STUDENT ATTENDANCE SYSTEM USING FACE RECOGNITION

A PROJECT REPORT

(AI2352 & Mini Project)

Submitted by

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BONAFIDE CERTIFICATE

Certified that this project report **“STUDENT ATTENDANCE SYSTEM USING FACE RECOGNITION”** is the bonafide work of **ANDALPRIYA C (920421243005), NUTTRENAI V (920421243033)** and **RAJA LAKSHMI K (920421243037)** who carried out the project work under my supervision.

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INTERNAL EXAMINER

EXTERNAL EXAMINER

ABSTRACT

ABSTRACT

This project present a novel approach for automating attendance tracking using computer vision and graphical user interface (GUI) technologies. Our system, named the Smart Attendance System, leverages the power of OpenCV for face detection and recognition, coupled with Tkinter for creating an intuitive and user-friendly interface. The system aims to streamline attendance management processes in various educational and organizational settings, eliminating the need for manual attendance recording and reducing the associated administrative burden. Through real-time face detection and recognition, our system accurately identifies individuals and records their attendance with minimal human intervention. Additionally, the GUI aspect enhances user interaction and provides a seamless experience for both administrators and end-users. We evaluate the system's performance through extensive testing and demonstrate its effectiveness in improving efficiency and accuracy in attendance tracking. Overall, our Smart Attendance System presents a promising solution for modernizing traditional attendance management practices, offering convenience, reliability, and scalability.

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INTRODUCTION

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INTRODUCTION

1.1 IMPORTANCE OF THE WORK

The importance of automating attendance tracking using computer vision and GUI technologies cannot be overstated in today's fast-paced educational and organizational environments. Traditional methods of attendance recording often rely on manual processes, which are not only time-consuming but also prone to errors and inaccuracies. By introducing the Smart Attendance System, we aim to revolutionize attendance management practices by harnessing the power of technology to streamline and optimize this essential task.

First and foremost, our system addresses the pressing need for efficiency and accuracy in attendance tracking. Manual methods often result in delays, discrepancies, and even fraudulent practices, leading to significant administrative overhead and potential legal ramifications. By automating the process through real-time face detection and recognition, our system ensures timely and precise attendance recording, thereby reducing administrative burden and enhancing overall productivity.

Furthermore, the scalability of our solution makes it suitable for deployment in diverse educational and organizational settings, from classrooms and lecture halls to corporate boardrooms and conference centre. Whether managing a small group or a large cohort, our system adapts seamlessly to meet the evolving needs of users, ensuring consistent and reliable attendance tracking across different environments.

Overall, the significance of our work lies in its potential to modernize and optimize traditional attendance management practices, offering convenience, reliability, and scalability in an increasingly digital age. By leveraging computer vision and GUI technologies, the Smart Attendance System represents a forward-thinking approach to enhancing efficiency and effectiveness in attendance tracking, ultimately empowering educators, administrators, and organizations to focus on what matters most—fostering learning, productivity, and success.

1.2 OBJECTIVE

- Provide a valuable attendance service for both Teacher and Student
- Avoiding time losses during class started
- To avoid cheating and fraud information

1.3 PROJECT DISCRIPTION AND FEATURES

Our project introduces a groundbreaking solution for automating attendance tracking by integrating computer vision and graphical user interface (GUI) technologies. Named the Smart Attendance System, it harnesses the capabilities of OpenCV for precise face detection and recognition, alongside Tkinter for constructing an intuitive and user-friendly interface. Our system is designed to revolutionize attendance management across diverse educational and organizational environments, replacing manual recording processes and alleviating administrative burdens. Through real-time face detection and recognition, our system identifies individuals accurately, capturing attendance data with minimal human intervention. Furthermore, the GUI component enhances user interaction, ensuring a seamless experience for administrators and end users alike. Through rigorous testing, we evaluate the system's performance and showcase its effectiveness in enhancing efficiency and accuracy in attendance tracking. In summary, our Smart Attendance System offers a promising solution for modernizing conventional attendance management practices, providing convenience, reliability, and scalability. Key features of our project include:

Face Detection and Recognition: Leveraging OpenCV's advanced algorithms, the system accurately detects and recognizes faces in real-time.

Intuitive GUI: Developed using Tkinter, the system's graphical user interface ensures ease of use and smooth navigation for administrators and end-users.

Automated Attendance Recording: By eliminating manual processes, the system automates attendance tracking, reducing administrative workload and errors.

Minimal Human Intervention: With its seamless face detection and recognition capabilities, the system captures attendance data with minimal human involvement.

Performance Evaluation: Extensive testing validates the system's performance, demonstrating its efficiency and accuracy in attendance management.

Efficiency Improvement: By streamlining attendance tracking processes, the system enhances efficiency, allowing educational institutions and organizations to allocate resources more effectively.

Scalability: Designed with scalability in mind, the system can accommodate varying user loads and adapt to evolving needs without compromising performance.

1.4 SOCIAL IMPACT

- Reduce paperwork and save time in schools and colleges.
- Eliminate duplicate data entry, errors in time and attendance entries.
- Prevent unauthorized attendance marking.
- Easy to use and productive.

1.5 CHALLENGES

While our Smart Attendance System presents a promising solution for modernizing traditional attendance management practices, there are several challenges that we encountered during its development and implementation. One significant challenge is the accuracy and reliability of face detection and recognition algorithms, especially in varying lighting 5 conditions, different facial expressions, and occlusions. Ensuring that the system can accurately identify individuals under these diverse circumstances required extensive testing and optimization of the algorithms.

1.6 DOCUMENT ORGANIZATION

Our project is focusing on enhanced inventory management system on blockchain for vendors.

Chapter 2 surveys the various methodologies for Student Attendance System using Face Recognition.

Chapter 3 lists the hardware and software specification to implement the project.

Chapter 4 focuses on system design which includes system architecture and description of various modules.

Chapter 5 describes the implementation of the modules.

Chapter 6 depicts the results of our project.

Chapter 7 discusses the conclusion and future enhancement of our project.

CHAPTER 2

LITERATURE SURVEY

CHAPTER 2

LITERATURE SURVEY

In the literature survey chapter, we delve into existing research to establish the foundation for our smart attendance system using OpenCV. We explore a multitude of scholarly papers and studies to comprehend the current landscape of attendance monitoring technologies. This survey encompasses a comprehensive review of methodologies, algorithms, and technologies employed in similar systems. By synthesizing insights from diverse sources, we aim to identify gaps, trends, and best practices in the field. Through this exploration, we aim to build upon existing knowledge and contribute novel insights to the domain of attendance tracking systems.

Pattnaik and Mohanty's [1] paper investigates AI-based techniques for real-time face recognition attendance systems through a comparative study. They examine various methodologies and technologies employed in such systems, aiming to discern their effectiveness and practicality. The study likely explores different algorithms, datasets, and performance metrics, providing insights into the strengths and limitations of each approach. By comparing and contrasting these techniques, the paper contributes to advancing the state-of-the-art in face recognition-based attendance systems.

Amrutha et al.'s paper presents a face recognition-based attendance monitoring system. They [2] likely detail the implementation of algorithms such as Haar cascade classifiers for face detection and recognition. The system's architecture, dataset used for training, and evaluation metrics are likely discussed. The paper aims to propose an efficient and accurate solution for attendance monitoring using facial recognition technology, contributing to the field of biometric attendance systems.

Alhanaee et al.'s paper introduces a face recognition smart attendance system leveraging deep transfer learning techniques. They [3] likely explore the application of pre-trained convolutional neural networks (CNNs) such as ResNet or VGG for feature extraction and fine-tuning on attendance-related datasets. The paper likely discusses the system's architecture, training process, and evaluation metrics, aiming to enhance the accuracy and efficiency of attendance tracking through advanced deep learning methodologies. This research contributes to the evolving field of biometric attendance systems.

Preethi and Vodithala's [4] paper presents an automated smart attendance system based on face recognition technology. They likely discuss the system's design, which likely involves face detection, feature extraction, and recognition using methods such as Haar cascades or deep learning approaches. The paper likely explores the implementation details, performance evaluation metrics, and usability aspects of the system. By leveraging face recognition, the proposed system aims to provide a convenient and efficient solution for attendance tracking in various contexts, contributing to the advancement of attendance management systems.

Filippidou and Papakostas' paper introduces a novel approach to single sample face recognition using convolutional neural networks (CNNs) for automated attendance systems. They [5] likely discuss the architecture of the CNN model designed for single sample face recognition, exploring methods for feature extraction and classification. The paper likely presents experimental results demonstrating the effectiveness of the proposed approach in accurately recognizing faces from a single sample, thereby enhancing the efficiency and usability of automated attendance systems.

CHAPTER 3

REQUIREMENT SPECIFICATION

CHAPTER 3

REQUIREMENT SPECIFICATION

This chapter presents the hardware and software requirements for the Smart Attendance system using Facial Recognition.

