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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

SESSION 2025-2026

SMART INDIA HACKATHON 2025 – INTERNAL HACKATHON REPORT

Team Details

Team ID: 76624

Team Name: DYnamite Coders

Problem Statement ID: SIH25016

Problem Statement Title: Automated Student Attendance Monitoring and Analytics System for Colleges

Theme: Smart Education

Category: Software

1. Introduction

Smart India Hackathon (SIH) is a nationwide initiative aimed at providing students a platform to solve pressing real-life problems using innovative technology. Our team, DYnamite Coders, participated in the Internal Hackathon 2025 with the problem statement “Automated Student Attendance Monitoring and Analytics System for Colleges.” The main goal of this project is to design a smart, AI-based attendance management system that automates attendance marking, prevents proxy, and offers analytical insights for colleges.

2. Problem Description

Traditional attendance systems are time-consuming, prone to errors, and susceptible to proxy attendance. There is a growing need for a secure, efficient, and automated system that ensures accuracy while minimizing manual intervention.

3. Proposed Solution

The proposed solution is a secure web-based portal that captures a class group photo, performs face recognition ($\geq 90\%$ accuracy) using deep learning algorithms, auto-fills an editable Excel sheet for attendance, sends real-time absentee alerts to parents through SMS or email, and provides an analytics dashboard for attendance trends, statistics, and detention lists.

4. How It Addresses the Problem

- Prevents Proxy: Accurate face matching ensures that only present students are marked.

- Saves Time: A single class photo replaces lengthy manual attendance taking.
- Instant Notifications: Parents are immediately informed about student absences.
- Reliable Records: Data is securely stored in a centralized database with complete audit trails.

5. Innovation and Uniqueness

- Low-Cost Implementation: Uses standard mobile or laptop cameras—no special hardware required.
- Hybrid Automation: Combines AI-based auto-marking with manual verification for full accuracy.
- Smart Analytics: Generates detention lists and trend reports automatically.
- Integration-Ready: Easily connects to existing ERP/LMS systems with minimal setup.

6. Technical Approach

Technologies Used

- Programming Language: Python
- Frameworks: Flask (Backend), React (Frontend)
- Computer Vision: OpenCV, dlib, face_recognition, CNN Algorithm
- Database: MySQL / PostgreSQL / MongoDB
- Frontend: HTML, CSS, JavaScript

Methodology & Process Flow

1. Photo Capture: Faculty captures a group photo using a smartphone or laptop.
2. Pre-Processing: System enhances the photo and detects faces.
3. Feature Extraction: CNN model converts each face into a 128-dimensional embedding.
4. Database Mapping: Embeddings are compared with stored data to mark attendance.
5. Data Visualization: Analytics dashboard presents attendance trends and summaries.

7. Feasibility and Viability

Feasibility

- Low-Cost & Scalable: Works with basic hardware (mobile cameras).
- Seamless Integration: Compatible with college ERP or LMS.
- High Accuracy: Delivers over 90 % precision in controlled environments.

Potential Challenges / Risks

- Accuracy drops in low lighting or blurry images.
- Privacy concerns regarding facial data storage.
- Internet dependency for real-time uploads.
- Faculty training requirements.

Mitigation Strategies

- Implement pre-capture quality checks and lighting guidelines.
- Use encryption, access control, and GDPR/IT Act compliance for data protection.
- Support offline photo capture with later synchronization.

- Provide user training and intuitive UI for easy adoption.

8. Impact and Benefits

Impact on Stakeholders

- Faculty: Reduces manual workload and saves class time.
- Students: Promotes accountability and attendance awareness.
- Parents: Provides instant absence alerts for peace of mind.
- College Administration: Improves data accuracy, security, and operational efficiency.

Key Benefits

- Social: Fosters discipline and strengthens communication between college and parents.
- Economic: Saves time and reduces administrative costs.
- Environmental: Encourages paperless and sustainable record keeping.

9. Research and References

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9. OpenCV Documentation – <https://docs.opencv.org/>
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12. Flask Framework – <https://flask.palletsprojects.com/>
13. MySQL Documentation – <https://dev.mysql.com/doc/>

10. Conclusion

The Automated Student Attendance Monitoring and Analytics System developed by Team DYNAMITE Coders (ID 76624) presents an efficient, cost-effective, and scalable solution to modernize college attendance management. By integrating AI-based facial recognition, real-time notifications, and analytics, this project aligns perfectly with the Smart Education theme of SIH 2025, fostering digital transformation in educational institutions.