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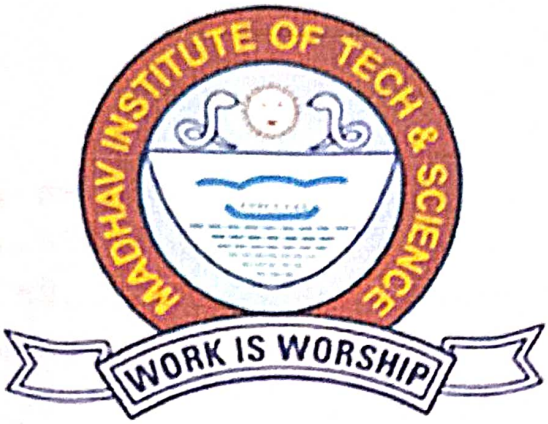

Project Report

on

Student Attendance System Using Face Recognition

Submitted By:

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Faculty Mentor:

Dr. Kritika Bansal

CENTRE FOR ARTIFICIAL INTELLIGENCE
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CERTIFICATE

This is certified that **Kanishka Jain (0901ad211023), Sandeep Singh Rajawat (0901ad211048)** has submitted the project report titled ***Student Attendance using Face Recognition*** *under the mentorship of* **Dr.Kritika Bansal**, in partial fulfilment of the requirement for the award of degree of Bachelor of Technology in **Artificial Intelligence and Data Science** from Madhav Institute of Technology and Science, Gwalior.

23/11/2023

Dr. Kritika Bansal
Faculty Mentor
Centre for Artificial Intelligence

23/11/2023

Dr. R. R. Singh
Coordinator
Centre for Artificial Intelligence

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DECLARATION

I hereby declare that the work being presented in this project report, for the partial fulfilment of requirement for the award of the degree of Bachelor of Technology in **Artificial Intelligence and Data Science** at Madhav Institute of Technology & Science, Gwalior is an authenticated and original record of my work under the mentorship of **Dr. Kritika Bansal**, **Assistant Professor**, **Centre for Artificial Intelligence**.

I declare that I have not submitted the matter embodied in this report for the award of any degree or diploma anywhere else.

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ABSTRACT

The "Student Attendance System Using Face Recognition" project is a cutting-edge solution designed to streamline and automate the process of tracking student attendance in educational institutions. Traditional attendance methods often suffer from inefficiencies and inaccuracies, leading to administrative challenges and resource wastage. This project leverages the power of facial recognition technology to overcome these limitations, offering a robust and reliable system for attendance management.

The proposed system employs state-of-the-art facial recognition algorithms to identify and authenticate students based on unique facial features. Utilizing a combination of image capture devices, image processing techniques, and machine learning algorithms, the system ensures accurate and real-time attendance recording. The project aims to enhance the overall efficiency of attendance tracking, reduce the workload on educators, and provide a seamless experience for both students and administrative staff.

The "Student Attendance System Using Face Recognition" project represents a significant step towards modernizing attendance management in educational institutions. By harnessing the capabilities of facial recognition technology, this system offers a reliable, efficient, and secure solution to the challenges associated with traditional attendance tracking methods, ultimately contributing to the enhancement of overall educational administration.

सार

"छात्र उपस्थिति प्रणाली उपयोग कर रहे नवीनतम परियाय का परियोजना एक उन्नत समाधान है जो शिक्षण संस्थानों में छात्रों की उपस्थिति की प्रक्रिया को सीधा और स्वतंत्र बनाने के लिए डिज़ाइन किया गया है। पारंपरिक उपस्थिति विधियों में अक्सर अक्षमताओं और अशुद्धियों का सामना करना पड़ता है, जिससे प्रशासनिक चुनौतियों और संसाधन बर्बादी का सामना करना पड़ता है। यह परियोजना उन सीधे और स्वतंत्र विधियों को पारित करने के लिए चेहरा पहचान प्रौद्योगिकी की शक्ति का उपयोग करती है, जो उपस्थिति प्रबंधन के लिए एक मजबूत और विश्वसनीय प्रणाली प्रदान करती है।

