A. P. SHAH INSTITUTE OF TECHNOLOGY

A
Mini-Project Report on

Attendance Using Face Recognization

Submitted in partial fulfillment of the requirements for the degree of
BACHELOR OF ENGINEERING
IN
Computer Science & Engineering Artificial Intelligence & Machine Learning by

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CERTIFICATE

This is to certify that the project entitled "**Attendance Using Face Recognization"** is a bonafide work of Ayush Kargutkar (21106042) ,Maviya Bubere (21106022), Prabudh Gaikwad (21106038), Shreyash Gharge (21106063) submitted to the University of Mumbai in partial fulfillment of the requirement for the award of **Bachelor of Engineering** in **Computer Science & Engineering (Artificial Intelligence & Machine Learning).**

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Project Report Approval

This Mini project report entitled "**Attendance Using Face Recognization"** by **Maviya Bubere, Ayush Kargutkar, Prabudh Gaikwad, Shreyash Gharge** is approved for the degree of ***Bachelor of Engineering*** in ***Computer Science &Engineering***, (AIML) ***2022-23***.

External Examiner: _____

Internal Examiner: _____

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Date:

Declaration

We declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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ABSTRACT

This concise abstract highlights the implementation of face recognition technology for attendance tracking. By leveraging facial recognition algorithms, this system offers a secure, efficient, and accurate method to manage attendance in various settings. This technology eliminates manual processes, reduces the risk of fraudulent attendance, and enhances overall security. Its adaptability makes it suitable for educational institutions, workplaces, and events, revolutionizing attendance management.

Keywords: Face recognition for attendance offers efficient, secure, and contactless tracking in various environments, streamlining administrative tasks and enhancing data integrity.

The main goal of this project is to create a Face Recognition-based attendance system that will turn this manual process into an automated one. This project meets the requirements for bringing modernization to the way attendance is handled, as well as the criteria for time management. This device is installed in the classroom, where and student's information, such as name, roll number, class, sec, and photographs, is trained. The images are extracted using Open CV. Before the start of the corresponding class, the student can approach the machine, which will begin taking pictures and comparing them to the qualified dataset.

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CHAPTER 1
INTRODUCTION

1. INTRODUCTION

In an increasingly digitized and interconnected world, the management of attendance in diverse settings, such as educational institutions, workplaces, and events, has undergone a profound transformation. Traditional methods of attendance tracking, reliant on manual sign-ins, paper-based registers, or outdated card-swiping systems, have proven to be inefficient, error-prone, and susceptible to fraudulent practices. As we navigate the evolving landscape of attendance management, the emergence of face recognition technology has emerged as a compelling solution, promising to reshape how we record and monitor attendance with unparalleled accuracy, efficiency, and security.

This comprehensive introduction delves into the multifaceted realm of attendance using face recognition technology, highlighting its significance and impact across various domains.

The Evolution of Attendance Tracking:

Historically, attendance tracking has been a fundamental aspect of institutional and organizational management, serving as a cornerstone for assessing participation, accountability, and performance. However, conventional methods have been beset with shortcomings. Manual attendance taking is labor-intensive, prone to human error, and subject to manipulation through practices like proxy attendance, where one person marks attendance on behalf of others. Moreover, these methods do not easily adapt to the changing needs of today's fast-paced and digitally-oriented world.

The Rise of Facial Recognition:

The rapid advancements in facial recognition technology have ushered in a new era for attendance management. Facial recognition systems leverage sophisticated algorithms and high-resolution cameras to capture, analyze, and verify the unique facial features of individuals in real-time. This revolutionary approach eliminates the need for physical contact or manual intervention, offering a contactless and secure means of attendance tracking. By comparing facial characteristics against a pre-established database, these systems can accurately identify and record attendance, effectively mitigating the drawbacks of traditional methods.

The Advantages of Face Recognition-Based Attendance:

The adoption of face recognition technology for attendance tracking brings forth a myriad of benefits. Firstly, it addresses the perennial challenge of proxy attendance, ensuring that individuals can only mark their own presence. Secondly, it streamlines

administrative tasks by automating the attendance process, thereby reducing the time and resources required for manual record-keeping. Thirdly, it fortifies security by
introducing a robust authentication mechanism, making it exceedingly difficult for unauthorized individuals to gain access or manipulate attendance records. Furthermore, the versatility of face recognition systems renders them suitable for a wide range of environments, from educational institutions seeking to enhance class management to corporate offices optimizing workforce productivity.