3.1 HARDWARE REQUIREMENT

• Operating System	: Windows 7 or later
• Hard disk	: Minimum 200 MB
• Processor Speed	: 2.00GHz
• Processor	: x86-64 processor

3.2 SOFTWARE REQUIREMENT

• Modules used	: Tkinter, OpenCv, smtp
• Language used	: Python Version 3.5 or above

CHAPTER 4

SYSTEM DESIGN

CHAPTER 4

SYSTEM DESIGN

This chapter presents the system design for the Smart Attendance System using Facial Recognition.

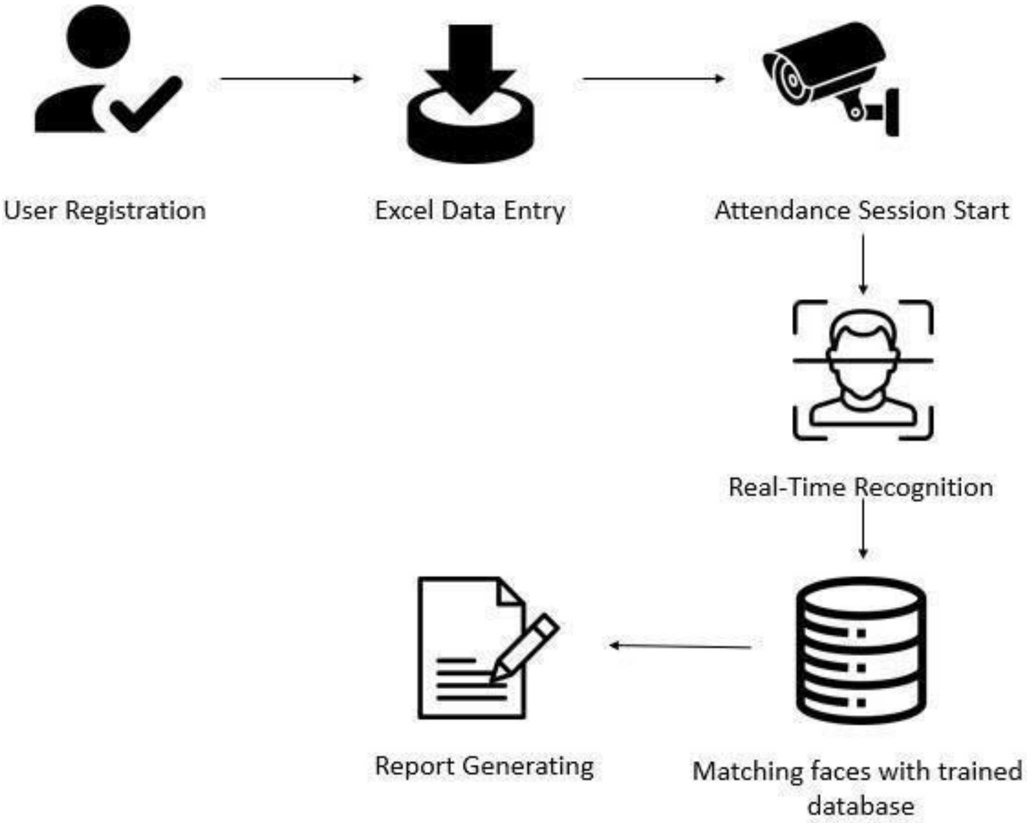


Figure 4.1 System Design

The system design outlines the architecture and functionality of the smart attendance system using OpenCV. It elucidates the integration of image processing algorithms for face detection and recognition, database management for storing attendance records, and the user interface for seamless interaction.

CHAPTER 5

IMPLEMENTATION

CHAPTER 5

IMPLEMENTATION METHODOLOGY

5.1 MODULES

Student Attendance System using face recognition is designed with the following major modules:

- User Profile Creation
- Attendance tracking
- Notification

5.1.1 USER PROFILE CREATION

The Profile Creation Module serves as an essential component within the proposed attendance management system, specifically tailored to empower students with personalized accounts and profiles. This module streamlines the process of student onboarding, allowing them to create individual profiles within the system to access attendance-related functionalities and personalized services. Students are provided with a user-friendly interface where they can register and create their profiles by providing necessary information such as their name, student ID, contact details, and other relevant personal information. The registration process may also include the verification of student credentials to ensure the authenticity of the provided information. Upon successful registration, each student is assigned a unique user ID and password, which they can use to log in securely to the attendance management system.

Additionally, students may have the option to personalize their profiles by adding profile pictures or additional details to enhance their user experience. The profile creation module offers students the flexibility to manage their profiles efficiently, allowing them to update personal information, change passwords, and configure notification preferences as needed. This self-service functionality empowers students to take control of their attendance-related interactions within the system, promoting a sense of ownership and responsibility for their academic engagement.

Furthermore, the profile creation module may integrate with the institution's Student Information System (SIS) to synchronize student profiles and ensure data consistency across different platforms. This seamless integration eliminates redundancy and reduces administrative overhead associated with managing student information. By providing students with personalized profiles, the attendance management system fosters a sense of inclusivity and engagement, enabling students to actively participate in the attendance tracking process.

Moreover, it facilitates targeted communication and engagement initiatives, allowing administrators and teachers to send personalized notifications and reminders to students based on their profile preferences.

Overall, the Profile Creation Module enhances the user experience for students within the attendance management system, empowering them with personalized accounts and self-service functionalities while ensuring data accuracy and security.

5.1.2 ATTENDANCE TRACKING

The "Attendance Tracking" module within the proposed attendance management system for educational institutions offers a comprehensive solution to digitize and streamline the process of monitoring student attendance. By providing a digital platform, teachers can efficiently mark attendance for their classes, replacing cumbersome manual methods with quick and easy electronic recording. This system enables real-time updates, ensuring that attendance records are promptly reflected in the database, giving administrators up-to-date insights into student attendance status. With support for various input methods such as biometric scanners, RFID cards, and mobile apps, the system offers flexibility to cater to different preferences and infrastructure requirements.

Additionally, it maintains detailed attendance records, allowing for the tracking of individual student attendance status over time. Automated alerts help flag missing attendance instances, ensuring proactive follow-up and intervention when necessary. Seamless integration with the institution's Student Information System (SIS) ensures data consistency and accuracy across all systems, ultimately enhancing efficiency, accuracy, and transparency in attendance tracking processes. In addition to streamlining the attendance tracking process, the system offers additional features to enhance overall functionality and user experience. One such feature is the ability to customize attendance parameters to suit the unique needs of different courses, allowing for flexible attendance policies based on class schedules and requirements.

Moreover, the system provides comprehensive reporting capabilities, allowing administrators to generate detailed attendance reports and analytics to identify trends, patterns, and potential areas for improvement. This data-driven approach empowers educational institutions to make informed decisions regarding attendance management strategies and student support initiatives.

Furthermore, the system prioritizes security and data privacy, implementing robust encryption protocols and access controls to safeguard sensitive attendance information. Regular security audits and updates ensure ongoing protection against cyber threats, instilling confidence in users regarding the integrity and confidentiality of their data.

Additionally, the system fosters communication and collaboration between stakeholders by enabling seamless communication channels between teachers, students, and administrators. Integration with communication tools such as email or messaging platforms allows for automated notifications regarding attendance related matters, facilitating timely communication and coordination. Moreover, the system supports advanced features such as automated attendance tracking based on geolocation or class check-ins, further reducing the administrative burden on teachers and ensuring accurate attendance records. These innovative functionalities leverage technology to streamline processes and enhance efficiency in attendance management, ultimately contributing to a more productive and conducive learning environment for all stakeholders involved.

5.1.3 NOTIFICATION MODULE

The Notification Module of the proposed attendance management system serves as a vital component in ensuring effective communication and timely updates regarding attendance-related matters. By implementing automated notification functionalities, the system facilitates seamless communication between administrators, teachers, and students, thereby enhancing overall efficiency and transparency. For teachers, the system can send reminders about marking attendance for their classes, as well as alerts for any missing attendance entries or discrepancies detected in the records. This proactive approach helps teachers stay on top of attendance tracking tasks and ensures the accuracy of attendance data. Similarly, students can receive notifications reminding them of upcoming classes and the importance of regular attendance.

Additionally, alerts can be sent to students who have been marked as absent from classes, encouraging them to take corrective action and attend future sessions to stay on track with their academic progress.

Furthermore, the Notification Module can be configured to send notifications to administrators in cases where unusual attendance patterns are detected, such as a significant increase in absences or instances of potentially fraudulent activity. This allows administrators to investigate and address any underlying issues promptly, maintaining the integrity of the attendance management system.

Overall, the Notification Module plays a crucial role in facilitating communication and ensuring that all stakeholders are kept informed about attendance-related updates and events, ultimately contributing to a more efficient and transparent attendance management process within educational institutions.

5.2 ALGORITHM

Step 1: Import Required Module

Import the necessary modules such as attendance tracking, notification and user authentication.

Step 2: Define Attendance system Function

Define functions for attendance system function:

i. Face Detection: The system identifies and locates human faces within images or video frames using computer vision algorithms.

ii. Face Recognition: Once faces are detected, the system matches them against a database of known individuals to perform facial recognition.

iii. Attendance Marking: Attendance records can be stored in a database or attendance management system for further processing and analysis.

iv. Real-time Monitoring: The system provides real-time monitoring of attendance activities, displaying live updates as individuals are recognized and attendance is recorded.