प्रस्तावित प्रणाली ने स्थानीय चेहरा पहचान एल्गोरिदम का उपयोग करके छात्रों की पहचान और प्रमाणीकरण करने के लिए उपयोग किया है। छवि कैप्चर डिवाइसेस, छवि प्रसंस्करण तकनीकों, और मशीन लर्निंग एल्गोरिदम्स का संयोजन करके, प्रणाली सुनिश्चित करती है कि उपस्थिति को सटीक और वास्तविक समय में दर्ज किया जाए। परियोजना का उद्देश्य उपस्थिति ट्रैकिंग की कुल क्षमता को बढ़ाना, शिक्षकों पर कार्यभार कम करना, और छात्रों और प्रशासनिक कर्मचारियों के लिए एक सरल अनुभव प्रदान करना है।

"छात्र उपस्थिति प्रणाली उपयोग कर रहे नवीनतम परियाय" परियोजना शिक्षण संस्थानों में उपस्थिति प्रबंधन को समृद्धि की दिशा में महत्वपूर्ण कदम की ओर एक महत्वपूर्ण कदम है। चेहरा पहचान प्रौद्योगिकी के क्षमताओं का

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1.1 Introduction:-

The Student Attendance System using Face Recognition addresses the longstanding challenges associated with traditional methods of tracking student attendance in educational institutions. By leveraging advanced facial recognition technology, this system aims to streamline the attendance management process, enhancing accuracy, efficiency, and overall administrative effectiveness. Moving away from cumbersome manual methods, the project embraces automation and modernizes attendance tracking, offering a solution that is not only reliable but also adaptable to the dynamic needs of educational environments. With a focus on precision and convenience, the system is poised to revolutionize how student attendance is monitored and recorded.

1.2 Objective :-

The primary objective of the Student Attendance System using Face Recognition is to revolutionize traditional attendance tracking methods in educational institutions. The system aims to:

- **Automate Attendance Recording:** Eliminate manual attendance processes by automating the identification and authentication of students using facial recognition technology, reducing administrative workload and potential errors.
- **Enhance Accuracy:** Improve the precision of attendance data by leveraging advanced facial recognition algorithms, ensuring reliable and real-time recording of student attendance.
- **Increase Efficiency:** Streamline the overall attendance management process, saving time for both educators and students while allowing educational institutions to operate more efficiently.
- **Provide Real-time Monitoring:** Enable administrators to monitor attendance in real-time, facilitating prompt intervention and decision-making based on up-to-date attendance data.
- **Facilitate Data Analysis:** Generate insightful reports and analytics on attendance trends, helping educators and administrators make informed decisions to improve overall institutional performance.

1.3 Scope:

We are setting up to design a system comprising of two modules. The first module (face detector) is a mobile component, which is basically a camera application that captures student faces and stores them in a file using computer vision face detection algorithms and face extraction techniques. The second module is a desktop application that does face recognition of the captured images (faces) in the file, marks the students register and then stores the results in a database for future analysis.

1.4System Requirements:-

1.4.1Hardware Requirements:

- **Computing Devices:**

  Minimum: Dual-core processor or equivalent

  Recommended: Quad-core processor or higher for better processing speed

- **Memory (RAM):**

  Minimum: 4 GB

  Recommended: 8 GB or higher for improved performance

- **Storage:**

  Minimum: 128 GB HDD/SSD

  Recommended: 256 GB SSD for faster data access

- **Web Camera/Imaging Device:**

  High-resolution camera with facial recognition capabilities

  Minimum resolution: 720p

1.4.2Software Requirement:-

- **Operating System:**

  Windows, Linux, or macOS

  Recommended: Latest version for security and compatibility

- **Development Platform:**

  Python for implementing facial recognition algorithms

- **Facial Recognition Library:**

  OpenCV

- **Additional Dependencies:**

NumPy, OS, date time, CSV and other relevant libraries for data processing and machine learning

