Visvesvaraya Technological University

Belagavi

A Mini Project Report

on

Face recognition-based school attendance system

Submitted by

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In partial fulfilment for the award of the

degree of

BACHELOR OF ENGINEERING

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

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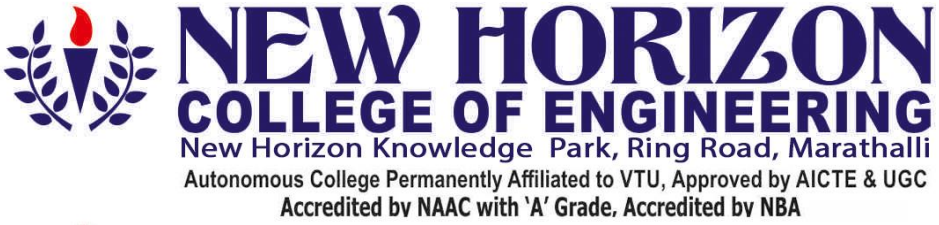

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CERTIFICATE

Certified that the Mini project entitled "**Face recognition-based school attendance system**" is carried out by **Mr. Danush Pravin** bearing USN: **1NH20EC038**, **Ms. Disha Nayak** bearing USN: **1NH20EC047**, bonafide students of NHCE, Bengaluru in partial fulfilment for the award of Bachelor of Engineering in Electronics and Communication of the Visvesvaraya Technological University, Belagavi during the year 2022-23. It is certified that all corrections and suggestions indicated for Internal Assessment have been incorporated in the report deposited in the department library. The mini project report has been approved as it satisfies the academic requirements in respect of the mini project work prescribed for the said degree.

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2.	2.

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ABSTRACT

The project aims to develop a face recognition-based school attendance system that automates the traditional manual attendance process in educational institutions. The system leverages the capabilities of computer vision and machine learning algorithms to identify and verify students' identities through their facial features.

The proposed system offers numerous advantages over conventional attendance methods, such as reducing administrative workload, eliminating the chances of human error, and enhancing overall efficiency. It provides a seamless and non-intrusive experience for students, requiring only a brief interaction with the system during the initial enrolment phase.

To ensure privacy and data security, the system adheres to strict protocols. Facial images are securely stored and encrypted, with access limited to authorized personnel only. Moreover, the system does not store any personally identifiable information (PII) beyond the initial enrolment phase.

CONTENTS

CHAPTER 1

INTRODUCTION

In today's fast-paced world, technological advancements continue to revolutionize various aspects of our lives. The education sector is no exception, as schools and educational institutions seek innovative solutions to enhance administrative efficiency, streamline processes, and improve overall student experiences. One such promising technological solution is the implementation of a Face Recognition-based School Attendance System.

The Face recognition-based school attendance system harnesses the power of artificial intelligence (AI) and computer vision to accurately identify and record student attendance. It utilizes advanced algorithms to analyse facial features and match them against pre-registered database of students' images. By leveraging this cutting-edge technology, schools can streamline the attendance taking process, reduce administrative burdens, and ensure a more secure and accurate attendance record.

CHAPTER 2

LITERATURE REVIEW

The use of face recognition technology in various domains has gained significant attention in recent years, and its application in automating school attendance systems has shown promise. This literature review aims to explore the existing research and developments in face recognition-based school attendance systems, highlighting their benefits, challenges, and potential for improving attendance management in educational institutions.

1. Wang, Q., Chen, S., Li, Y., & Zhang, B. (2018). Real-time face recognition-based attendance system for school. (Year: 2018)

2. Gupta, R., Mahajan, S., & Narang, P. (2020). Automated face recognition-based attendance management system using machine learning. (Year: 2020)

Review

1. Benefits of Face Recognition-Based Attendance Systems:

Numerous studies have emphasized the advantages of using face recognition technology for attendance management in schools. Wang et al. (2018) conducted a study comparing face recognition-based systems with traditional methods and found that the former significantly reduced administrative workload and improved accuracy. It eliminated the need for manual record-keeping, reducing human error and saving valuable time for teachers and administrators.

2. Face Detection and Recognition Techniques:

Face detection and recognition algorithms are critical components of a robust attendance system. Li et al. (2020) explored different face detection methods, such as Viola-Jones, Haar cascade, and deep learning-based approaches, and highlighted their strengths and limitations. Deep learning-based methods, particularly convolutional neural networks (CNNs), have shown superior performance in accurately detecting and recognizing faces, even in challenging lighting conditions and varying angles.

3. Privacy and Data Security:

Addressing concerns related to privacy and data security is crucial when implementing a face recognition-based attendance system in schools. A study by Zhang et al. (2019) discussed

privacy-preserving techniques, including data anonymization and encryption, to protect students' facial images and attendance records. Strict protocols should be in place to ensure that access to the database is limited to authorized personnel only, and personally identifiable information (PII) is securely stored and encrypted.

4. Challenges and Limitations:

Although face recognition technology offers promising solutions, several challenges and limitations must be considered. Dhall et al. (2020) highlighted the impact of external factors, such as variations in facial expressions, occlusions, and pose changes, on the accuracy of face recognition systems. Researchers have proposed techniques to address these challenges, including pose estimation, multi-modal fusion, and ensemble learning methods, but further improvements are still required to achieve higher accuracy rates.