Step 3: Define Inference Function

Define an inference function inference.

i. Establish a recognition confidence threshold for successful matches.

ii. Provide clear error feedback for recognition failures.

Step 4: Define User Interface Components

Define user interface components using local binary patter histogram.

i. Image Input: Upload or capture images.

ii. Preprocessing: Apply filters or adjustments.

iii. Histogram Calculation: Display computed histograms.

iv. Feature Extraction: Show extracted feature vectors.

v. Visualization: Display results and metrics.

Step 5: Handle Errors and Debugging

Implement error handling mechanisms to detect and manage errors, and provide debugging options for advanced users to diagnose and troubleshoot issues within the LBPH-based system.

CHAPTER 6

RESULT AND DISCUSSION

CHAPTER 6

RESULT AND DISCUSSION

This system has been implemented and tested on Python IDE. An efficient attendance system using OpenCV has been implemented which provides high accuracy and better management of attendance data.

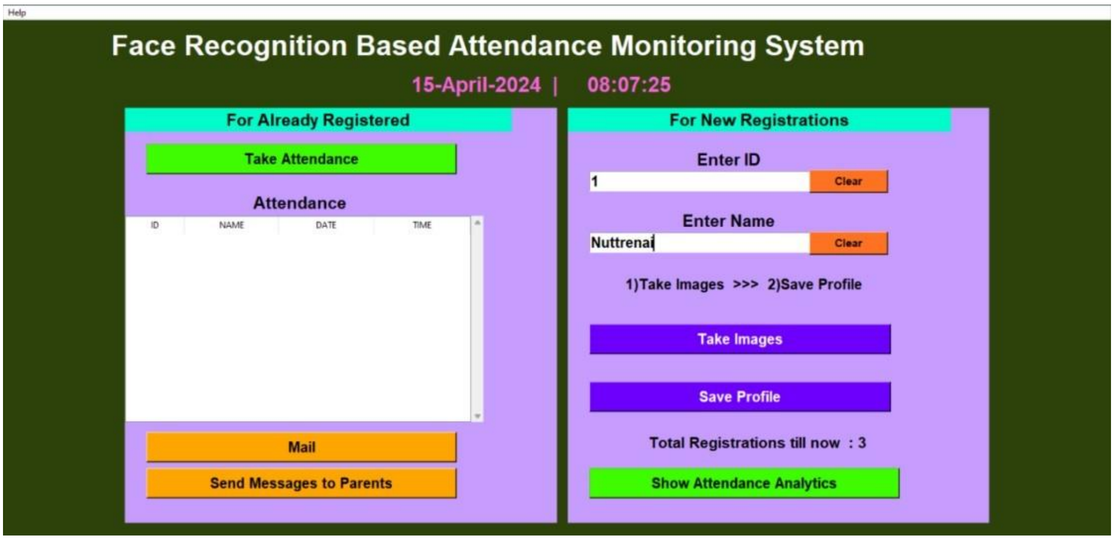
6.1 EXPERIMENTAL SETUP

The experimental setup for evaluating the Face Recognition Based Attendance Monitoring System involved deploying the application in a real-world educational environment. Over a period of time, the system was used to track attendance across multiple classes and student cohorts. Data on attendance records, including captured images, timestamps, and student details, were collected and analysed to assess the system's performance and effectiveness. The results demonstrated that the system successfully automated the attendance tracking process, significantly reducing the time and effort required by administrators. By leveraging face recognition technology, the system accurately identified and recorded student attendance, minimizing errors and ensuring data integrity. Moreover, the email notification feature proved to be invaluable in facilitating communication between schools and parents, fostering greater accountability and engagement.

Overall, the outcomes of the project indicated that the Face Recognition Based Attendance Monitoring System effectively addressed the challenges associated with manual attendance management, providing a reliable, efficient, and user-friendly solution for educational institutions.

6.2 RESULTS FOR EXPERIMENTAL SETUP

In this chapter, we present the results obtained from the implementation of the Smart Attendance System using OpenCV. The outcomes encompass accuracy metrics, efficiency evaluations, and comparative analyses with existing systems. These findings illuminate the system's performance and efficacy in real-world scenarios, informing further discussions and improvements.



Enter ID: 1

Enter Name: Nuttrenai

Figure 6.1 User Profile Creation

The profile creation process involves capturing facial images of individuals, extracting facial features using OpenCV algorithms, and storing them in a database for recognition and attendance tracking purposes.

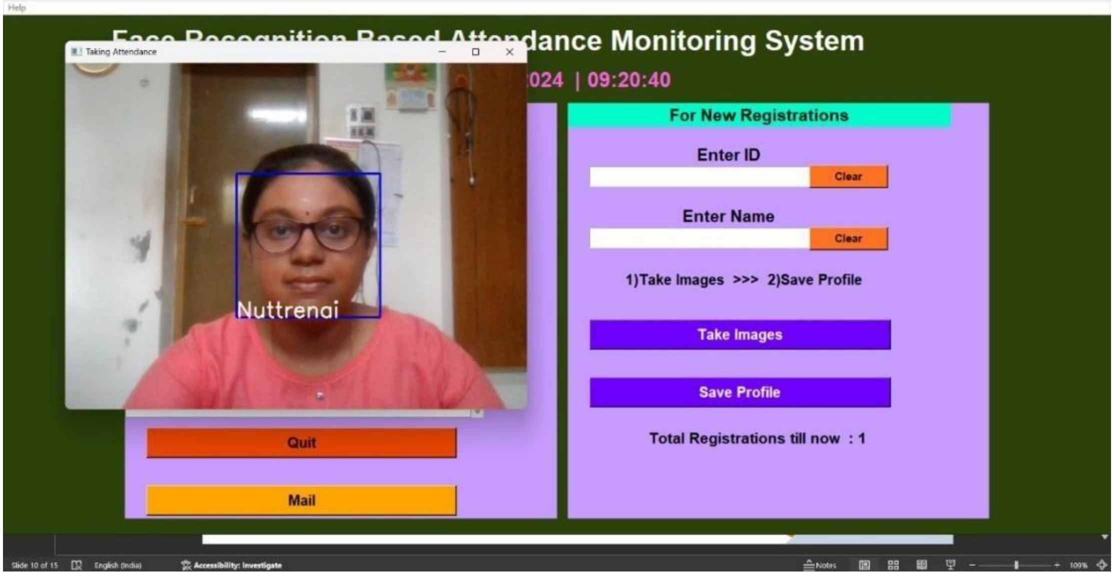
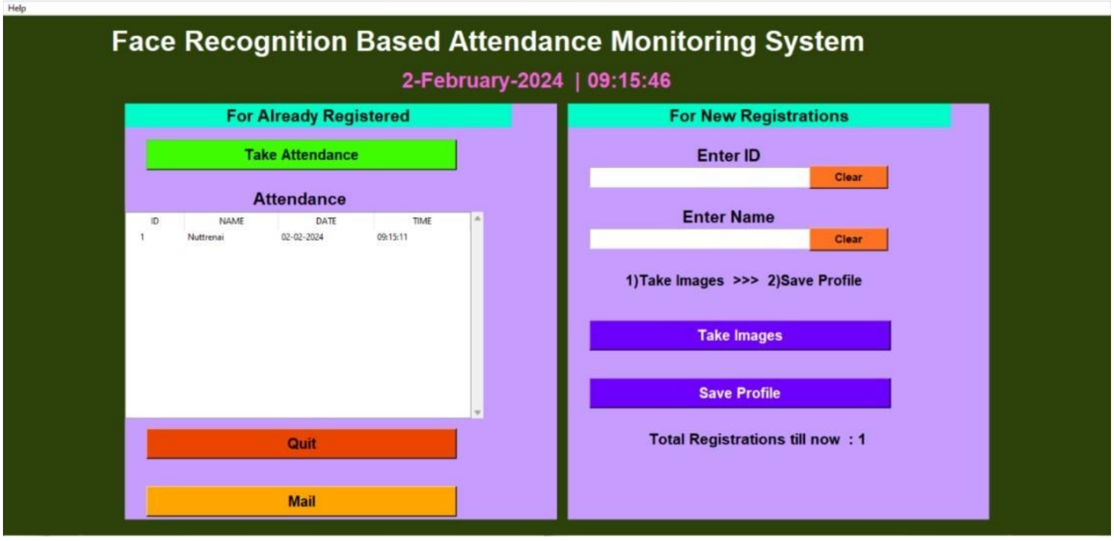