1.5 Flow chart of process

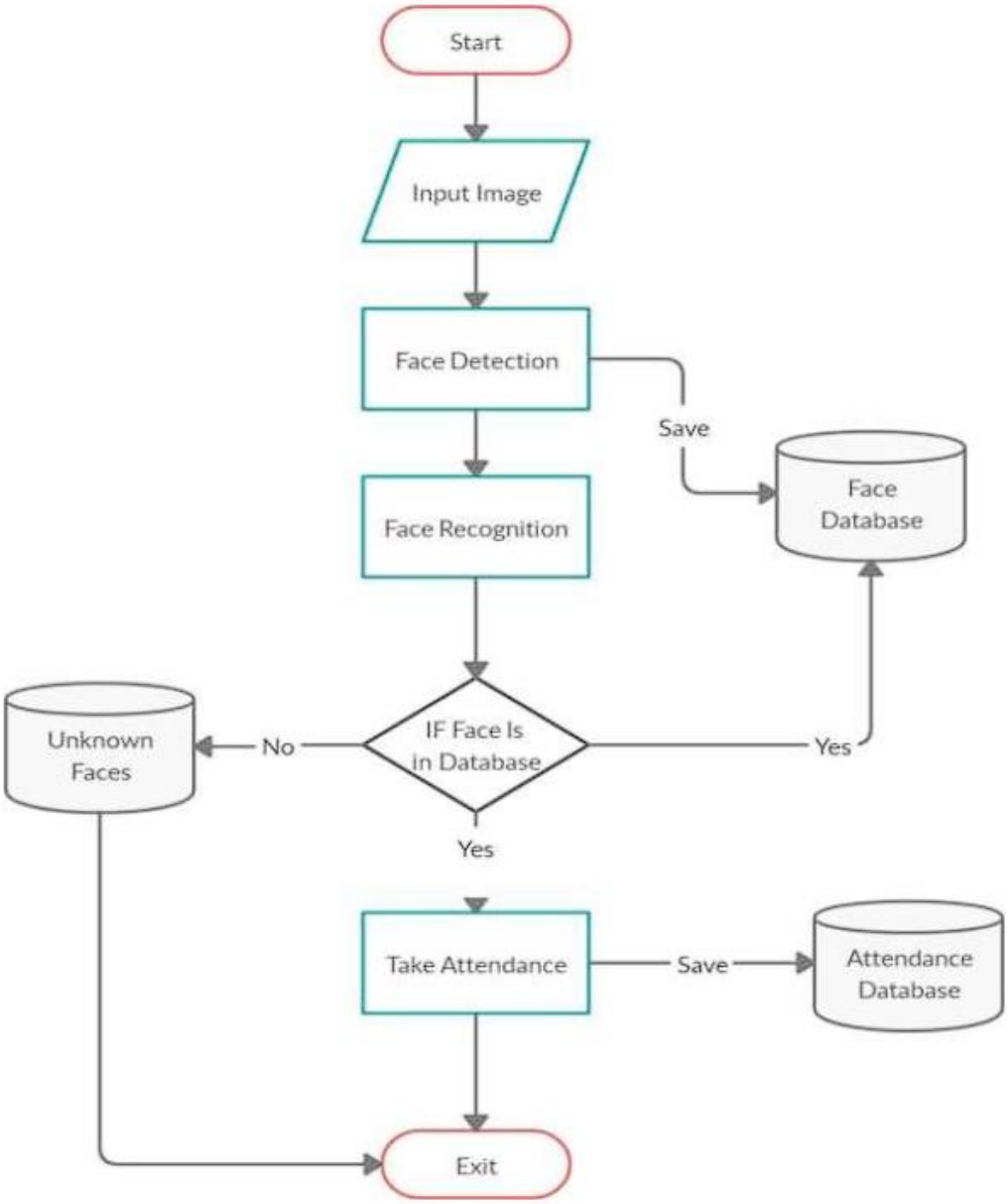


Fig 1.1

Chapter 2:- Literature Review

A comprehensive literature review on student attendance systems reveals a rich landscape of research and development, with a growing emphasis on leveraging advanced technologies, including face recognition. Here is a summary of key findings from existing literature:

In [1], R. Gupta and S Gupta provides an overview of various attendance management systems, emphasizing the need for an efficient and automated approach. It discusses the limitations of traditional methods and highlights the advantages of automated systems in terms of accuracy and time efficiency.