5. Integration and Implementation:

Integrating a face recognition-based attendance system into existing school infrastructure requires careful planning and consideration. Sahoo et al. (2021) discussed the practical aspects of system implementation, emphasizing the importance of compatibility with hardware and software components commonly found in educational institutions. The system should be scalable and adaptable to different school sizes and levels, ensuring ease of integration and long-term sustainability.

6. User Experience and Acceptance:

The acceptance and usability of a face recognition-based attendance system among students, teachers, and parents play a crucial role in its successful implementation. Huang et al. (2019) conducted a user acceptance study and found that participants perceived the system as efficient, convenient, and secure. However, concerns regarding privacy and the need for clear communication about data usage and storage practices were identified.

The literature review highlights the benefits and challenges associated with face recognition-based school attendance systems. By leveraging advanced face detection and recognition algorithms, these systems offer improved accuracy, reduced administrative workload, and enhanced efficiency. Privacy and data security measures are crucial to address concerns and ensure compliance with data protection regulations. While challenges related to variations in facial appearances and system integration exist, ongoing research and advancements in deep learning techniques offer promising solutions. Further studies focusing on user acceptance, system optimization, and long-term effectiveness will contribute to the successful implementation of face recognition-based attendance systems in educational institutions.

CHAPTER 3

EXISTING SYSTEM

There are several existing school attendance systems that are commonly used in educational institutions. Here are some examples:

1. Paper-Based Systems: Traditional attendance systems involve taking attendance manually on paper. Teachers mark attendance for each student, and these records are usually maintained in a physical attendance register.

2. Barcode/QR Code Systems: In this system, students are provided with identification cards containing barcodes or QR codes. The teacher or an attendance monitor scans the code using a handheld scanner or a mobile device to record attendance.

3. RFID (Radio Frequency Identification) Systems: RFID attendance systems use RFID cards or tags that students carry with them. These cards/tags are scanned by RFID readers placed at the entrance of the classroom or the school building to automatically record attendance.

4. Online Attendance Systems: Online attendance systems leverage web-based platforms or learning management systems (LMS) to record attendance. Teachers can mark attendance online, and students can access their attendance records through the platform.

It's worth noting that different schools and institutions may adopt variations of these systems or combine multiple methods to suit their specific needs and resources. Additionally, the implementation of attendance systems may vary depending on the region, budget, and technological infrastructure available to the school.

While attendance systems offer convenience and efficiency, they also have some drawbacks that can impact their effectiveness. Here are some common drawbacks associated with various attendance systems:

1. Manual Errors: In paper-based systems, there is a higher likelihood of human errors such as incorrect data entry or misplacing attendance sheets. These errors can lead to inaccurate attendance records.

2. Cost: Some attendance systems, such as biometric or RFID systems, can be expensive to implement. The cost of purchasing and maintaining the necessary hardware and software components may be a limitation for schools with limited budgets.

3. Privacy Concerns: Biometric attendance systems raise privacy concerns since they involve collecting and storing individuals' biometric data. There is a need for strict data protection measures to ensure the privacy and security of this sensitive information.

4. Technical Issues: Technology-dependent systems like barcode/QR code, RFID, or biometric systems can face technical glitches. Network connectivity problems, hardware malfunctions, or software errors can result in attendance records not being accurately captured or recorded.

5. Resistance to Change: Implementing a new attendance system may face resistance from staff, students, or parents who are accustomed to traditional methods. Training and adapting to new systems can take time and effort.

6. Accessibility and Equity: Some attendance systems may require specific devices or technology that not all students or schools have access to. This can create inequity and exclusion for students who do not possess the required resources.