The Path Ahead:
As technology continues to evolve, the potential applications of face recognition in attendance management are boundless. Innovations in machine learning, biometrics, and camera technology promise to further enhance accuracy, scalability, and ease of use. However, it is essential to address ethical and privacy concerns associated with facial recognition, ensuring that data protection and civil liberties are safeguarded.

In conclusion, the integration of face recognition technology into attendance management systems represents a significant leap forward in the quest for precise, efficient, and secure record-keeping. This introduction offers a comprehensive overview of the pivotal role that face recognition plays in attendance tracking, setting the stage for a deeper exploration of its applications, challenges, and implications in the chapters that follow

CHAPTER 2

LITERATURE SURVEY

2. LITERATURE SURVEY

2.1-HISTORY

The records of face reputation technology dates back numerous a long time and has developed substantially over time. Here is a quick evaluation of the key milestones inside the development of face recognition technology:

Early Concepts (Sixties-Nineteen Seventies):

The earliest paintings on face popularity can be traced again to the Nineteen Sixties and Seventies. Researchers started out exploring the concept of the usage of computer systems to understand and examine facial functions.

Woody Bledsoe, Helen Chan Wolf, and Charles Bisson conducted pioneering research on automated facial popularity at the Stanford Research Institute (SRI) in the course of this period.

Eigenfaces (1980s-Nineties):

In the Eighties, Sirovich and Kirby delivered the concept of "eigenfaces," a mathematical approach for representing faces as vectors in a excessive-dimensional space. This method laid the foundation for current facial reputation algorithms.

In the 1990s, researchers like Matthew Turk and Alex Pentland developed practical eigenfaceprimarily based facial reputation structures.

Principal Component Analysis (PCA) and Fisherfaces:

Principal Component Analysis (PCA) and Fisher Linear Discriminant (FLD) have become popular techniques for reducing the dimensionality of facial characteristic vectors, improving reputation accuracy.

Advances in Neural Networks (2000s):

In the 2000s, deep mastering and neural networks received prominence in the area of pc imaginative and prescient. Convolutional Neural Networks (CNNs) proved powerful for function extraction and category responsibilities, which include face popularity.

Viola-Jones Algorithm, which used Haar-like features and boosted classifiers, became widely utilized in actual-time face detection.

Modern Face Recognition (2010s-gift):

The 2010s noticed extensive advancements in face recognition, pushed by using deep getting to know models including DeepFace by using Facebook, FaceNet with the aid of Google

2.2-LITERATURE REVIEW :

A review paper on attendance marking system based on face recognition
K Puthea, R Hartanto, R Hidayat - 2017

Providing accurate attendance marking system in real-time is challenging. It is tough to mark the attendance of a student in the large classroom when there are many students attending the class. Many attendance management systems have been implemented in the recent research. However, the attendance management system based on facial recognition still has issues. Thus many research have been conducted to improve system. This paper reviewed the previous works on attendance management system based on facial recognition. This article does not only provide the literature review on the earlier work or related work, but it also provides the deep analysis of Principal Component Analysis, discussion, suggestions for future work..

Student attendance with face recognition (LBPH or CNN): Systematic literature review A Budiman, RA Yaputera, S Achmad

Technology growth is speedy, and more and more things can be solved easily with the existence of sophisticated technology. One of them is solving the problem of student attendance at the university. The current attendance system has developed into RFID (Radio Frequency Identification) from the previous manual. However, many things still become obstacles. For example, students who miss their cards cannot take attendance, and the problem of leaving attendance can be cheating. Now, this has developed much technology in the form of face recognition with various algorithms that can be used. The use of face recognition can overcome the previous problem because it only uses faces for attendance. However, the many algorithms for facial recognition make it difficult to determine the best algorithm to implement. The main purpose of this literature review is to compare algorithms suitable for implementation in an environment at universities, especially CNN and LBPH. Based on the literature review, it was found that CNN's accuracy is superior in terms of accuracy compared to LBPH, CNN also produces more stable accuracy if there are external factors that can affect accurac.