In [2], V. P. Ojha, V. S. Patel, and N. P. Gohil, explores the development and implementation of an automated attendance system using face recognition. It discusses the architecture of the system, focusing on the integration of face recognition technology to enhance the accuracy and efficiency of attendance tracking.

In [3], A. Almazaydeh, N. Alnawaiseh, and I. Alzubi, examines various biometric-based attendance systems, including fingerprint, iris, and face recognition. It discusses the strengths and weaknesses of each biometric modality and emphasizes the importance of choosing the most suitable technology based on specific application requirements.

In [4], A. A. Hassanat etal, presents an in-depth analysis of implementing a face recognition system for attendance applications. It discusses the challenges associated with face recognition, such as variations in lighting and facial expressions, and proposes solutions to address these issues.

In [5], R. S. Pawar and D. N. Pawar, focuses specifically on face recognition-based student attendance systems. It discusses the importance of face recognition in educational institutions, its advantages over traditional methods, and the challenges associated with implementing such systems.

Table No. 2.1

Tittle: comparision of model

Author	year	Different approches
R. Gupta and S. Gupta	2015	Student Attendance Management System, discusses the limitations of traditional methods and highlights the advantages of automated systems in terms of accuracy
V. P. Ojha, V. S. Patel, and N. P. Gohil	2016	Automated Attendance System using Face Recognition, discusses the architecture of the system, focusing on the integration of face recognition technology to enhance the accuracy

A. Almazaydeh, N. Alnawaiseh, and I. Alzubi	2019	Biometric-Based Attendance System, This review examines various biometric-based attendance systems, including fingerprint, iris, and face recognition
A. A. Hassanat, R. M. Al-Zubi, and S. K. Al-Azzawi	2013	Implementation of Face Recognition System for Attendance Application, discusses the challenges associated with face recognition, such as variations in lighting and facial expressions
R. S. Pawar and D. N. Pawar	2015	Student Attendance System Using Face Recognition, discusses the importance of face recognition in educational institutions, its advantages over traditional methods

Chapter 3:- Preliminary design

3.1 System Components:

- **Image Capture Device:**

  Utilizes high-resolution cameras for capturing facial images.

  May include infrared capabilities for improved performance in varying lighting conditions.

- **Image Processing Module:**

  Processes captured images to enhance facial features.

  Utilizes OpenCV library for facial detection and feature extraction.

- **Face Recognition Algorithm:**

  Implements a state-of-the-art face recognition algorithm (e.g., OpenFace, FaceNet).

  Employs machine learning for accurate identification based on unique facial features.

- **Attendance Management Module:**

  Manages the attendance records, updating in real-time.

  Connects with the face recognition system for authentication.

3.2 System Workflow:

- **Initialization:**

  The system starts by initializing the image capture device and loading the face recognition model.

- **Face Capture:**

  The camera captures facial images of students during class attendance.

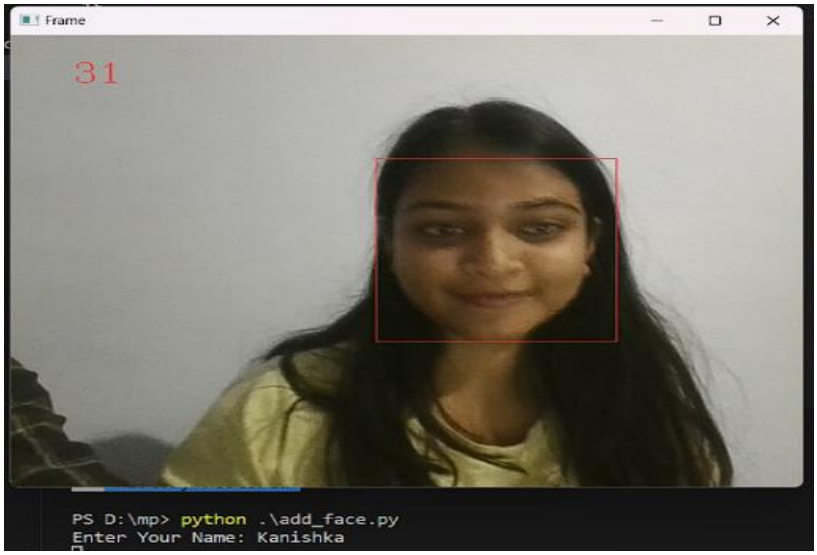


Fig 3.1: face capture

- **Face Recognition:**
  The preprocessed images are fed into the face recognition algorithm for identification. The algorithm matches facial features with those stored in the database.