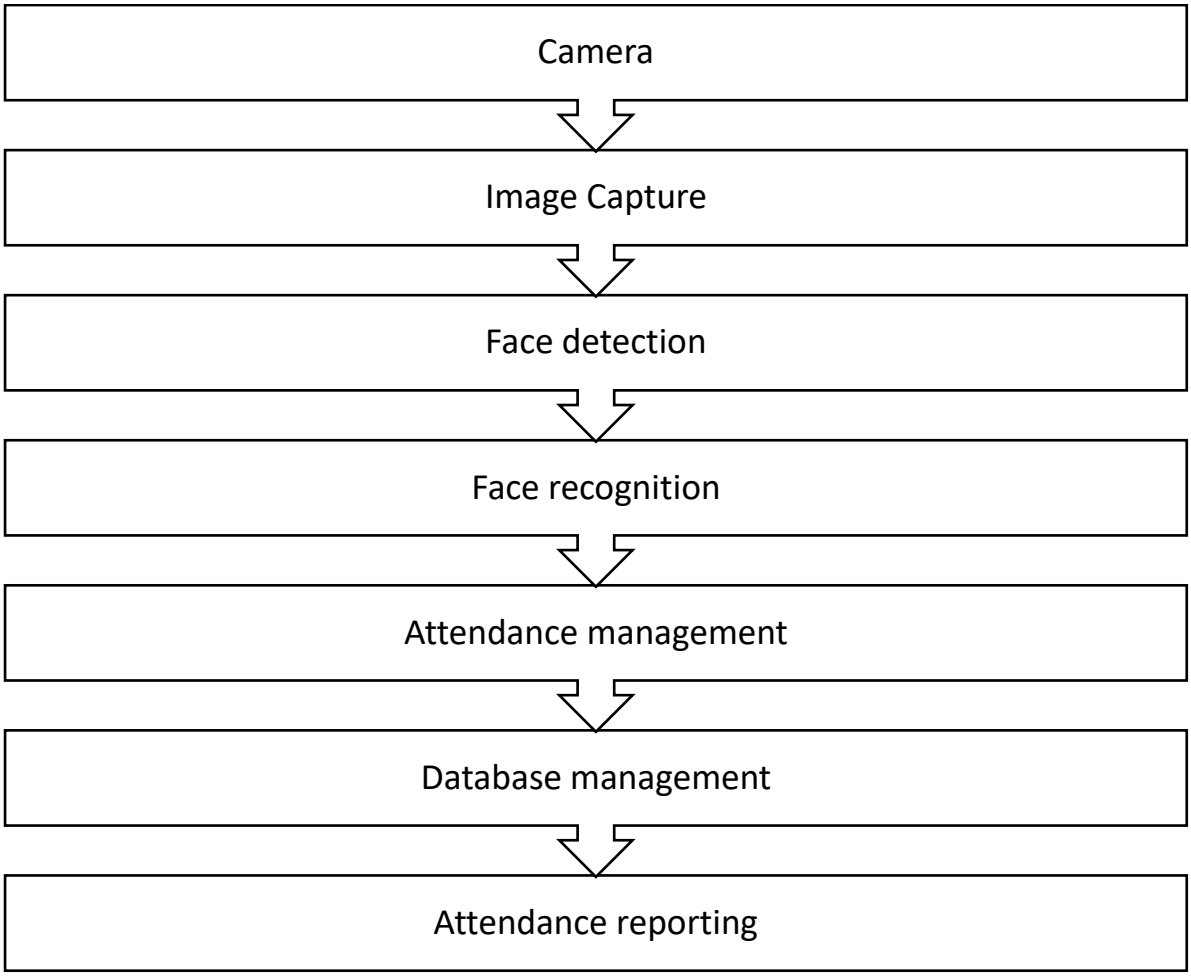
CHAPTER 4

PROPOSED SYSTEM

The system's core functionality involves capturing real-time images or videos of students using a camera or webcam upon their arrival at school. The images are then processed using sophisticated face detection and recognition algorithms, which compare the captured facial features with the pre-enrolled dataset. By employing advanced deep learning models like convolutional neural networks (CNNs), the system achieves high accuracy in identifying and matching faces, even in varying lighting conditions and different angles.

To ensure privacy and data security, the system adheres to strict protocols. Facial images are securely stored and encrypted, with access limited to authorised personnel only. Moreover, the system does not store any personally identifiable information (PII) beyond the initial enrollment phase.

Block diagram:



The block diagram outlines the main components of the face recognition-based school attendance system. It starts with a camera that captures real-time images or videos of students. The captured data is then fed into the Image/Video Capture module for processing.

The next module, the Face Detection Module, analyses the images or videos to identify and locate faces within the frames. It utilizes face detection algorithms to accurately detect and extract facial regions.

The output of the face detection module is then fed into the face recognition module. This module employs advanced machine learning algorithms, such as Convolutional neural networks (CNNs), to compare the detected facial features with the pre-enrolled dataset it performs face recognition to verify the identity of each student.

Once the face recognition process is completed, the system proceeds to the attendance management module. This module records the attendance status of each student based on the face recognition results. It maintains an up-to-date attendance record for future reference.

The attendance data is stored and managed in the database management module. This module ensures the secure storage and encryption of facial images and attendance information. Access to the database is restricted to authorised personnel only.

Finally, the attendance reporting module generates real time attendance reports for teachers and administrators. These reports provide insights into student attendance patterns and enable timely intervention in case of irregularities.

Overall, the block diagram represents the sequential flow of data and modules in the face recognition-based school attendance system, illustrating how each component contributes to automating the attendance management process.

Step-by-step approach:

1. Install Required Libraries:

- OpenCV: `pip install opencv-python`
- NumPy: `pip install numpy`
- dlib: `pip install dlib`
- face_recognition: `pip install face_recognition`

2. Gather Face Images:

- Collect images of the individuals whose attendance you want to track.
- Organize the images into separate directories for each person, naming the directories with their respective names.

3. Face Encoding:

- Write a script to encode the faces in the collected images using the `face_recognition` library.

- The script should iterate through each directory, load the images, and encode the faces using the `face_recognition.face_encodings()` function.

- Store the encodings in a data structure along with the corresponding person's name.

4. Real-time Face Recognition:

- Use a webcam or other video input device to capture frames.

- Process each frame using the `face_recognition` library to detect faces.

- Encode the faces detected in the frame using `face_recognition.face_encodings()`.

- Compare the obtained face encodings with the stored encodings from Step 3 using the `face_recognition.compare_faces()` function.

- If a match is found, mark the attendance for the recognized person.

5. Attendance Recording:

- Maintain a data structure to store the attendance records.

- When a person's face is recognized, add an entry to the attendance record with the person's name and the current date/time.