Figure 6.2 Face Detection

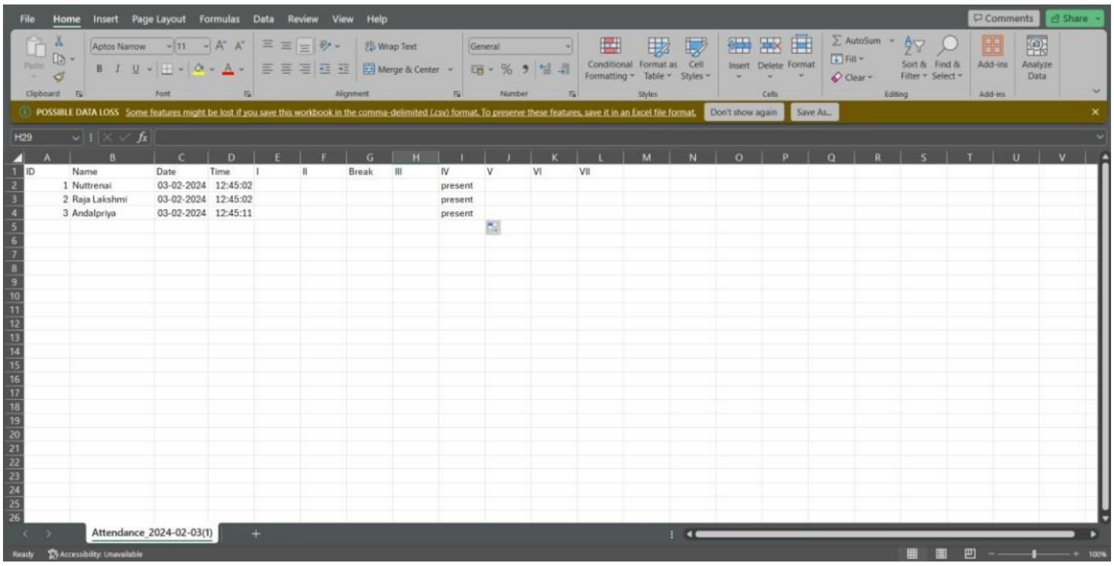
The face detection step employs OpenCV's algorithms to identify and locate human faces within images or video streams, enabling subsequent processing for tasks such as recognition and attendance tracking.


Help
Face Recognition Based Attendance Monitoring System
2-February-2024 | 09:15:46
For Already Registered
Take Attendance
Attendance
Quit
Mail
For New Registrations
Enter ID
Clear
Enter Name
Clear
1)Take Images >>> 2)Save Profile
Take Images
Save Profile
Total Registrations till now : 1

ID	NAME	DATE	TIME
1	Nuttrenai	02-02-2024	09:15:11

Figure 6.3 Attendance Noted

The attendance data is extracted and stored in a CSV file format. This file is then accessed and displayed as a preview within the graphical user interface (GUI) for convenient visualization and analysis.

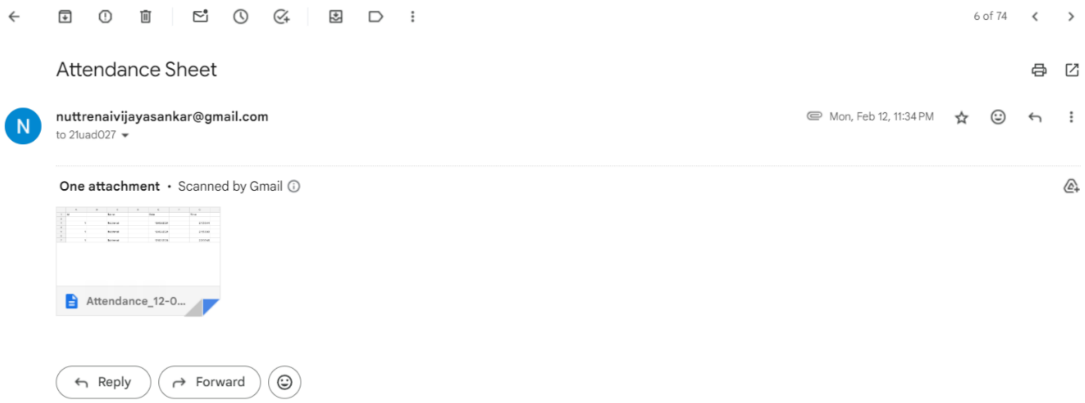


POSSIBLE DATA LOSS Some features might be lost if you save this workbook in the comma-delimited (.csv) format. To preserve these features, save it in an Excel file format.

ID	Name	Date	Time	I	II	Break	III	IV	V	VI	VII
1	Nuttrenai	03-02-2024	12:45:02					present			
2	Raja Lakshmi	03-02-2024	12:45:02					present			
3	Andalpriya	03-02-2024	12:45:11					present			

Figure 6.4 Data Updating

The data updating process involves accessing the existing Excel spreadsheet, identifying the relevant cells for attendance records, and updating them with the latest attendance data obtained from the system.



Attendance Sheet

nuttrenaivijayasankar@gmail.com
to 21uad027

Mon, Feb 12, 11:34 PM

One attachment • Scanned by Gmail

Attendance_12-0...

Figure 6.5 Data Exported

The system exports attendance data to a specified email address. It compiles the data into a formatted message and sends it as an attachment or embedded content to the designated administrator's email.

CHAPTER 7

CONCLUSION AND FUTURE WORK

CHAPTER 7

CONCLUSION AND FUTURE WORK

7.1 CONCLUSION

In conclusion, the Smart Attendance System, integrating facial recognition, Excel data storage, and email notifications through OpenCV, represents a modern and efficient solution for educational institutions. This innovative approach enhances accuracy in attendance tracking, promotes seamless communication through automated email notifications, and offers potential for continuous improvement through machine learning. The system's user-friendly GUI and potential for future expansions position it as a versatile and adaptive tool for optimizing attendance management in educational settings.

7.2 FUTURE WORK

In this Smart Attendance System utilizing OpenCV could be the implementation of predictive analytics for attendance trends. By leveraging machine learning algorithms, the system could analyze historical attendance data along with contextual factors such as class schedules, extracurricular activities, and weather conditions to predict future attendance patterns. This predictive capability would enable educational institutions to anticipate potential attendance fluctuations, optimize resource allocation, and proactively address attendance-related challenges. For example, if the system forecasts lower attendance rates for a particular class session, instructors could adjust teaching strategies or schedule engaging activities to encourage higher participation. Moreover, administrators could use these insights to allocate resources efficiently and implement targeted interventions to improve overall attendance rates. Overall, integrating predictive analytics would enhance the system's value by providing actionable insights for better attendance management and student engagement in educational institutions.