Face Recognition for Identification and Verification in Attendance System: A Systematic Review A Anshari, SA Hirtranusi, DI Sensuse :

Attendance is an important concept to be implemented in order to enhance organizational performance. Measuring attendance may be a concern issue for many organizations, especially with the rapid changes that have occurred in this era of digitalisation. Face recognition is one of many approaches to support long distance attendance, unfortunately, there are some issues that need to be overcome regarding face recognition, for example, its verification. The purpose of this systematic literature review is to provide either academics and practitioner with insight and knowledge related to face recognition implementation, how to verify it, and what is its critical success factors towards an attendance system. Therefore, the results of this study hopes to give both practitioners and academics knowledge on how to build a relevant attendance system based on the findings of this study. The review was conducted through a systematic literature review stages that was adopted from Kitchenham. It began with declaring protocol review and ended with an analysis of the prior studies that was obtained from five relevant sources. There were 22 of 516 studies that met the criteria after several filtering stages. It is found that academic reasons are mostly used on verifying face recognition. Moreover, based on the findings, information security has been considered the most utilized security methods regarding face recognition in attendance system. Furthermore, 78% of the analysed papers stated that security issues is the most critical factors towards implementing a successful attendance system.

A conceptual model for automated attendance marking system using facial recognition M Sajid, R Hussain, M Usman

Attendance marking in a classroom during a lecture is not only burdensome but also a time consuming task. Due to a usual large number of students present in the lecture hall there is always a possibility of proxy attendance. It is extremely difficult for lecturers to manually identify the students who skip their lectures on regular basis. Attendance management of students through the conventional methods had been a challenge in the recent years. The growing need of efficient and automatic techniques of marking attendance is a growing challenge in the area of face recognition. In recent years, the problem of automatic attendance marking has been widely addressed through the use of standard biometrics. However, majority of the previously proposed techniques lack the element of reliability. The focus of this research is to analyze and critically evaluate the recent attendance marking techniques using face recognition methods. Literature review reveals the fact that the intelligent application of iterative facial recognition techniques can make attendance management systems more reliable. In this paper, we propose a conceptual model for automated attendance system through facial recognition. Our proposed model uses an integral validation process which enhances the reliability of your model.

CHAPTER 3
Problem Statement

Problem Statement

Traditional methods of attendance management, such as filling out forms and drawing card systems, are often inaccurate and inefficient It is critical if planning reliable, safe and effective controls using facial recognition technology are used to address these issues. System Development and Operation Differences in lighting conditions, facial features, privacy concerns, and ethical considerations, face many challenges The aim of this study is to design, develop and test a facial recognition system that overcomes these challenges win, in educational institutions and workplaces and delivers robust and user-friendly solutions for accurate and secure attendance management.

This problem statement outlines existing issues related to traditional modes of attendance and identifies the key challenges associated with implementing a face-to-face attendance program and sets the stage for conducting research and development efforts address these challenges and develop effective solutions.

CHAPTER 4

Experimental Setup

4. Experimental Setup

4.1 Hardware Setup

Setting up an attendance system using face recognition technology involves a combination of hardware and software components. Below, I'll outline the typical hardware components you would need for such a system:

Camera:

A high-quality camera with good resolution is essential for capturing clear images of faces. You can use webcams, IP cameras, or specialized facial recognition cameras. Ensure the camera has good lowlight performance for accurate recognition in various lighting conditions.

Computer or Server:

You'll need a computer or server to run the facial recognition software. The system's processing power should be sufficient to handle the recognition algorithms. A dedicated server or a powerful desktop computer may be required, depending on the scale of your application.

GPU (Graphics Processing Unit):

For real-time and high-performance face recognition, it's advisable to have a dedicated GPU. Many facial recognition libraries and frameworks, such as OpenCV, can leverage the power of GPUs to accelerate the recognition process.

Memory (RAM):

Adequate RAM is crucial for processing and storing face data efficiently. The amount of RAM required depends on the number of concurrent users and the size of the dataset you are working with.

Storage:

You need sufficient storage to store facial images, templates, and related data. Depending on your usage, you may require large amounts of storage. Consider using SSDs (Solid State Drives) for faster data retrieval.