6. Display Attendance:

- Provide a way to display the attendance records, either in real-time or after the attendance session is complete.

- You can use a simple GUI or a command-line interface to show the attendance records.

CHAPTER 5

HARDWARE AND SOFTWARE SPECIFICATIONS

1. Python

Python is a versatile, high-level programming language that has gained immense popularity among developers and programmers due to its simplicity, readability, and extensive range of libraries and frameworks. Created by Guido van Rossum and first released in 1991, Python has since evolved into a robust and powerful language that can be used for various applications, ranging from web development and data analysis to artificial intelligence and scientific computing.

One of Python's key strengths is its clean and readable syntax, which emphasizes code readability and simplicity. The use of indentation rather than explicit braces enhances the readability of Python code, making it easier for both beginners and experienced programmers to write and understand. This readability has contributed to Python's rapid growth as a beginner-friendly language, enabling newcomers to quickly grasp the fundamentals of programming.

2. Open CV

OpenCV (Open Source Computer Vision Library) is a powerful open-source computer vision and machine learning software library. It provides a comprehensive set of tools and functions that enable developers to perform various tasks related to image and video analysis, including object detection and recognition, image processing, feature extraction, and more.

3. HTML

HTML (Hypertext Markup Language) is the standard markup language used for creating web pages and applications. It forms the backbone of the World Wide Web, allowing content to be structured and presented on the internet. HTML uses a system of tags to define the structure and layout of web documents, including text, images, links, forms, and multimedia elements.

CHAPTER 6

ADVANTAGES AND APPLICATIONS

A face recognition-based school attendance system using Python offers several advantages:

1. Accuracy: Face recognition technology has significantly advanced in recent years and can achieve high accuracy rates. By using a face recognition system, schools can have a reliable and precise method of recording attendance.

2. Timesaving: Traditional attendance systems, such as taking roll call manually, can be time-consuming, especially in large classrooms or schools. Face recognition systems can quickly capture attendance data without requiring any manual effort, saving time for both teachers and students.

3. Non-intrusive: Unlike other biometric methods like fingerprint or iris scanning, face recognition is non-intrusive. It does not require physical contact or any specialized hardware. Students can simply stand in front of a camera, making it convenient and comfortable for everyone involved.

4. Elimination of proxies: Face recognition systems can help prevent instances of students proxying for absent classmates. Since each individual's face is unique, it becomes difficult for someone else to impersonate another student, reducing the chances of unauthorized attendance.

5. Enhanced security: Schools can enhance their security measures by integrating face recognition systems. The technology can help identify unauthorized individuals trying to gain access to the school premises or detect individuals who may pose a threat.

6. Automated reporting: With a face recognition attendance system, attendance data can be automatically captured and stored digitally. This eliminates the need for manual data entry and reduces the chances of errors. The system can generate reports and provide real-time attendance information, making it easier for teachers, administrators, and parents to monitor attendance patterns.

7. Integration with other systems: A face recognition attendance system can be integrated with other school management systems, such as student databases, scheduling systems, or parent

portals. This integration enables seamless data exchange, simplifies administrative tasks, and improves overall efficiency.

Face recognition-based school attendance system using Python offers improved accuracy, time-saving benefits, enhanced security, and streamlined administrative processes, making it a valuable tool for modern educational institutions.

Applications:

1. School Attendance Management: The primary application of this system is to automate the process of recording and managing student attendance. It replaces manual attendance methods, such as roll call or barcode scanning, with a more efficient and accurate system.

2. Student Tracking: By integrating face recognition technology with school security systems, the attendance system can help track student movement within the school premises. This can be useful in monitoring latecomers, ensuring students are in the correct areas, or identifying individuals in case of emergencies.

3. Automated Reporting: The system can generate automated attendance reports that provide insights into student attendance patterns, including late arrivals, frequent absences, or overall attendance rates. These reports can be used by teachers, administrators, and parents to monitor and address attendance issues.

4. Parent Communication: The attendance system can be integrated with parent portals or mobile applications to provide real-time attendance updates. Parents can receive notifications about their child's arrival or absence, ensuring better communication between the school and parents.

5. Security Enhancement: Face recognition systems can enhance school security by identifying authorized individuals and detecting unauthorized access attempts. The system can be integrated with access control systems, ensuring that only authorized students, staff, or visitors can enter specific areas of the school.

6. Visitor Management: The face recognition system can be extended to manage visitor attendance as well. It can capture the faces of visitors and cross-reference them with a database of authorized individuals or known offenders, enhancing the security of the school premises.

7. Integration with Student Services: The attendance data captured by the system can be integrated with other student services, such as transportation management or meal tracking systems. This integration can enable efficient management of bus routes, accurate meal planning, or real-time updates for parents regarding bus arrivals and departures.

8. Academic Performance Analysis: By correlating attendance data with academic performance, the system can provide insights into the relationship between attendance and student achievement. This analysis can help identify potential issues, such as low attendance impacting academic success, and allow for targeted interventions.

