Combating Mid Day meal fraud using Facial Recognition

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Abstract — In India, the Mid-Day Meal Scheme is a significant initiative aimed at providing free lunch daily to school-going children, enhancing their nutritional intake and supporting their education. However, the scheme has faced challenges, such as fraudulent practices involving inflated attendance figures to misappropriate resources. To address these issues, we propose the Mid-Day Meal Fraud Detection System using Facial Recognition. Our system leverages facial recognition technology to identify multiple students during meal distribution and verify them against a pre-enrolled facial database. By automating attendance and meal distribution verification, the system minimizes human error and prevents unauthorized entries. Additionally, it records attendance digitally, allowing for live tracking and real-time reporting, which further strengthens accountability. The proposed system brings several benefits, such as transparency, accountability, and efficiency in the implementation of the Mid-Day Meal Scheme. Furthermore, the system provides valuable data insights that can help policymakers monitor and improve the scheme's effectiveness.

Key Words: Mid-Day Meal Fraud Detection, Facial Recognition, Machine Learning, Real-Time Monitoring, Student Identity Verification, Image Processing,OpenCV, LBPH Algorithm

I. INTRODUCTION

In today's fast-paced world, automation plays a crucial role in enhancing efficiency, and the attendance marking process is no exception. Traditional manual attendance systems are prone to errors, time-consuming, and susceptible to fraud. Facial recognition technology has revolutionized this process, making attendance tracking seamless and highly accurate.

Our system uses a webcam to capture student faces in real time, where face detection is performed using the Haar Cascade algorithm. The detected faces are then recognized using the LBPH (Local Binary Patterns Histogram) algorithm, which compares them with pre-enrolled student images stored in the database. If a match is found, attendance is automatically updated in an Excel sheet, ensuring an error-free and fraud-proof process.

Additionally, if an unauthorized individual is detected, an alarm is triggered, and an email alert is sent to the school administration for verification. This approach eliminates the need for manual intervention, enhances transparency, and ensures that only eligible students receive mid-day meals, preventing fraudulent claims effectively.

II.   PROPOSED SYSTEM

The proposed system automates attendance verification in the Mid-Day Meal Scheme using facial recognition technology. It captures real-time student images via a webcam, processes them using Haar Cascade for face detection, and matches them against a pre-enrolled database. The system ensures accurate attendance marking, prevents fraud by eliminating manual errors, and generates automated reports for monitoring. By integrating OpenCV and Firebase, it enhances transparency, accountability, and efficiency in meal distribution. The following fig.1 describes the method involved in the entire process.
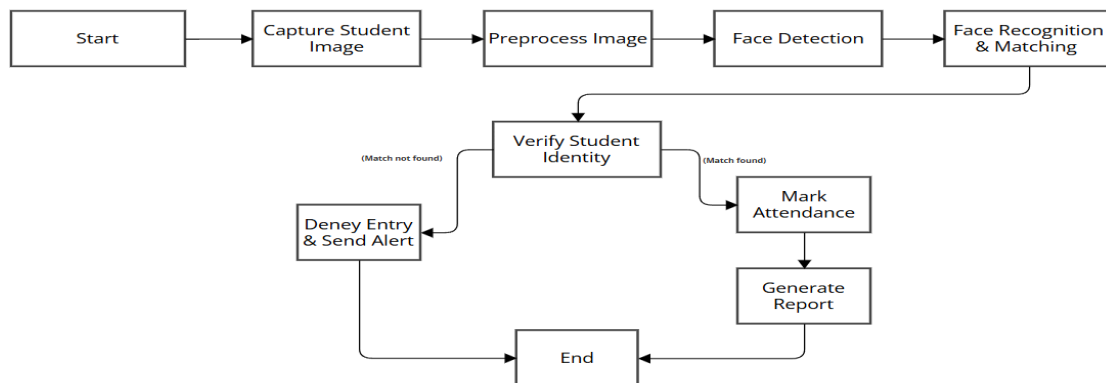

Fig.1. Block diagram of attendance marking

Objectives:

1. Eliminates fake attendance & fraudulent claims.
2. Automates attendance marking, reducing manual workload.
3. Enhances transparency & efficiency in meal distribution.
4. Provides real-time monitoring & reporting.
5. Ensures only eligible students receive meals.