Networking Equipment:

A stable and fast network connection is essential for sending and receiving data if you are using a distributed system. Ethernet or Wi-Fi, depending on your setup, is necessary.

Display (Optional):
You may need a display for administrative purposes to configure and monitor the system.

Power Backup:
Implement a power backup system, such as a UPS (Uninterruptible Power Supply), to ensure continuous operation in case of power outages.

Mounting and Enclosure:
Depending on the deployment location, you may need mounting hardware and weatherproof enclosures for the camera and other components.

Access Control Hardware (Optional):
If the attendance system is integrated with access control, you'll need electronic locks, turnstiles, or other hardware to control physical access.

Additional Sensors (Optional):
You can enhance the system's security and accuracy by integrating additional sensors, such as motion detectors, infrared sensors, or temperature sensors.

Remember that the choice of hardware should align with your specific use case, including the number of users, the environment where it will be deployed, and the desired level of accuracy and performance. Moreover, ensure that your hardware is compatible with the facial recognition software and libraries you plan to use.
Additionally, it's important to consider privacy and data security concerns, especially when dealing with biometric data. Comply with relevant privacy regulations and implement security measures to protect the data and the system from unauthorized access.

4.2 Software Setup

Setting up an attendance system using face recognition technology requires appropriate software to process and manage the captured facial data. Below are the steps and key software components needed for such a system:

Operating System:
Choose a suitable operating system for your server or computer. Common choices include Windows, Linux (e.g., Ubuntu, CentOS), or macOS, depending on your preferences and compatibility with the facial recognition software you plan to use.

Face Recognition Software:
Select a facial recognition software or library that fits your requirements. Some popular options include:

OpenCV: An open-source computer vision library with facial recognition capabilities.

Dlib: A C++ toolkit with facial recognition and machine learning features.

Face Recognition: A Python library that simplifies face recognition tasks.

Deep Learning Frameworks (e.g., TensorFlow, PyTorch): These frameworks offer pre-trained models and tools for developing custom face recognition applications.

Database Management System:
You need a database to store and manage facial templates and attendance records. Choose a suitable database management system (DBMS) like MySQL, PostgreSQL, SQLite, or NoSQL databases like MongoDB, depending on your needs.

User Interface (Optional):
Create a user interface for administrators and users to interact with the system. You can develop a web-based dashboard or a desktop application, depending on your preferences and requirements.

Network Protocols and Communication:
If you are using a distributed system, you'll need to set up network protocols and communication methods to connect cameras, servers, and other components. You can use technologies like HTTP, MQTT, or custom protocols.

Data Storage and Backup:
Implement data storage solutions to securely store facial templates and attendance records. Ensure that you have a robust backup system in place to prevent data loss.

Authentication and Security:
Implement robust authentication mechanisms to control access to the system. Security measures such as encryption and access control lists (ACLs) should be employed to protect sensitive biometric data.

Algorithm Training and Testing:
Train your facial recognition algorithm using a dataset of faces that your system will recognize. This step is critical for the system to perform accurately.

Integration with Other Systems (Optional):
If your attendance system is part of a larger ecosystem, integrate it with other systems, such as access control or HR management software.

Compliance and Privacy Measures:

Ensure that your system complies with relevant privacy laws and regulations, especially regarding the handling of biometric data. Implement privacy features such as data anonymization and user consent options.

Logging and Reporting:

Implement logging and reporting functionalities to track system usage, detect anomalies, and generate attendance reports.

Monitoring and Maintenance:

Set up monitoring tools to ensure system health and performance. Regularly update and maintain the software to address security vulnerabilities and improve accuracy.

Documentation and Training:

Document the system's setup, configuration, and maintenance procedures. Provide training to users and administrators on how to use the system effectively.

Testing and Quality Assurance:

Thoroughly test the system in different scenarios to ensure that it accurately records attendance. Conduct quality assurance to identify and resolve issues.