APPENDIX

APPENDIX

A1: SAMPLE CODE

```
import tkinter as tk

from tkinter import ttk

from tkinter import messagebox as mess

import tkinter.simpledialog as tsd

import cv2,os

import csv

import numpy as np

from PIL import Image

import pandas as pd

import datetime

import time

import smtplib

from email.mime.multipart import MIMEMultipart

from email.mime.text import MIMEText

from email.mime.base import MIMEBase

from email import encoders

import pandas as pd

import matplotlib.pyplot as plt

import seaborn as sns
```

```
from twilio.rest import Client
import tkinter as tk
import glob
def assure_path_exists(path):
    dir = os.path.dirname(path)
    if not os.path.exists(dir):
        os.makedirs(dir)
def tick():
    time_string = time.strftime('%H:%M:%S')
    clock.config(text=time_string)
    clock.after(200,tick)
def contact():
    mess._show(title='Contact us', message="Please contact us on : 
'nuttrenaivijayasankar@gmail.com' ")
def check_haarcascadefile():
    exists = os.path.isfile("haarcascade_frontalface_default.xml")
    if exists:
        pass
    else:
        mess._show(title='Some file missing', message='Please contact us for help')
        window.destroy()
def save_pass():
    assure_path_exists("TrainingImageLabel/")
    exists1 = os.path.isfile("TrainingImageLabel\psd.txt")
    if exists1:
        tf = open("TrainingImageLabel\psd.txt", "r")
        key = tf.read()
    else:
        master.destroy()
        new_pas = tsd.askstring('Old Password not found', 'Please enter a new
password below', show='*')
        if new_pas == None:
            mess._show(title='No Password Entered', message='Password not set!!
Please try again')
        else:
            tf = open("TrainingImageLabel\psd.txt", "w")
            tf.write(new_pas)
            mess._show(title='Password Registered', message='New password was
registered successfully!!')
            return
    op = (old.get())
    newp= (new.get())
    nnewp = (nnew.get())
    if (op == key):
        if(newp == nnewp):
            txf = open("TrainingImageLabel\psd.txt", "w")
            txf.write(newp)
        else:
            mess._show(title='Error', message='Confirm new password again!!!')
            return
    else:
        mess._show(title='Wrong Password', message='Please enter correct old password.')
        return
    mess._show(title='Password Changed', message='Password changed successfully!!')
    master.destroy()
def change_pass():
    global master
    master = tk.Tk()
    master.geometry("400x160")
    master.resizable(False,False)
    master.title("Change Password")
    master.configure(background="white")
    lbl4 = tk.Label(master,text='    Enter Old Password',bg='white',font=('comic', 12, ' bold '))
    lbl4.place(x=10,y=10)
    global old
    old=tk.Entry(master,width=25 ,fg="black",relief='solid',font=('comic', 12, ' bold '),show='*')
    old.place(x=180,y=10)
    lbl5 = tk.Label(master, text='      Enter New Password', bg='white', font=('comic', 12, ' bold '))
    lbl5.place(x=10, y=45)
    global new
    new = tk.Entry(master, width=25, fg="black",relief='solid', font=('comic', 12, ' bold '),show='*')
    new.place(x=180, y=45)
    lbl6 = tk.Label(master, text='Confirm New Password', bg='white', font=('comic', 12, ' bold '))
    lbl6.place(x=10, y=80)
    global nnew
    nnew = tk.Entry(master, width=25, fg="black", relief='solid',font=('comic', 12, ' bold '),show='*')
    nnew.place(x=180, y=80)
    cancel=tk.Button(master,text="Cancel", command=master.destroy ,fg="black" ,bg="red" ,height=1,width=25 , activebackground = "white" ,font=('comic', 10, ' bold '))
    cancel.place(x=200, y=120)
    save1 = tk.Button(master, text="Save", command=save_pass, fg="black", bg="#00fcca", height = 1,width=25, activebackground="white", font=('comic', 10, ' bold '))
    save1.place(x=10, y=120)
    master.mainloop()
def psw():
    assure_path_exists("TrainingImageLabel/")
    exists1 = os.path.isfile("TrainingImageLabel\psd.txt")
    if exists1:
        tf = open("TrainingImageLabel\psd.txt", "r")
        key = tf.read()
    else:
        new_pas = tsd.askstring('Old Password not found', 'Please enter a new password below', show='*')
        if new_pas == None:
            mess._show(title='No Password Entered', message='Password not set!! Please try again')
        else:
            tf = open("TrainingImageLabel\psd.txt", "w")
            tf.write(new_pas)
            mess._show(title='Password Registered', message='New password was registered successfully!!')
            return
    password = tsd.askstring('Password', 'Enter Password', show='*')
    if (password == key):
        TrainImages()
    elif (password == None):
        pass
    else:
        mess._show(title='Wrong Password', message='You have entered wrong password')
def clear():
    txt.delete(0, 'end')
    res = "1)Take Images  >>>  2)Save Profile"
    message1.configure(text=res)
def clear2():
    txt2.delete(0, 'end')
    res = "1)Take Images  >>>  2)Save Profile"
    message1.configure(text=res)
def TakeImages():
    check_haarcascadefile()
    columns = ['SERIAL NO.', ", 'ID', ", 'NAME']
```

```
assure_path_exists("StudentDetails/")
assure_path_exists("TrainingImage/")
serial = 0
exists = os.path.isfile("StudentDetails\StudentDetails.csv")
if exists:
    with open("StudentDetails\StudentDetails.csv", 'r') as csvFile1:
        reader1 = csv.reader(csvFile1)
        for l in reader1:
            serial = serial + 1
    serial = (serial // 2)
    csvFile1.close()
else:
    with open("StudentDetails\StudentDetails.csv", 'a+') as csvFile1:
        writer = csv.writer(csvFile1)
        writer.writerow(columns)
        serial = 1
    csvFile1.close()
Id = (txt.get())
name = (txt2.get())
if ((name.isalpha()) or (' ' in name)):
    cam = cv2.VideoCapture(0)
    harcascadePath = "haarcascade_frontalface_default.xml"
    detector = cv2.CascadeClassifier(harcascadePath)
    sampleNum = 0
    while (True):
        ret, img = cam.read()
        gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
        faces = detector.detectMultiScale(gray, 1.3, 5)
        for (x, y, w, h) in faces:
            cv2.rectangle(img, (x, y), (x + w, y + h), (255, 0, 0), 2)
            sampleNum = sampleNum + 1
            cv2.imwrite("TrainingImage\ " + name + "." + str(serial) + "." + Id +
'.' + str(sampleNum) + ".jpg",
                        gray[y:y + h, x:x + w])
            cv2.imshow('Taking Images', img)
        if cv2.waitKey(100) & 0xFF == ord('q'):
            break
        elif sampleNum > 100:
            break
    cam.release()
    cv2.destroyAllWindows()
    res = "Images Taken for ID : " + Id
    row = [serial, '', Id, '', name]
    with open('StudentDetails\StudentDetails.csv', 'a+') as csvFile:
        writer = csv.writer(csvFile)
        writer.writerow(row)
    csvFile.close()
    message1.configure(text=res)
else:
    if (name.isalpha() == False):
        res = "Enter Correct name"
        message.configure(text=res)
def TrainImages():
check_haarcascadefile()
assure_path_exists("TrainingImageLabel/")
recognizer = cv2.face_LBPHFaceRecognizer.create()
harcascadePath = "haarcascade_frontalface_default.xml"
detector = cv2.CascadeClassifier(harcascadePath)
faces, ID = getImagesAndLabels("TrainingImage")
try:
    recognizer.train(faces, np.array(ID))
except:
    mess._show(title='No Registrations', message='Please Register someone
first!!!')
    return
recognizer.save("TrainingImageLabel\Trainner.yml")
res = "Profile Saved Successfully"
message1.configure(text=res)
message.configure(text='Total Registrations till now  : ' + str(ID[0]))
def getImagesAndLabels(path):
imagePaths = [os.path.join(path, f) for f in os.listdir(path)]
faces = []
Ids = []
for imagePath in imagePaths:
    pilImage = Image.open(imagePath).convert('L')
    imageNp = np.array(pilImage, 'uint8')
    ID = int(os.path.split(imagePath)[-1].split(".")[1])
    faces.append(imageNp)
    Ids.append(ID)
return faces, Ids
def TrackImages():
check_haarcascadefile()
assure_path_exists("Attendance/")
assure_path_exists("StudentDetails/")
for k in tv.get_children():
    tv.delete(k)
msg = ''
i = 0
j = 0
recognizer=cv2.face.LBPHFaceRecognizer_create()
exists3 = os.path.isfile("TrainingImageLabel\Trainner.yml")
if exists3:
    recognizer.read("TrainingImageLabel\Trainner.yml")
else:
    mess._show(title='Data Missing', message='Please click on Save Profile to reset data!!')
    return
harcascadePath = "haarcascade_frontalface_default.xml"
faceCascade = cv2.CascadeClassifier(harcascadePath);
cam = cv2.VideoCapture(0)
font = cv2.FONT_HERSHEY_SIMPLEX
col_names = ['Id', ", 'Name', ", 'Date', ", 'Time']
exists1 = os.path.isfile("StudentDetails\StudentDetails.csv")
if exists1:
    df = pd.read_csv("StudentDetails\StudentDetails.csv")
else:
    mess._show(title='Details Missing', message='Students details are missing, please check!')
    cam.release()
    cv2.destroyAllWindows()
    window.destroy()
while True:
    ret, im = cam.read()
    gray = cv2.cvtColor(im, cv2.COLOR_BGR2GRAY)
    faces = faceCascade.detectMultiScale(gray, 1.2, 5)
    for (x, y, w, h) in faces:
        cv2.rectangle(im, (x, y), (x + w, y + h), (225, 0, 0), 2)
        serial, conf = recognizer.predict(gray[y:y + h, x:x + w])
        if (conf < 50):
            ts = time.time()
            date = datetime.datetime.fromtimestamp(ts).strftime('%d-%m-%Y')
            timeStamp                                              =
datetime.datetime.fromtimestamp(ts).strftime('%H:%M:%S')
            aa = df.loc[df['SERIAL NO.'] == serial]['NAME'].values
            ID = df.loc[df['SERIAL NO.'] == serial]['ID'].values
            ID = str(ID)
            ID = ID[1:-1]
            bb = str(aa)
            bb = bb[2:-2]
            # Get the current time
            current_time                                           =
datetime.datetime.fromtimestamp(ts).strftime('%H:%M:%S')
```

```
            # Determine whether it's morning or afternoon
            period = "Am" if int(current_time.split(':')[0]) < 12 else "Fn"
            attendance = [str(ID), '', bb, '', str(date), '', str(timeStamp), '', period]
        else:
            Id = 'Unknown'
            bb = str(Id)
        cv2.putText(im, str(bb), (x, y + h), font, 1, (255, 255, 255), 2)
    cv2.imshow('Taking Attendance', im)
    if (cv2.waitKey(1) == ord('q')):
        break
ts = time.time()
date = datetime.datetime.fromtimestamp(ts).strftime('%d-%m-%Y')
exists = os.path.isfile("Attendance\Attendance_" + date + ".csv")
if exists:
    with open("Attendance\Attendance_" + date + ".csv", 'a+') as csvFile1:
        writer = csv.writer(csvFile1)
        writer.writerow(attendance)
    csvFile1.close()
else:
    with open("Attendance\Attendance_" + date + ".csv", 'a+') as csvFile1:
        writer = csv.writer(csvFile1)
        writer.writerow(col_names)
```

```
            writer.writerow(attendance)
        csvFile1.close()
    with open("Attendance\Attendance_" + date + ".csv", 'r') as csvFile1:
        reader1 = csv.reader(csvFile1)
        for lines in reader1:
            i = i + 1
            if (i > 1):
                if (i % 2 != 0):
                    iidd = str(lines[0]) + '   '
                    tv.insert('', 0, text=iidd, values=(str(lines[2]), str(lines[4]),
str(lines[6])))
    csvFile1.close()
    cam.release()
    cv2.destroyAllWindows()
def send_mail():
    try:
        email_address = "yourmail@gmail.com"
        email_password = "oevv abjo wrlb bugn"
        to_address = "mailid@gmail.com"
        msg = MIMEMultipart()
        msg['From'] = email_address
        msg['To'] = to_address
        msg['Subject'] = "Attendance Sheet"
        attachment_path = "Attendance/Attendance_" + date + ".csv"
        attachment = open(attachment_path, 'rb')
        part = MIMEBase('application', 'octet-stream')
        part.set_payload((attachment).read())
        encoders.encode_base64(part)
        part.add_header('Content-Disposition', "attachment; filename= %s" %
"Attendance_" + date + ".csv")
        msg.attach(part)
        # Connect to the email server and send the email
        server = smtplib.SMTP('smtp.gmail.com', 587)
        server.starttls()
        server.login(email_address, email_password)
        text = msg.as_string()
        server.sendmail(email_address, to_address, text)
        server.quit()
        mess.showinfo("Email Sent", "Attendance sheet sent successfully!")
    except Exception as e:
        mess.showerror("Error", f"An error occurred: {str(e)}")
def load_attendance_data(file_path):
    data = pd.read_csv(file_path)  # Adjust based on your data storage format
    return data
```

```
def daily_attendance_trend(data):
    daily_trend = data.groupby('Date')['Id'].count()
    return daily_trend
def weekly_attendance_trend(data):
    data['Date'] = pd.to_datetime(data['Date'])
    weekly_trend = data.resample('W-Mon', on='Date')['Id'].count()
    return weekly_trend
def monthly_attendance_trend(data):
    data['Date'] = pd.to_datetime(data['Date'])
    monthly_trend = data.resample('M', on='Date')['Id'].count()
    return monthly_trend
def plot_attendance_trend(trend_data, title, xlabel, ylabel):
    plt.figure(figsize=(10, 6))
    sns.lineplot(x=trend_data.index, y=trend_data.values)
    plt.title(title)
    plt.xlabel(xlabel)
    plt.ylabel(ylabel)
    plt.show()
def show_attendance_analytics():
    data = load_attendance_data("D:/face final/Face Recognition Based Attendance Monitoring System/Attendance/Attendance_02-02-2024.csv") # Adjust based on your data file
    daily_trend = daily_attendance_trend(data)
    weekly_trend = weekly_attendance_trend(data)
    monthly_trend = monthly_attendance_trend(data)
    plot_attendance_trend(daily_trend, "Daily Attendance Trend", "Date",
"Attendance Count")
    plot_attendance_trend(weekly_trend, "Weekly Attendance Trend", "Week",
"Attendance Count")
    plot_attendance_trend(monthly_trend, "Monthly Attendance Trend",
"Month", "Attendance Count")
data = load_attendance_data(r"D:/face final/Face Recognition Based Attendance
Monitoring System/Attendance/Attendance_02-02-2024.csv")
def load_attendance_data(file_path="D:/face final/Face Recognition Based
Attendance Monitoring System/Attendance/Attendance_02-02-2024.csv"):
    try:
        data = pd.read_csv("D:/face final/Face Recognition Based Attendance
Monitoring System/Attendance/Attendance_02-02-2024.csv")
        return data
    except FileNotFoundError as e:
        print(f"FileNotFoundError: {e}")
        print(f"Current Working Directory: {os.getcwd()}")
        return None
def load_latest_attendance():
    attendance_files = glob.glob("attendance/*.csv")
    latest_file = max(attendance_files, key=os.path.getctime)
    attendance_df = pd.read_csv(latest_file)
    return attendance_df
def send_messages():
    account_sid = 'AC224bffba73a38fde7a4fc7f60d3559b5'
    auth_token = '4105aba48c20860d9861d3ae0b7f2404'
    client = Client(account_sid, auth_token)
    message_body = 'Your child was absent from school today.'
    attendance_df = load_latest_attendance()
    phone_details_df = pd.read_csv("PhoneDetails.csv")
    present_students = attendance_df["Name"].tolist()
    all_students = phone_details_df["Name"].tolist()
    students_to_notify = [student for student in all_students if student not in
present_students]
    for student in students_to_notify:
        parent_phone_number = phone_details_df.loc[phone_details_df['Name']
== student, 'PhoneNumber'].values[0]
        try:
messageclient.messages.create(body=message_body,from_='+15737992128',to
=parent_phone_number)
```

```
        print(f"Message sent to parent of {student} with phone number {parent_phone_number}: {message.sid}")
    except Exception as e:
        mess.showerror("Error", f"An error occurred while sending messages: {str(e)}")
global key
key = ''
ts = time.time()
date = datetime.datetime.fromtimestamp(ts).strftime('%d-%m-%Y')
day,month,year=date.split("-")
mont={'01':'January','02':'February','03':'March','04':'April','05':'May','06':'June','07':'July','08':'August','09':'September','10':'October','11':'November','12':'December'}
window = tk.Tk()
window.geometry("1280x720")
window.resizable(True,False)
window.title("Attendance System")
window.configure(background='#2d420a')
frame1 = tk.Frame(window, bg="#c79cff")
frame1.place(relx=0.11, rely=0.17, relwidth=0.39, relheight=0.80)
frame2 = tk.Frame(window, bg="#c79cff")
frame2.place(relx=0.51, rely=0.17, relwidth=0.38, relheight=0.80)
```

```
message3 = tk.Label(window, text="Face Recognition Based Attendance
Monitoring System" ,fg="white",bg="#2d420a" ,width=55
,height=1,font=('comic', 29, ' bold '))
message3.place(x=10, y=10)
frame3 = tk.Frame(window, bg="#c4c6ce")
frame3.place(relx=0.52, rely=0.09, relwidth=0.09, relheight=0.07)
frame4 = tk.Frame(window, bg="#c4c6ce")
frame4.place(relx=0.36, rely=0.09, relwidth=0.16, relheight=0.07)
datef = tk.Label(frame4, text = day+"-"+mont[month]+"-"+year+" | ",
fg="#ff61e5",bg="#2d420a" ,width=55 ,height=1,font=('comic', 22, ' bold '))
datef.pack(fill='both',expand=1)
clock = tk.Label(frame3,fg="#ff61e5",bg="#2d420a" ,width=55
,height=1,font=('comic', 22, ' bold '))
clock.pack(fill='both',expand=1)
tick()
head2 = tk.Label(frame2, text="For New Registrations",
fg="black",bg="#00fcca" ,font=('comic', 17, ' bold ') )
head2.grid(row=0,column=0)
head1 = tk.Label(frame1, text="For Already Registered",
fg="black",bg="#00fcca" ,font=('comic', 17, ' bold ') )
head1.place(x=0,y=0)
```