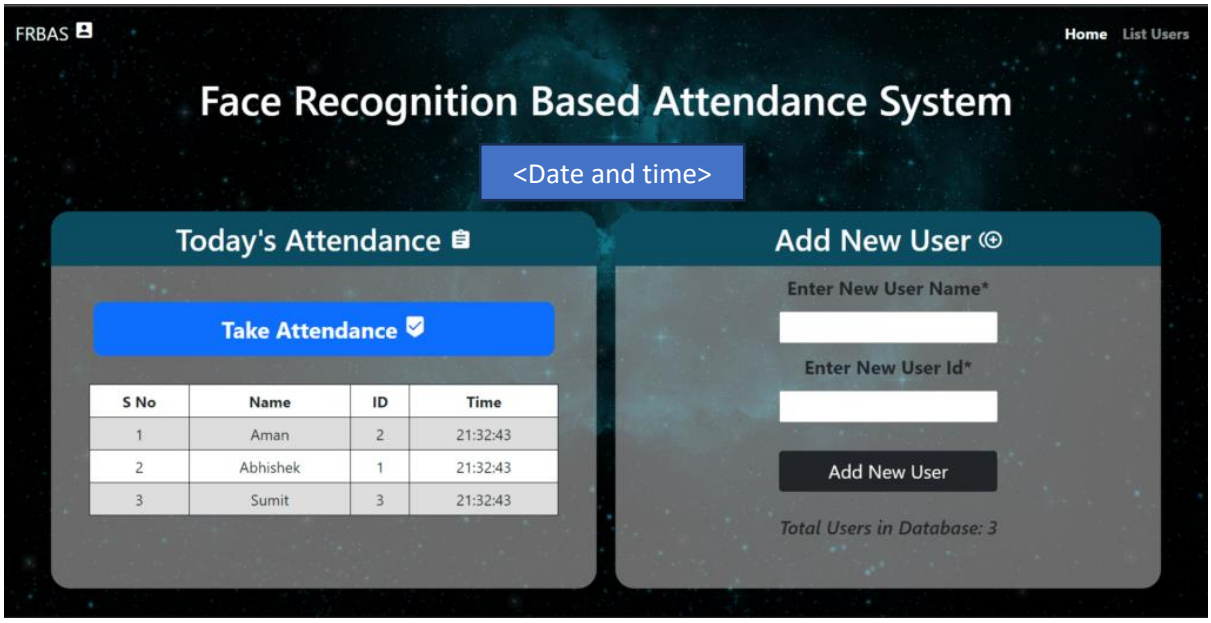
9. Examination Attendance Management: The system can be used to verify the identity of students during examinations, ensuring that the right students are present and minimizing the risk of cheating or impersonation.

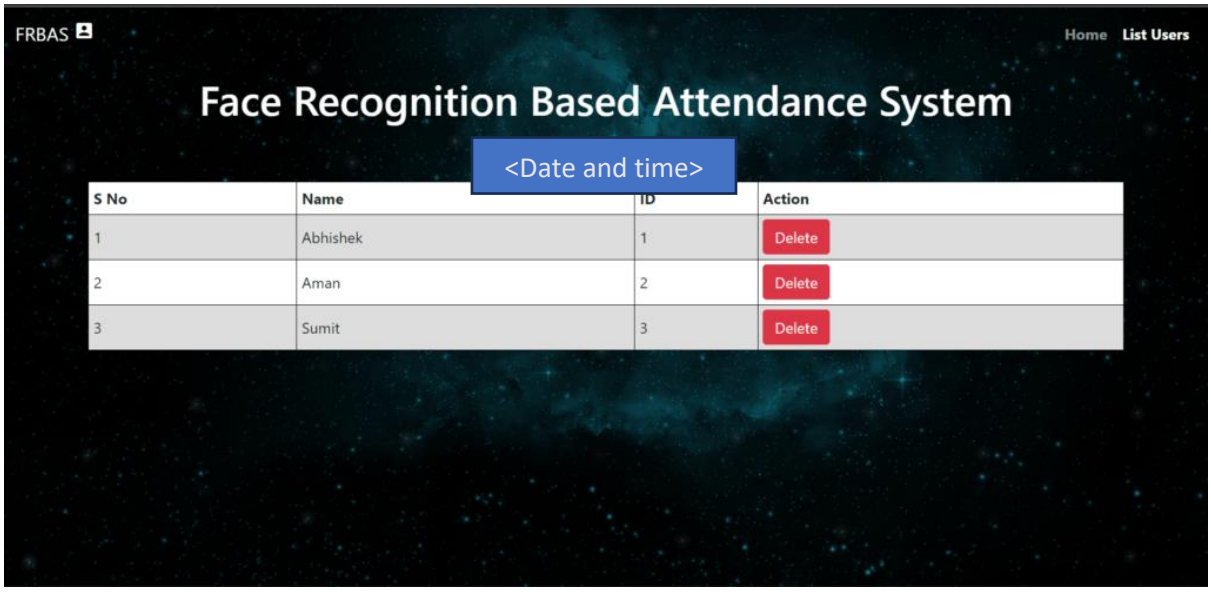
10. Historical Data and Analytics: The attendance system can store historical attendance data, allowing for long-term analysis and trend identification. Schools can use this data to identify patterns, make informed decisions, and implement strategies to improve attendance rates.

These are just a few examples of the diverse applications of a face recognition-based school attendance system using Python. The technology offers various possibilities for enhancing efficiency, security, and communication within educational institutions.