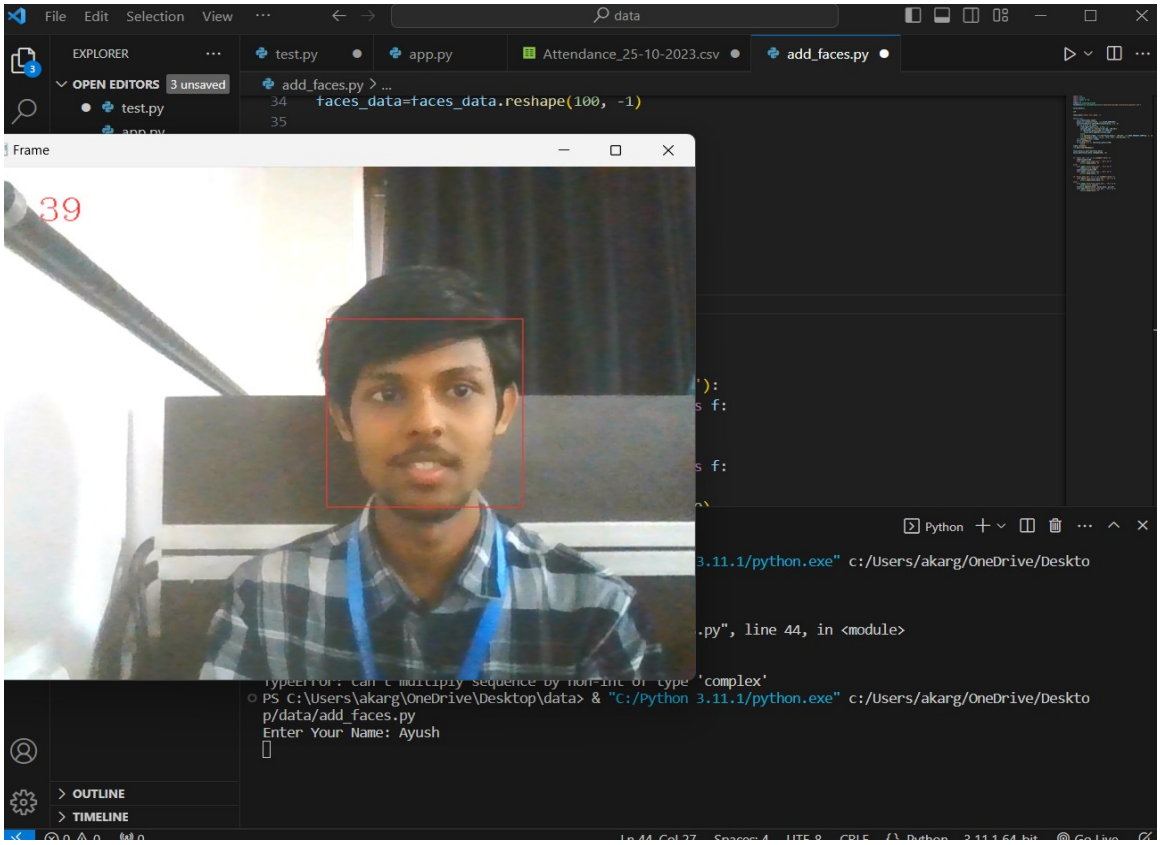
Keep in mind that the choice of software and its configuration may vary depending on the specific requirements and constraints of your project. Be prepared to continuously monitor and adapt your software setup as necessary to improve system performance and address emerging challenges.