Fig 3.2: face recognition

- **Attendance Recording:**
  Successful recognition results in the recording of attendance for the identified student. The attendance management module updates the database in real-time.

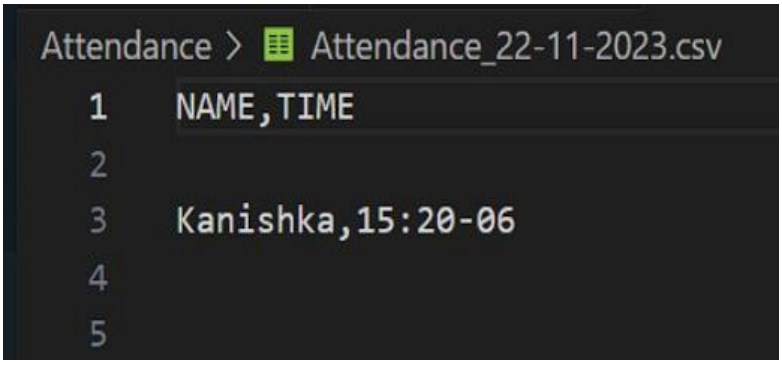
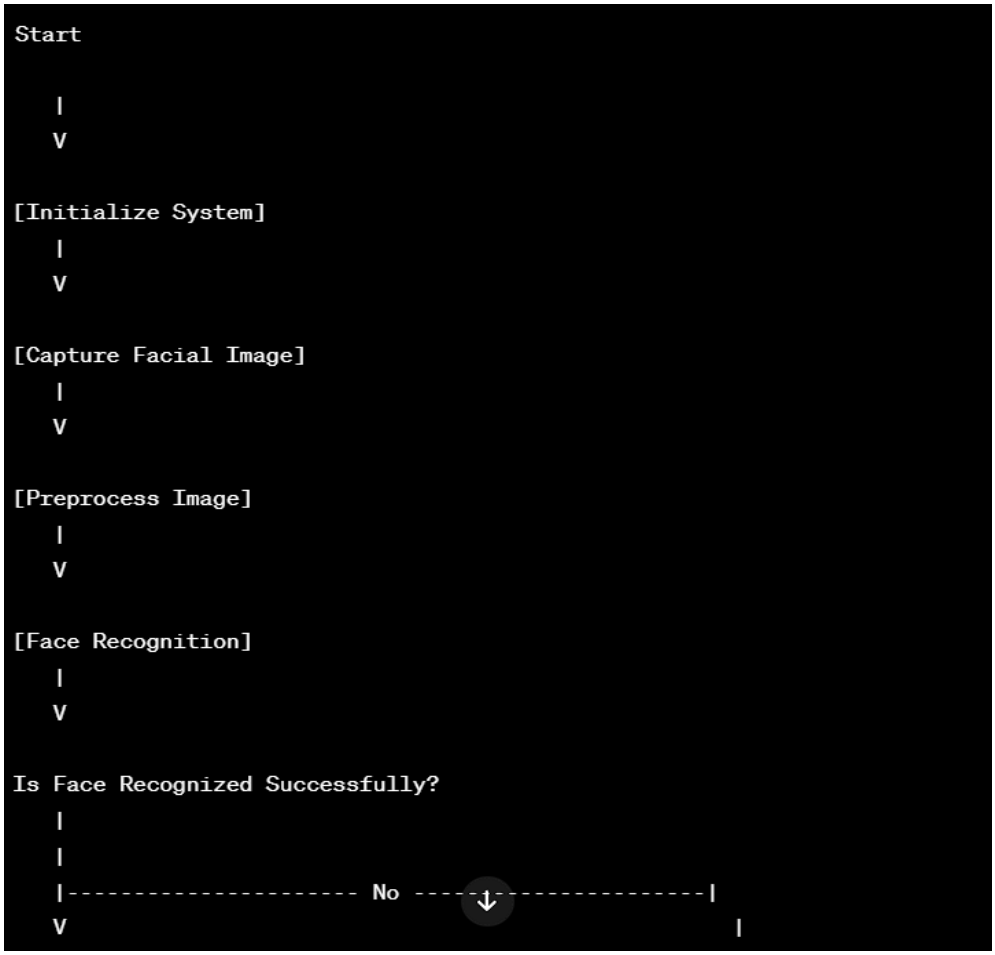