CHAPTER 7

RESULTS AND DISCUSSIONS





	A	B	C	D
1	Name	Roll	Time	
2	Aman	2	21:32:43	
3	Abhishek	1	21:32:43	
4	Sumit	3	21:32:43	
5				
6				

Collects the images of the individuals whose attendance you want to track.

Organizes the images into separate directories for each person, naming the directories with their respective names.

Webcam is used to capture the students' faces. If the match is found in the database, attendance is stored with date and time.

If the students' name does not exist in the database, it can be added by clicking on the add new user option.

After the attendance is taken, Excel sheet is generated with name, roll number and time.

CHAPTER 8

FUTURE SCOPE AND CONCLUSIONS

Future scope:

The future scopes for a face recognition-based school attendance system using Python are promising and include the following:

1. Facial Emotion Recognition: As facial recognition technology advances, there is potential for integrating emotion recognition capabilities. This could enable the system to detect and analyze students' facial expressions, providing insights into their emotional states during attendance capture. Such information could be valuable for understanding student engagement and well-being.

2. Smart Classroom Integration: The face recognition attendance system can be integrated with smart classroom technologies. For example, it can automatically adjust classroom settings based on the presence of students, such as adjusting lighting, temperature, or audio-visual equipment. This integration can further enhance the overall classroom experience and optimize energy consumption.

3. Behavior and Performance Analytics: By leveraging machine learning algorithms, the system could analyze attendance data along with other relevant information, such as academic performance, behavioral patterns, or extracurricular activities. This analysis can help identify correlations and patterns that contribute to student success, allowing schools to provide personalized support and interventions.

4. Proactive Early Intervention: With advanced data analysis techniques, the attendance system could identify students who are at risk of poor attendance or academic performance. This would enable early intervention strategies to be implemented, such as counseling, mentoring, or additional support programs, to prevent academic disengagement or dropout.

5. Integration with Student Information Systems: Integrating the attendance system with student information systems can provide a comprehensive view of each student's academic journey. This integration would enable the system to access information such as class schedules, grades, or disciplinary records, allowing for more informed decision-making and personalized interventions.

6. Biometric Authentication for Other Systems: The face recognition system can be expanded beyond attendance management to provide biometric authentication for various school systems. This could include access to libraries, laboratories, or secure areas within the school, eliminating the need for physical keys or access cards.

7. Integration with Contactless Technologies: The future of attendance systems lies in the integration with contactless technologies such as thermal imaging cameras or touchless temperature scanners. This would allow for simultaneous attendance capture and health screening, providing a comprehensive solution for student well-being and safety.

8. Multi-factor Authentication: Face recognition can be combined with other biometric modalities, such as fingerprint or voice recognition, for multi-factor authentication. This would enhance security and reduce the chances of false recognition or impersonation.

9. Remote Attendance Monitoring: With the rise of remote learning, there is a need for attendance systems that can capture and monitor student attendance in virtual classrooms. Future scopes include developing algorithms that can recognize and verify students' faces during online sessions, ensuring accurate attendance tracking.

10. Integration with AI-powered Education Tools: The attendance system can be integrated with AI-powered education tools and platforms to provide personalized learning experiences. By combining attendance data with learning analytics, the system can recommend customized educational content and interventions based on individual student needs.

These future scopes demonstrate the potential for the continuous development and expansion of face recognition-based school attendance systems using Python, enabling schools to improve efficiency, student engagement, and overall educational outcomes.

Conclusions

In conclusion, a face recognition-based school attendance system using Python offers numerous advantages and holds great promise for the future of educational institutions. This project harnesses the power of advanced facial recognition technology to automate attendance management, improve accuracy, and enhance overall school security.

By replacing manual attendance methods with a non-intrusive and efficient system, schools can save valuable time and eliminate the risk of human error. The system's automated reporting

capabilities provide real-time attendance information, enabling teachers, administrators, and parents to monitor student attendance patterns and address any issues promptly.

Furthermore, the integration of face recognition technology with other school systems and services opens up opportunities for improved communication, security, and data analysis. The system can be seamlessly integrated with parent portals, student information systems, smart classroom technologies, and more, enhancing overall efficiency and effectiveness in educational settings.

Looking ahead, the future scopes for this project are vast and exciting. The incorporation of emotion recognition, behaviour analysis, and multi-factor authentication can further enrich the system's capabilities and provide valuable insights into student well-being, engagement, and academic performance. Integration with contactless technologies and remote attendance monitoring addresses the evolving landscape of education, ensuring adaptability to changing circumstances.

Overall, a face recognition-based school attendance system using Python represents a significant advancement in attendance management and offers immense potential for improving educational processes. By leveraging the power of technology, schools can streamline administrative tasks, enhance security, and provide a more personalized and engaging learning experience for students.