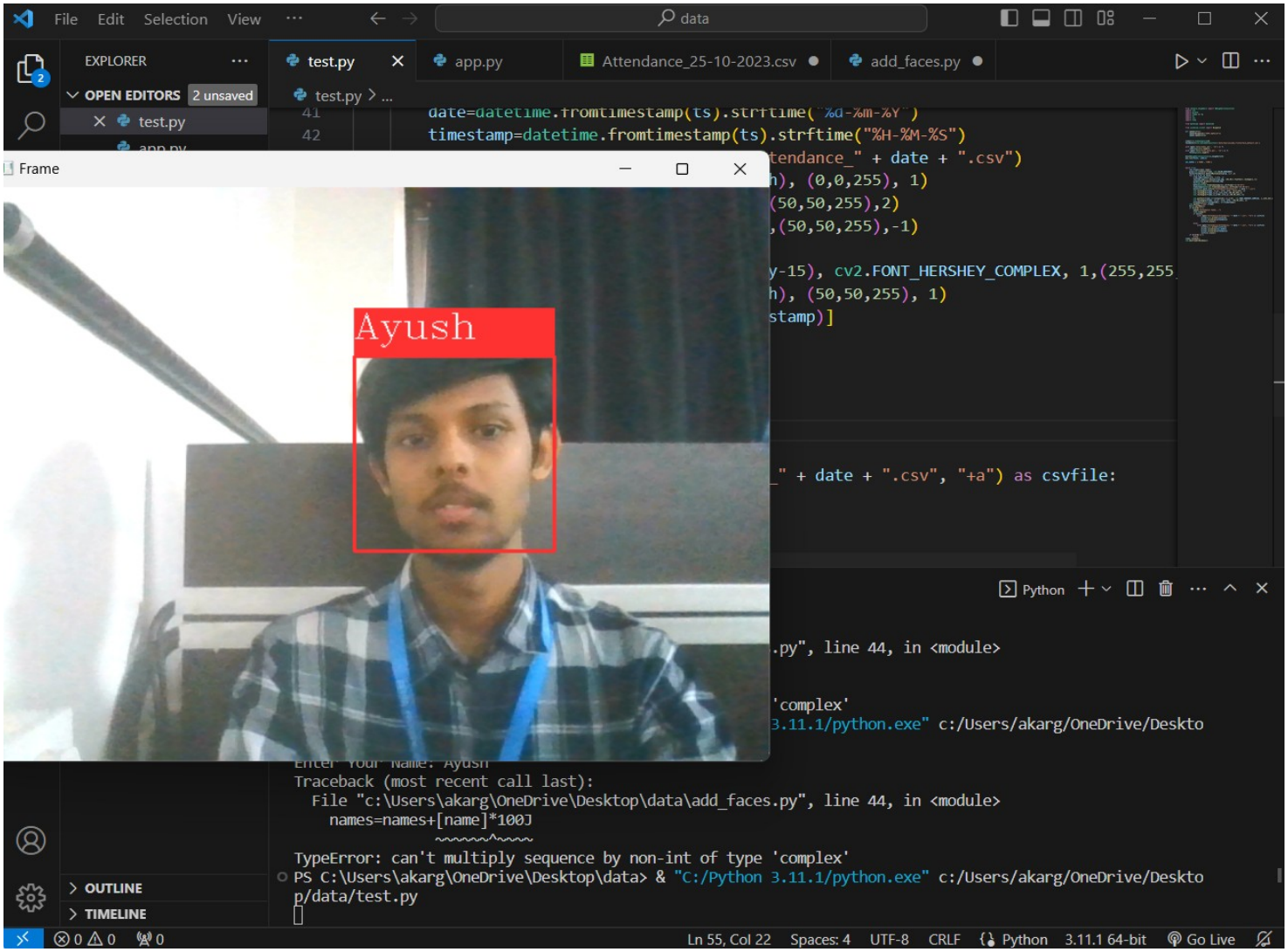
CHAPTER 5

Proposed System & Implementation

Proposed system & Implementation

5.1 Implementation:-




File Edit Selection View
data
EXPLORER
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test.py
app.py
Attendance_25-10-2023.csv
add_faces.py
Frame
Ayush
Python
Traceback (most recent call last):
File "c:\Users\akarg\OneDrive\Desktop\data\add_faces.py", line 44, in <module>
names=names+[name]*100J
TypeError: can't multiply sequence by non-int of type 'complex'
PS C:\Users\akarg\OneDrive\Desktop\data> & "C:/Python 3.11.1/python.exe" c:/Users/akarg/OneDrive/Desktop/data/test.py
OUTLINE
TIMELINE
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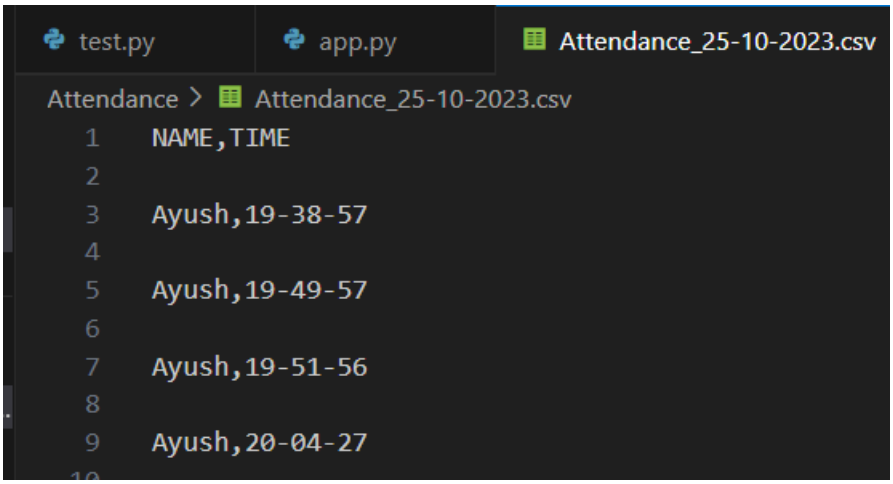
test.py
app.py
Attendance_25-10-2023.csv
Attendance > Attendance_25-10-2023.csv
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2
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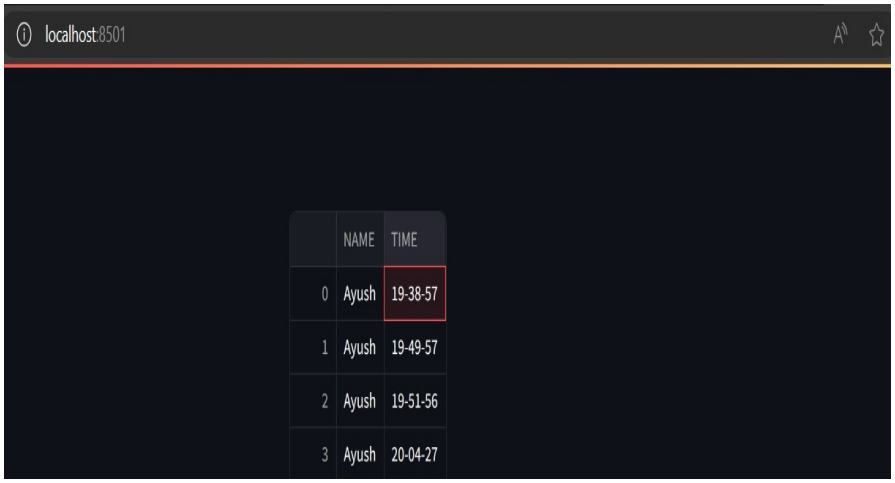
4
5 Ayush,19-49-57
6
7 Ayush,19-51-56
8
9 Ayush,20-04-27


localhost:8501
NAME TIME
0 Ayush 19-38-57
1 Ayush 19-49-57
2 Ayush 19-51-56
3 Ayush 20-04-27

CHAPTER 6

Conclusion

Conclusion

By using face recognition technology to implement an attendance system, you can enjoy numerous advantages, such as improved precision, productivity, and automation. However, there are also potential challenges to consider, including hardware, software, privacy, and security concerns. In summary, here are the key takeaways to keep in mind when considering this technology: Improved Accuracy and Efficiency: Face recognition systems offer a high level of accuracy, reducing the risk of false attendance records. They also save time with quick check-ins and simplified attendance tracking. Carefully Plan Hardware Setup: The hardware setup for a face recognition attendance system may include cameras, computers or servers, GPUs, memory, storage, networking equipment, and optional components like displays and sensors. The hardware chosen should be selected based on the specific needs and scale of your attendance system. Thorough Software Setup: The software used for a face recognition attendance system can play a crucial role in its success. It should be carefully planned and chosen to ensure compatibility and effectiveness.

Maximizing Your Face Recognition System: Before beginning the setup process, it is crucial to carefully consider the hardware components needed to create an efficient and reliable system. This includes selecting high-quality cameras, powerful computers or servers, GPUs, memory, and storage that meet your specific requirements. Additionally, it is essential to take into account network equipment, power backup, and other necessary accessories. Equally important is the software setup. It is essential to carefully choose the appropriate face recognition software or libraries, as well as a suitable operating system, and a database management system. If needed, develop a user interface and establish secure communication protocols. To ensure the protection of sensitive biometric data and compliance with privacy regulations, implementing encryption, access control, and anonymization techniques is crucial. Proper training of the face recognition algorithm is also necessary, as well as extensive testing to guarantee accuracy and reliability in realworld scenarios. Overall, careful consideration and thorough testing are key to maximizing the efficiency and effectiveness of your face recognition

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