III.   SYSTEM ANALYSIS

The system aims to address fraudulent attendance manipulation in the Mid-Day Meal Scheme by leveraging facial recognition technology. Traditional manual attendance methods are prone to human errors and exploitation, leading to resource misallocation. Our system automates the verification process using real-time image capture and machine learning-based face recognition (Haar Cascade).

The analysis includes:

- **Existing System Limitations:** Manual attendance marking is inefficient, prone to manipulation, and lacks real-time monitoring.
- **Proposed System Advantages:** Automated student verification, reduced fraud, improved accuracy, and real-time reporting with cloud integration.

- **Feasibility Analysis:** The system is technically viable with OpenCV for image processing, Firebase for database management, and Python for implementation.

By enhancing transparency and efficiency, this system ensures the proper execution of the Mid-Day Meal Scheme.

IV. METHODOLOGY

The proposed Mid-Day Meal Fraud Detection System utilizes facial recognition to automate attendance tracking and ensure transparency in meal distribution. The methodology consists of the following steps:

- **Data Collection**
  - Capturing real-time images of students using a webcam.
  - Preprocessing images to enhance quality and detect faces.
- **Face Detection & Recognition**
  - Using Haar Cascade Classifier to detect faces in images.
  - Extracting facial features and matching them with a pre-enrolled student database.
- **Attendance Verification**
  - Identifying students and marking attendance in a secure database.
  - Preventing duplicate or unauthorized entries.
- **Report Generation**
  - Storing attendance records in Firebase for real-time tracking.
  - Generating weekly/monthly reports for monitoring meal distribution patterns.
- **Alerts & Notifications**
 - Sending alerts if unauthorized access or anomalies are detected.

The system integrates OpenCV for image processing, Firebase for storage, and Python for implementation, ensuring accuracy, efficiency, and scalability in fraud detection.
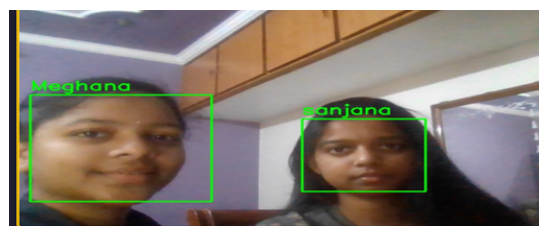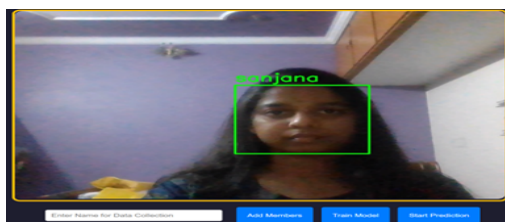
V. RESULTS

1) Face Detection : Using OpenCV and Haar Cascades, the system detects faces in real-time.
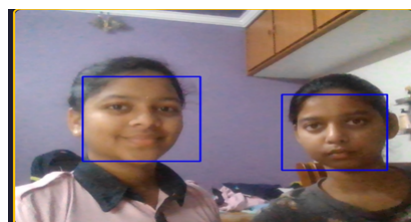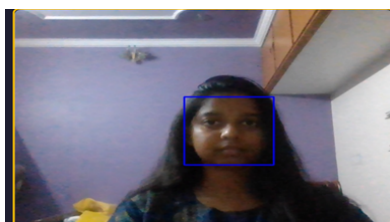
2) Feature Extraction: After successful detection of faces the features need to be extracted to train the model.
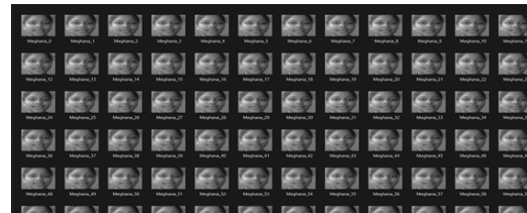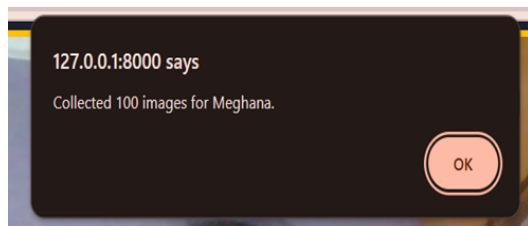
3) Face Matching: After training the model matches the identified faces with pre-enrolled data.