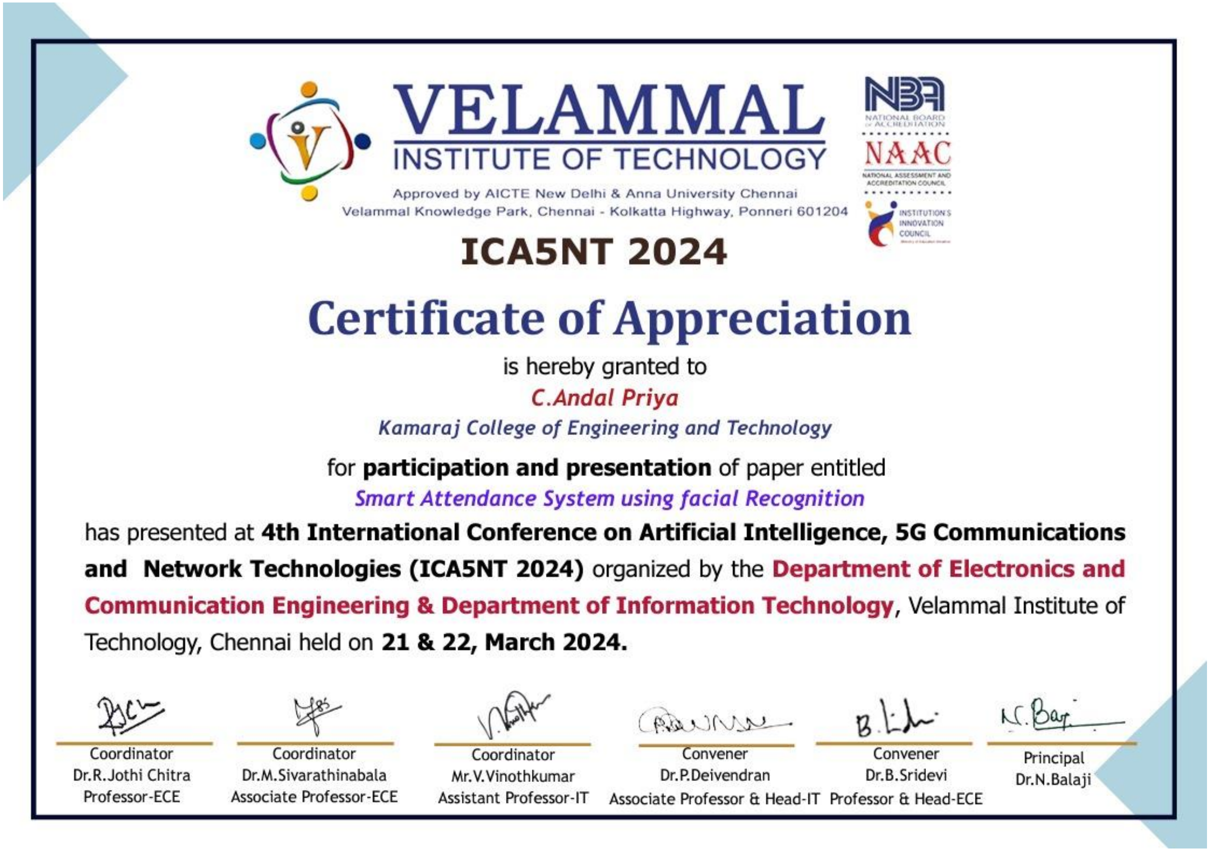
```
lbl = tk.Label(frame2, text="Enter ID",width=20 ,height=1 ,fg="black"
,bg="#c79cff" ,font=('comic', 17, ' bold ') )
lbl.place(x=80, y=55)
txt = tk.Entry(frame2,width=32 ,fg="black",font=('comic', 15, ' bold '))
txt.place(x=30, y=88)
lbl2=tk.Label(frame2, text="Enter Name",width=20 ,fg="black" ,bg="#c79cff"
,font=('comic', 17, ' bold '))
lbl2.place(x=80, y=140)
txt2 = tk.Entry(frame2,width=32 ,fg="black",font=('comic', 15, ' bold ') )
txt2.place(x=30, y=173)
message1=tk.Label(frame2,text="1)TakeImages>>>2)SaveProfile",bg="#c79cf
f",fg="black",width=39 ,height=1, activebackground = "#3ffc00" ,font=('comic',
15, ' bold '))
message1.place(x=7, y=230)
message=tk.Label(frame2,text="",bg="#c79cff",fg="black",width=39,height=1
, activebackground = "#3ffc00" ,font=('comic', 16, ' bold '))
message.place(x=7, y=450)
lbl3 =tk.Label(frame1, text="Attendance",width=20 ,fg="black" ,bg="#c79cff"
,height=1 ,font=('comic', 17, ' bold '))
lbl3.place(x=100, y=115)
res=0
exists = os.path.isfile("StudentDetails\StudentDetails.csv")
```

```
if exists:
    with open("StudentDetails\StudentDetails.csv", 'r') as csvFile1:
        reader1 = csv.reader(csvFile1)
        for l in reader1:
            res = res + 1
    res = (res // 2) - 1
    csvFile1.close()
else:
    res = 0
message.configure(text='Total Registrations till now  : '+str(res))
menubar = tk.Menu(window,relief='ridge')
filemenu = tk.Menu(menubar,tearoff=0)
filemenu.add_command(label='Change Password', command = change_pass)
filemenu.add_command(label='Contact Us', command = contact)
filemenu.add_command(label='Exit',command = window.destroy)
menubar.add_cascade(label='Help',font=('comic', 29, ' bold '),menu=filemenu)
tv= ttk.Treeview(frame1,height =13,columns = ('name','date','time'))
tv.column('#0',width=82)
tv.column('name',width=130)
tv.column('date',width=133)
tv.column('time',width=133)
tv.grid(row=2,column=0,padx=(0,0),pady=(150,0),columnspan=4)
tv.heading('#0',text ='ID')
tv.heading('name',text ='NAME')
tv.heading('date',text ='DATE')
tv.heading('time',text ='TIME')
scroll=ttk.Scrollbar(frame1,orient='vertical',command=tv.yview)
scroll.grid(row=2,column=4,padx=(0,100),pady=(150,0),sticky='ns')
tv.configure(yscrollcommand=scroll.set)
clearButton = tk.Button(frame2, text="Clear", command=clear  ,fg="black" ,bg="#ff7221" ,width=11 ,activebackground = "white" ,font=('comic', 11, ' bold '))
clearButton.place(x=335, y=86)
clearButton2 = tk.Button(frame2, text="Clear", command=clear2  ,fg="black" ,bg="#ff7221" ,width=11 , activebackground = "white" ,font=('comic', 11, ' bold '))
clearButton2.place(x=335, y=172)
takeImg = tk.Button(frame2, text="Take Images", command=TakeImages ,fg="white" ,bg="#6d00fc" ,width=34 ,height=1, activebackground = "white" ,font=('comic', 15, ' bold '))
takeImg.place(x=30, y=300)
trainImg = tk.Button(frame2, text="Save Profile", command=psw ,fg="white" ,bg="#6d00fc" ,width=34 ,height=1, activebackground = "white" ,font=('comic', 15, ' bold '))
```

```
trainImg.place(x=30, y=380)
trackImg = tk.Button(frame1, text="Take Attendance", command=TrackImages
,fg="black" ,bg="#3ffc00" ,width=35 ,height=1, activebackground = "white"
,font=('comic', 15, ' bold '))
trackImg.place(x=30,y=50)
send_message_button = tk.Button(frame1, text="Send Messages to Parents",
command=send_messages, fg="black", bg="#ffa500", width=35, height=1,
activebackground="white", font=('comic', 15, ' bold '))
send_message_button.place(x=30, y=500)
mailButton = tk.Button(frame1, text="Mail", command=send_mail, fg="black",
bg="#ffa500", width=35, height=1,activebackground="white", font=('comic',
15, ' bold '))
mailButton.place(x=30, y=450)
analytics_button = tk.Button(frame2, text="Show Attendance Analytics",
command=show_attendance_analytics, fg="black", bg="#3ffc00", width=35,
height=1, activebackground="white", font=('comic', 15, ' bold '))
analytics_button.place(x=30, y=500)
window.configure(menu=menubar)
window.mainloop()
```

