 2013.

[15] Mr.C.S.Patil, Mr.R.R.Karhe, Mr.M.D.Jain , Student Attendance Recording System Using Face Recognition with GSM Based , International Journal of Research in Advent Technology , Vol.2, No.8,August 2014.

[16] Jyotshana Kanti1, Anubhooti Papola2 , Smart Attendance using Face Recognition with Percentage Analyzer , International Journal of Advanced Research in Computer and Communication Engineering , Vol. 3, Issue 6, June 2014.

[17] MuthuKalyani.K, VeeraMuthu.A , Smart Application For AMS Using Face Recognition , Computer Science & Engineering: An International Journal (CSEIJ) , Vol. 3, No. 5, October 2013.

[18] RohitChavan, BaburaoPhad ,SankalpSawant, AshaRawat , Attendance Management System using Face Recognition , IJIRST– International Journal for Innovative Research in Science & Technology , Vol. 1 , Issue 11 , April 2015.

[19] Mr. C. S. P a til , Mr. R. R. Karhe , Mr. M. D. Jain , Student Attendance System and Authentication using Face Recognition , International Journal of Engineering Research & Technology (IJERT) , Vol. 3 Issue 7, July 2014.

[20] AmandeepKamboj, Anju Gupta(Associate Prof.) , Simulink Model Based Image Segmentation , International Journal of Advanced Research in Computer Science and Software Engineering , Vol.2, Issue 6, June 2012.

[21] Yogesh V. Raut1, Charudatta V. Kulkarni2 , FPGA Based Face Detection System using Xilinx System Generator , International Journal of Advanced Research in Computer and Communication Engineering , Vol. 4, Issue 6, June 2015.

[22] K.Senthamil Selvi1, P.Chitrakala2, A.Antony Jenitha3 , Face Recognition Based Attendance Marking System , A Monthly Journal of Computer Science and Information Technology , Vol. 3, Issue. 2, February 2014.

[23] NirmalyaKar, MrinalKantiDebbarma, AshimSaha, and DwijenRudra Pal , Study of

[24] Implementing Automated Attendance System Using Face Recognition Technique , International Journal of Computer and Communication Engineering , Vol. 1, No. 2, July 2012.

[25] AbhishekJha , Class Room Attendance System Using Facial Recognition System , The International Journal of Mathematics, Science, Technology and Management , Vol. 2 Issue 3.

[26] Breesam, A. M., Wail, M. K., & Fayadh, R. A. (2022, October). Principle component analysis based face recognition. In AIP Conference Proceedings (Vol. 2398, No. 1). AIP Publishing.

BIOGRAPHIES OF AUTHORS

	Mohammed Wajeeh Hussien He was born in the village of Yarmouk in the Iraqi capital Baghdad in 1962. He obtained her bachelor's degree in electrical engineering in 1985. He obtained a master's degree in electrical engineering in the electronic branch in 1988. From 1988 until 2003, I practiced a specialist as an electrical engineer in government institutions and laboratories in the Iraqi state. From 2005 until 2010, I worked in my specialist field in private companies and factories in Baghdad and Damascus. Since 2010 and until now I have worked as a university lecturer in the Department of Computer Technology Engineering at the University's Tigris College in Baghdad-Iraq. My research interests include designing electronic and electrical circuits, solar energy uses, and in the field of drones...
	**Ali M. Kadhim**, Received His Higher Diploma degree in the computing science from University of East Anglia / England – UK in 1990 and MSc in computer science from University of Technology –Baghdad Iraq -1992. He has been a full-time lecturer and head of computer science and engineering technique departments in Al_Salam College university, Baghdad, Iraq ,for 10 years since Nov. 2003. Currently, he is a full-time lecturer in computer engineering techniques Department/ Dijlah University College/ Baghdad/ Iraq since 2013, ongoing He can be contacted at email: ali.alsalihy@duc.edu.iq.
	**Asst. Lec. yasmeen.mahmood** Hussein Received her MSc degree in Computer Techniques Engineering from Middle Technical University, Electrical Engineering Technical College, Baghdad, Iraq, in 2022. She serves as a full-time lecturer in the Computer Engineering Techniques Department at Dijlah University College, Baghdad, since February 2023. She can be contacted via email: yasmeen.mahmood@duc.edu.iq
	B.Sc. and MSc. in electrical engineering from University of Basrah - Iraq in 1983 and 1986 respectively. From 1988 to 2012 he worked as Lecturer at Department of Electrical Engineering - college of engineering - University of Basrah/Iraq. Since 2013, he was joined the Al-Iraqia University - Department electrical engineering. He has authored/ co-authored many scientific papers in various fields of electrical engineering and his technical interests include instrumentation, communication systems, digital signal processing, and digital filters. He can be contacted via e-mail:fawzi.mohammed@duc.edu.iq.

الخلاصة

تقدم هذه الورقة تقنيات التعرف على الوجوه باستخدام لغة سي شارب التي تستخدم لمحاكاة التصميم المقترح لاستخدام العديد من التطبيقات في أنظمة إدارة الحضور وأنظمة الأمن. يتم تحديد فترة زمنية لتسجيل الحضور وبعد اكتمال الفترة الزمنية، يتم تخزين الحضور مباشرة في جهاز التخزين ميكانيكيًا دون أي تدخل بشري. سيتم إرسال رسالة إلى هاتف الطالب الغائب باستخدام تقنية .GSM لتجنب مشكلة الورقة، استخدمنا تقنية تقنيات التعرف على الوجوه. تمر صورة الإدخال عبر نظام التعرف للتعرف على الوجه. في بعض الحالات حيث لا توجد صورة الإدخال من كاميرا الويب في قاعدة البيانات، سيواجه المستخدم بعض الأخطاء. ومع ذلك، في الحالات التي توجد فيها الصورة في قاعدة البيانات، سيتم حساب تلك الصورة لقياس التشابه باستخدام المسافة بين مقاييس نقطة التحكم من صورة الإدخال. تشير نتيجة تجربتنا إلى أن عملية التعرف على عدد الصور في قاعدة البيانات وبعض الصور من كاميرا الويب توفر دقة 100٪ من حيث التعرف. هذا النظام هو الأكثر فعالية وسهولة وأقل وقتًا لتتبع الحضور في المنظمات مع فترة زمنية دون أي تدخل بشري.