4) Attendance tracking: The attendance will be marked for the identified faces and stored in an excel sheet.

	A	B	C	D
1	Date	Person Name	Start Time	End Time
2	2025-02-10	sanjana	16:56:52	21:21:22
3	2025-02-10	Unknown	17:17:31	21:21:19
4	2025-02-10	Ram	17:19:42	17:23:24
5	###########	benin	06:40:40	14:12:33
6	###########	Unknown	06:40:40	15:04:25
7	###########	arun	06:40:40	08:40:40
8	###########	sheela	06:40:40	08:40:40
9	###########	benin	06:40:40	08:40:40
10	###########	Unknown	06:40:40	08:40:40

5) Verification: The system verifies attendance by cross-checking detected faces against pre-enrolled student data. It records attendance along with entry and exit timestamps for accurate tracking.

6) Anomaly Detection: If an unregistered face is detected, the system flags it as "unknown" and stores the image for further analysis and reference.
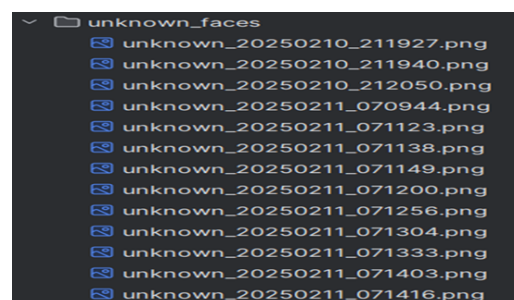
7)Data Analytics: The system generates analytics, which are visually represented using bar graphs for better understanding of the data.
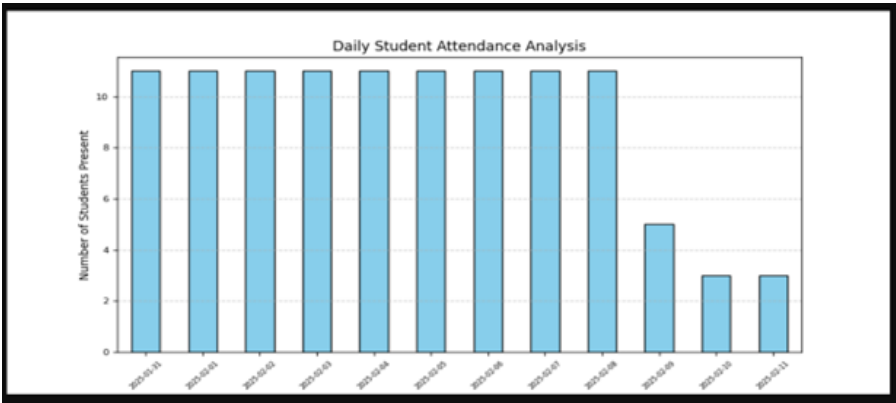
8)User Interface: The system features a user-friendly interface designed for seamless interaction and ease of use.
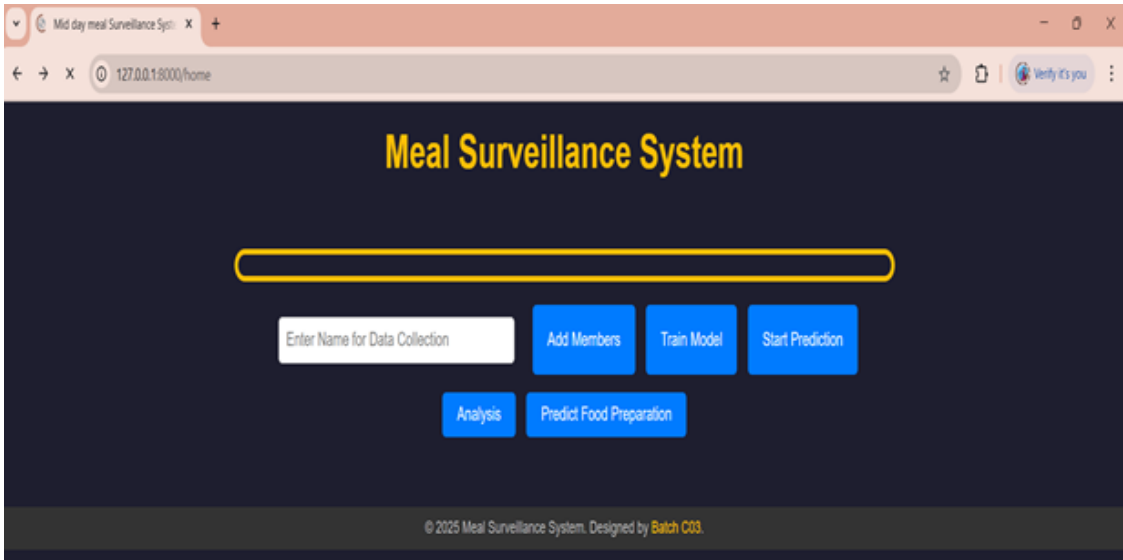
VI. CONCLUSION