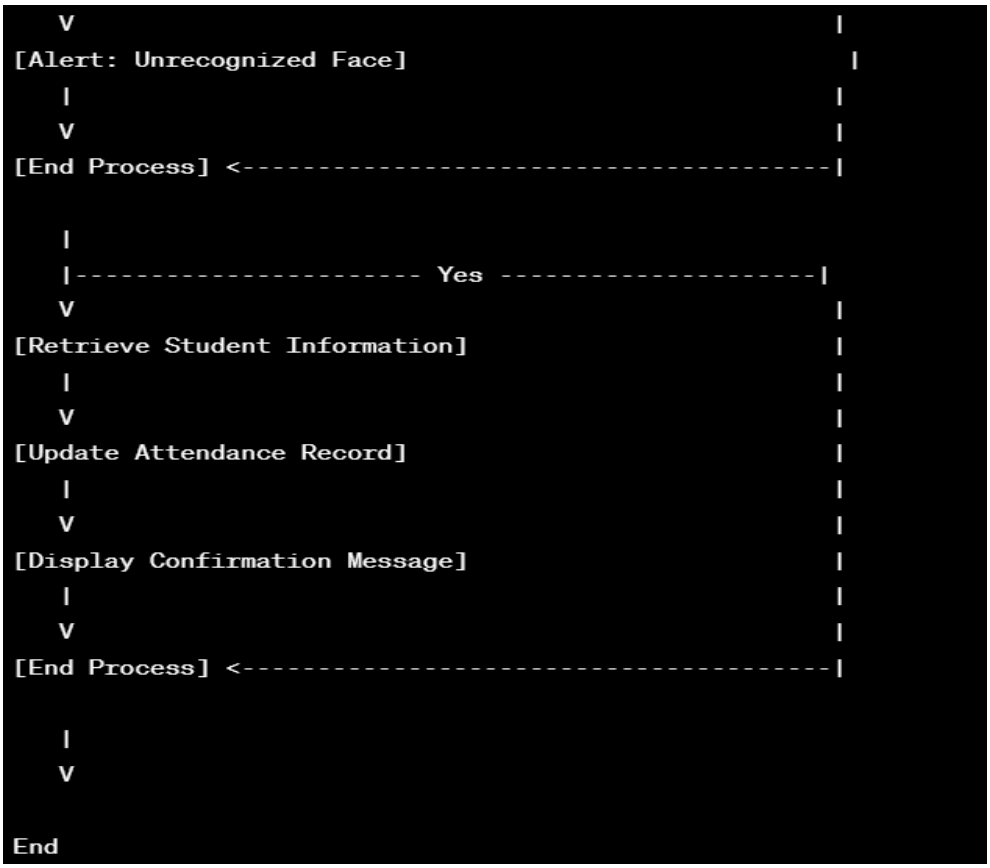


Fig 3.3: Attendence recording

3.3 Flowchart:-




V
[Alert: Unrecognized Face]
V
[End Process] <----------
Yes
[Retrieve Student Information]
V
[Update Attendance Record]
V
[Display Confirmation Message]
V
[End Process] <----------
V
End