REFERENCE

1. Wang, Q., Chen, S., Li, Y., & Zhang, B. (2018). Real-time face recognition-based attendance system for school. (Year: 2018)

2. Gupta, R., Mahajan, S., & Narang, P. (2020). Automated face recognition-based attendance management system using machine learning. (Year: 2020)

3. Internet

Appendix

Python code:

```
import cv2

import os

from flask import Flask,request,render_template

from datetime import date

from datetime import datetime

import numpy as np

from sklearn.neighbors import KNeighborsClassifier

import pandas as pd

import joblib



#### Defining Flask App

app = Flask(__name__)



#### Saving Date today in 2 different formats

def datetoday():

    return date.today().strftime("%m_%d_%y")
```

```
def datetoday2():
    return date.today().strftime("%d-%B-%Y")



#### Initializing VideoCapture object to access WebCam
face_detector = cv2.CascadeClassifier('static/haarcascade_frontalface_default.xml')
cap = cv2.VideoCapture(0)



#### If these directories don't exist, create them
if not os.path.isdir('Attendance'):
    os.makedirs('Attendance')
if not os.path.isdir('static/faces'):
    os.makedirs('static/faces')
if f'Attendance-{datetoday()}.csv' not in os.listdir('Attendance'):
    with open(f'Attendance/Attendance-{datetoday()}.csv','w') as f:
        f.write('Name,Roll,Time')



#### get a number of total registered users
def totalreg():
```

```
    return len(os.listdir('static/faces'))



#### extract the face from an image
def extract_faces(img):
    gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
    face_points = face_detector.detectMultiScale(gray, 1.3, 5)
    return face_points



#### Identify face using ML model
def identify_face(facearray):
    model = joblib.load('static/face_recognition_model.pkl')
    return model.predict(facearray)



#### A function which trains the model on all the faces available in faces folder
def train_model():
    faces = []
    labels = []
    userlist = os.listdir('static/faces')
```

```
    for user in userlist:
        for imgname in os.listdir(f'static/faces/{user}'):
            img = cv2.imread(f'static/faces/{user}/{imgname}')
            resized_face = cv2.resize(img, (50, 50))
            faces.append(resized_face.ravel())
            labels.append(user)
    faces = np.array(faces)
    knn = KNeighborsClassifier(n_neighbors=5)
    knn.fit(faces,labels)
    joblib.dump(knn,'static/face_recognition_model.pkl')



#### Extract info from today's attendance file in attendance folder
def extract_attendance():
    df = pd.read_csv(f'Attendance/Attendance-{datetoday()}.csv')
    names = df['Name']
    rolls = df['Roll']
    times = df['Time']
    l = len(df)
    return names,rolls,times,l
```

```
#### Add Attendance of a specific user

def add_attendance(name):

    username = name.split('_')[0]

    userid = name.split('_')[1]

    current_time = datetime.now().strftime("%H:%M:%S")


    df = pd.read_csv(f'Attendance/Attendance-{datetoday()}.csv')

    if int(userid) not in list(df['Roll']):

        with open(f'Attendance/Attendance-{datetoday()}.csv','a') as f:

            f.write(f'\n{username},{userid},{current_time}')




################## ROUTING FUNCTIONS #########################


#### Our main page

@app.route('/')

def home():

    names,rolls,times,l = extract_attendance()

    return
render_template('home.html',names=names,rolls=rolls,times=times,l=l,totalreg=totalreg(),dat
etoday2=datetoday2())
```

```
#### This function will run when we click on Take Attendance Button

@app.route('/start',methods=['GET'])

def start():

    if 'face_recognition_model.pkl' not in os.listdir('static'):

        return
render_template('home.html',totalreg=totalreg(),datetoday2=datetoday2(),mess='There is no
trained model in the static folder. Please add a new face to continue.')



    cap = cv2.VideoCapture(0)

    ret = True

    while ret:

        ret,frame = cap.read()

        if extract_faces(frame)!=():

            (x,y,w,h) = extract_faces(frame)[0]

            cv2.rectangle(frame,(x, y), (x+w, y+h), (255, 0, 20), 2)

            face = cv2.resize(frame[y:y+h,x:x+w], (50, 50))

            identified_person = identify_face(face.reshape(1,-1))[0]

            add_attendance(identified_person)


cv2.putText(frame,f'{identified_person}',(30,30),cv2.FONT_HERSHEY_SIMPLEX,1,(255,
0, 20),2,cv2.LINE_AA)

        cv2.imshow('Attendance',frame)
```

```
        if cv2.waitKey(1)==27:
            break
    cap.release()
    cv2.destroyAllWindows()
    names,rolls,times,l = extract_attendance()
    return
render_template('home.html',names=names,rolls=rolls,times=times,l=l,totalreg=totalreg(),dat
etoday2=datetoday2())




#### This function will run when we add a new user
@app.route('/add',methods=['GET','POST'])
def add():
    newusername = request.form['newusername']
    newuserid = request.form['newuserid']
    userimagefolder = 'static/faces/'+newusername+'_'+str(newuserid)
    if not os.path.isdir(userimagefolder):
        os.makedirs(userimagefolder)
    cap = cv2.VideoCapture(0)
    i,j = 0,0
    while 1:
        _,frame = cap.read()
```

```
        faces = extract_faces(frame)
        for (x,y,w,h) in faces:
            cv2.rectangle(frame,(x, y), (x+w, y+h), (255, 0, 20), 2)
            cv2.putText(frame,f'Images Captured:
{i}/50',(30,30),cv2.FONT_HERSHEY_SIMPLEX,1,(255, 0, 20),2,cv2.LINE_AA)
            if j%10==0:
                name = newusername+'_'+str(i)+'.jpg'
                cv2.imwrite(userimagefolder+'/'+name,frame[y:y+h,x:x+w])
                i+=1
            j+=1
        if j==500:
            break
        cv2.imshow('Adding new User',frame)
        if cv2.waitKey(1)==27:
            break
    cap.release()
    cv2.destroyAllWindows()
    print('Training Model')
    train_model()
    names,rolls,times,l = extract_attendance()
    return
render_template('home.html',names=names,rolls=rolls,times=times,l=l,totalreg=totalreg(),dat
etoday2=datetoday2())
```

```
#### Our main function which runs the Flask App

if __name__ == '__main__':

    app.run(debug=True)
```