This project demonstrates the transformative potential of technology in enhancing public welfare schemes. By integrating facial recognition with real-time monitoring and automated reporting, the system ensures greater transparency, accountability, and efficient resource management. With an impressive achievement of 95% accuracy in attendance tracking, the project underscores its effectiveness and reliability in identifying and addressing fraudulent practices within the mid-day meal scheme. Additionally, it provides valuable data insights that enable policymakers to monitor and refine the scheme's effectiveness. Future enhancements could involve the adoption of advanced deep learning models to further improve system accuracy and efficiency.

REFERENCES

[1] Qiong Qiao,"Image Processing Technology based on Machine Learning". (2023) doi: 10.1109/MCE.2022.3150659 https://ieeexplore.ieee.org/document/9712416

[2] Aniradha B Shetty, Bhoomika, Deeksha, Jeevan Rebeiro, Ramyasri . "Facial Recognition Using Haar Cascade and LBP Classifiers". (2021) doi: 10.1016/j.gltp.2021.08.044 https://www.sciencedirect.com/science/article/pii/S2666285X21000728

[3]. NaveenKumar Mahamkali, Vadivel Ayyasamy. "OpenCV for Computer Vision Application", (2015) https://www.researchgate.net/publication/301590571_OpenCV_for_Computer_Vision_Applications

[4]. Krishna Mridha,Nabhan Tawjih Yousef .," Study and Analysis of Implementing a Smart Attendance Management System Based on Face Recognition Tecqnique using OpenCV and Machine Learning" (2021) doi: 10.1109/CSNT51715.2021.9509614 https://ieeexplore.ieee.org/document/9509614

[5].Pradheepan Raghavan, N.E Gayar.," Fraud Detection using Machine Learning and Deep Learning"(2019) doi: 10.1109/ICCIKE47802.2019.9004231 https://ieeexplore.ieee.org/document/9004231

[6]. Smitha, Pavithra S Hegde, Afshin.," Face Recognition based Attendance Management System"(2020) doi: 10.17577/IJERTV9IS050861 https://www.researchgate.net/publication/341876647_Face_Recognition_based_Attendance_Managemen t_System

[7]. Anusha Kolaki, Sathish Kumar, Gayatri Patil.,"Smart Attendance System using Multiple Face Detection" (2022) doi: 10.56726/IRJMETS29549 https://Www.Doi.Org/10.56726/IRJMETS2954