Chapter 4: Final Analysis and Design

4.1 Results:-

The result of student attendance system using face recognition is below:-

Fig 4.1: Recognition of face

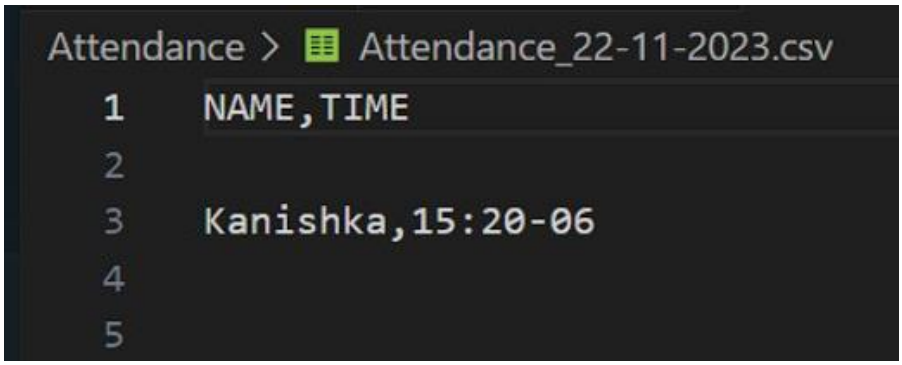


Fig 4.2:Management of attendance in CSV file

4.2 Result Analysis:-

The result analysis of the Student Attendance System using face recognition demonstrates its effectiveness in providing accurate and real-time attendance data. Leveraging facial recognition technology ensures reliability, reduces administrative burden, and enhances overall efficiency in attendance tracking, contributing to improved educational administration**.**

4.3 Application:-

The Student Attendance System using face recognition finds applications in educational institutions to automate and streamline attendance tracking. It improves efficiency, reduces manual effort, enhances accuracy, and provides real-time data. Additionally, it contributes to security by ensuring that only authorized individuals gain access to educational premises.

4.4 Challenges and Problems faced:-

The project on a student attendance system using face recognition encountered challenges such as lighting variations affecting image quality, limited hardware capabilities for real-time processing, and potential privacy concerns. Additionally, fine-tuning face recognition algorithms for diverse faces posed difficulties. Integration complexities with existing systems and ensuring system security were also significant issues. Addressing these challenges required a multidisciplinary approach involving image processing optimizations, hardware upgrades, and rigorous privacy safeguards, showcasing the need for thorough planning and adaptability in developing advanced technologies like facial recognition for attendance tracking in educational settings.

4.5 Limitations:-

Creating a student attendance system using face recognition has limitations.

- Privacy concerns
- Variability in lighting.
- Developing robust algorithms
- Hardware requirements
- Ethical considerations
- legal compliance,

Additionally, the cost of implementing and maintaining such a system may be prohibitive for certain educational institutions. Balancing technological advancements with ethical, legal, and practical considerations is crucial when developing projects involving facial recognition in educational settings.

4.6 Conclusion:-

In conclusion, developing a student attendance system using face recognition is a technologically advanced solution with great potential for efficiency and accuracy. However, it comes with challenges such as privacy concerns, recognition accuracy in diverse conditions, and the need for substantial hardware resources. Successful implementation requires a careful balance between technological innovation, ethical considerations, and legal compliance. Despite challenges, the project offers a transformative approach to

attendance tracking in educational institutions, streamlining processes and reducing administrative burdens. A comprehensive understanding of the limitations and a commitment to addressing ethical and privacy aspects are essential for the successful and responsible development of such projects.

5. References:-

[1] Student Attendance Management System: A Review, by R. Gupta and S. Gupta,Published in International Journal of Innovative Research in Computer and Communication Engineering (2015).

[2] Automated Attendance System using Face Recognition: by V. P. Ojha, V. S. Patel,and N. P. Gohil Published in International Journal of Computer Applications (2016).

[3] Implementation of Face Recognition System for Attendance Application: by A. A. Hassanat, R. M. Al-Zubi, and S. K. Al-Azzawi published in Journal of Computer Science (2013).

[4] Biometric-Based Attendance System: A Review

[5] Student Attendance System Using Face Recognition: A Review, Authors: R. S. Pawar and D. N. Pawar Published in: International Journal of Computer Applications (2015).

[6] Geeks for geeks

[7] Wikipedia