A2: PUBLICATION DETAILS

Andalpriya C, Nuttrenai V, Raja Lakshmi K presented a paper entitled "Smart Attendance system for facial Recognition" under the guidance of Mrs. Muthu Lakshmi K in 4th International Conference on Artificial Intelligence, 5G Communication and Network Technologies (ICA5NT 2024), on 22nd March 2024, organized by Department of Electronics and Communication Engineering & Department of Information Technology.



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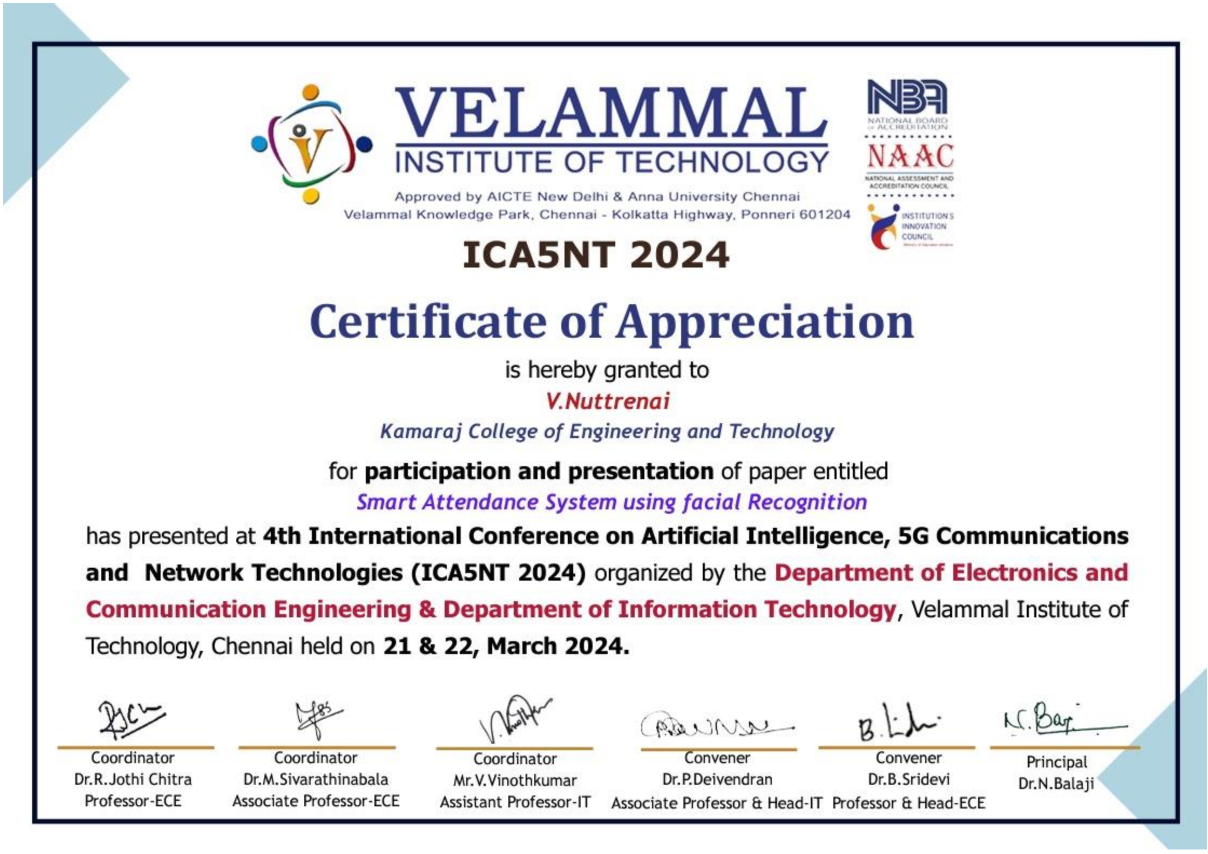