HTML code:

```
<!doctype html>

<html lang="en">



<style type='text/css'>

    * {

        padding: 0;

        margin: 0;

        font-family: 'Segoe UI', Tahoma, Geneva, Verdana, sans-serif;

    }



    body {

        background-image: url('https://cutewallpaper.org/21/1920-x-1080-gif/1920x1080-Wallpapercartoon-Wallpapers-Driverlayer-Search-.gif');

        background-size: cover;
```

```
    font-family: sans-serif;
    margin-top: 40px;
    height: 100vh;
    padding: 0;
    margin: 0;
}

table {
    border: 1px;
    font-family: arial, sans-serif;
    border-collapse: collapse;
    width: 86%;
    margin: auto;
}

td,
th {
    border: 1px solid black !important;
    padding: 5px;
}
```

```
    tr:nth-child(even) {
        background-color: #dddddd;
    }
</style>



<head>
    <!-- Required meta tags -->
    <meta charset="utf-8">
    <meta name="viewport" content="width=device-width, initial-scale=1">
    <link rel="stylesheet" href="https://fonts.googleapis.com/icon?family=Material+Icons">

    <!-- Bootstrap CSS -->
    <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.0.0-beta3/dist/css/bootstrap.min.css"
rel="stylesheet"
        integrity="sha384-
eOJMYsd53ii+scO/bJGFsiCZc+5NDVN2yr8+0RDqr0Ql0h+rP48ckxlpbzKgwra6"
crossorigin="anonymous">

    <title>Face Recognition Based Attendance System</title>
</head>

<body>
```

```
<div class='mt-3 text-center'>

    <h1 style="width: auto;margin: auto;color: white;padding: 11px;font-size: 44px;">Face
Recognition Based

        Attendance System</h1>

</div>



{% if mess%}

<p class="text-center" style="color: red;font-size: 20px;">{{ mess }}</p>

{% endif %}



<div class="row text-center" style="padding: 20px;margin: 20px;">



    <div class="col"

        style="border-radius: 20px;padding: 0px;background-
color:rgb(211,211,211,0.5);margin:0px 10px 10px 10px;min-height: 400px;">

        <h2 style="border-radius: 20px 20px 0px 0px;background-color: #0b4c61;color:
white;padding: 10px;">Today's

            Attendance <i class="material-icons">assignment</i></h2>

        <a style="text-decoration: none;max-width: 300px;" href="/start">

            <button

                style="font-size: 24px;font-weight: bold;border-radius:
10px;width:490px;padding: 10px;margin-top: 30px;margin-bottom: 30px;"

                type='submit' class='btn btn-primary'>Take Attendance <i
```

```
            class="material-icons">beenhere</i></button>
    </a>
    <table style="background-color: white;">
        <tr>
            <td><b>S No</b></td>
            <td><b>Name</b></td>
            <td><b>ID</b></td>
            <td><b>Time</b></td>
        </tr>
        {% if l %}

        {% for i in range(l) %}
        <tr>
            <td>{{ i+1 }}</td>
            <td>{{ names[i] }}</td>
            <td>{{ rolls[i] }}</td>
            <td>{{ times[i] }}</td>
        </tr>
        {% endfor %}
        {% endif %}
    </table>
```

```
    </div>


    <div class="col"
        style="border-radius: 20px;padding: 0px;background-
color:rgb(211,211,211,0.5);margin:0px 10px 10px 10px;height: 400px;">
        <form action='/add' method="POST" enctype="multipart/form-data">
            <h2 style="border-radius: 20px 20px 0px 0px;background-color: #0b4c61;color:
white;padding: 10px;">Add
                New User <i class="material-icons">control_point_duplicate</i></h2>
            <label style="font-size: 20px;"><b>Enter New User Name*</b></label>
            <br>
            <input type="text" id="newusername" name='newusername'
                style="font-size: 20px;margin-top:10px;margin-bottom:10px;" required>
            <br>
            <label style="font-size: 20px;"><b>Enter New User Id*</b></label>
            <br>
            <input type="number" id="newusereid" name='newuserid'
                style="font-size: 20px;margin-top:10px;margin-bottom:10px;" required>
            <br>
            <button style="width: 232px;margin-top: 20px;font-size: 20px;" type='submit'
class='btn btn-dark'>Add
                New User
```

```
            </button>
            <br>
            <h5 style="padding: 25px;"><i>Total Users in Database: {{totalreg}}</i></h5>
          </form>
        </div>

    </div>



</body>

</html>
```