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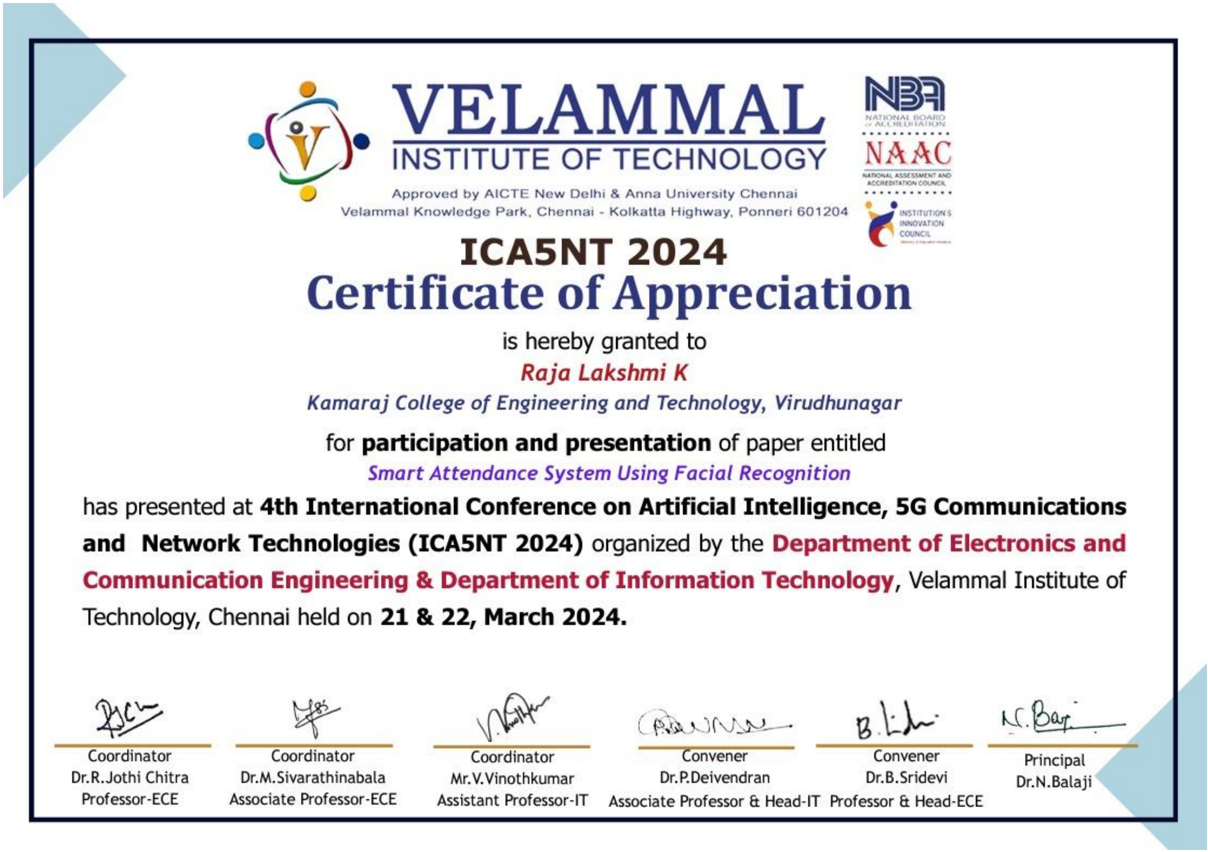

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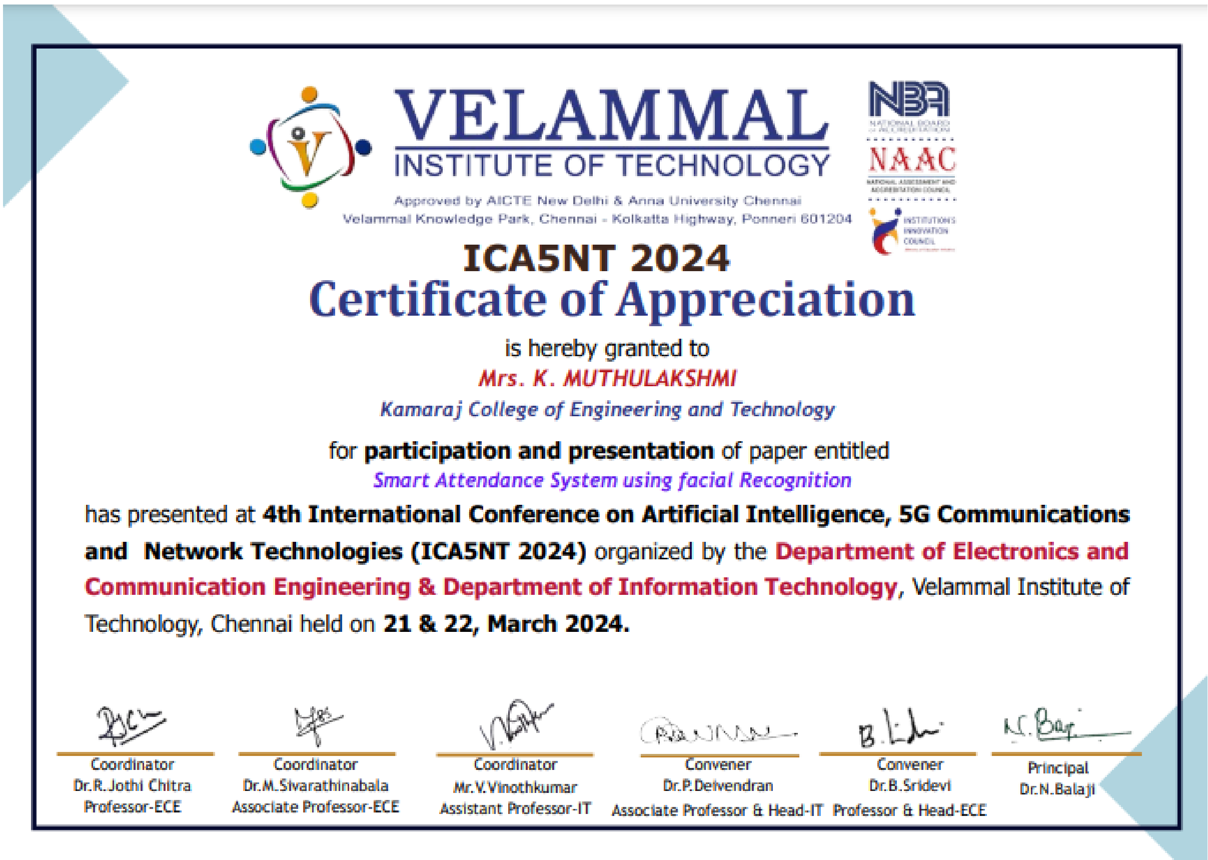

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REFERENCES

REFERENCES

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Department of Computer Science and Engineering

Vision of the institution

To make this Institution the unique of its kind in the field of Research and Development activities in this part of world.

Mission of the institution

To impart highly innovative and technical knowledge to the urban and unreachable rural student folks through "Total Quality Education".

Vision of the Department

To make the Department of Computer Science and Engineering the unique of its kind in the field of Research and Development activities in this part of world.

Mission of the Department

To impart highly innovative and technical knowledge to the urban and unreachable rural student folks in Computer Science and Engineering through "Total Quality Education".

Program Educational Objectives (PEO)

PEO 1: Apply the basic engineering skills and domain knowledge for developing effective computing solutions to address various social issues.

PEO 2: Able to have successful career in technical / managerial roles in multi-disciplinary environment.

PEO 3: To confront the evolving technical challenges and problems in the areas of computing.

Program Specific Outcomes (PSO)

PSO1: Professional Skills: To apply learned skills to build optimized solutions pertaining to Data Processing, Artificial Intelligence and Machine Learning.

PSO2: Problem - Solving Skills: To analyze data using domain knowledge to get insights and develop appropriate solutions.

Program Outcomes (PO)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.