FACE RECOGNITION IN CLASSROOM SET UP

Presented by : U21CS071 | U21CS063 | U21CS096 | U21CS0131

Prasanth Deepak Prajwala Aswin

PROBLEM STATEMENT

To Develop an efficient deep learning-based Siamese network system for real-time classroom attendance, addressing challenges in varying lighting, facial occlusions, multiple student detection, and ensuring biometric data privacy and security.

LITERATURE SURVEY

In developing our proposed methodology for an attendance automation system using facial recognition, we reviewed several key studies that informed our approach:

➢**Face Recognition using Histograms of Oriented Gradients**
This paper highlights the robust use of HOG features for face recognition, emphasizing dimensionality reduction to improve accuracy and mitigate overfitting in noisy datasets

➢ **Smart Attendance System Using CNN**
This study introduces a smart attendance system leveraging Convolutional Neural Networks, specifically utilizing Haar classifiers for face detection and Siamese Networks for generating face embeddings

➢ **Student Attendance System Using Face Recognition**
This research integrates KNN, CNN, and SVM algorithms for face detection and recognition, combining Gabor filters and Haar classifiers to address challenges like illumination and pose variations

PROPOSED METHODOLOGY

Siamese Network for Face Classification

- Used to classify faces by comparing embeddings of detected faces with those of registered faces in the database.
- Determines matches based on the similarity of embeddings.

Haar Cascade Classifier

- Fast and lightweight ideal for quickly detecting faces.
- Reliable for Face Detection: Provides a good balance of accuracy and efficiency, suitable as a preprocessing step for our project.

WHY SIAMESE?

One-Shot Learning: Can identify new faces with minimal data, ideal for dynamic environments like classrooms.

Feature Matching: Compares embeddings to determine facial similarity effectively.

Scalable and Efficient: Handles large databases without retraining for new entries.

Robust: Performs well despite variations in lighting, pose, and occlusions.

DATASET

Training the Siamese Network

- **Dataset:** A custom dataset comprising labeled individual student images for training. Includes classroom group images for testing to simulate real-world scenarios.

- **Description:** Captures variations in lighting, facial expressions, and angles, ensuring the model is robust and relevant to classroom attendance automation.

FLOW CHART

Input: Classroom Image

↓

Face Detection: Identify and crop individual faces

↓

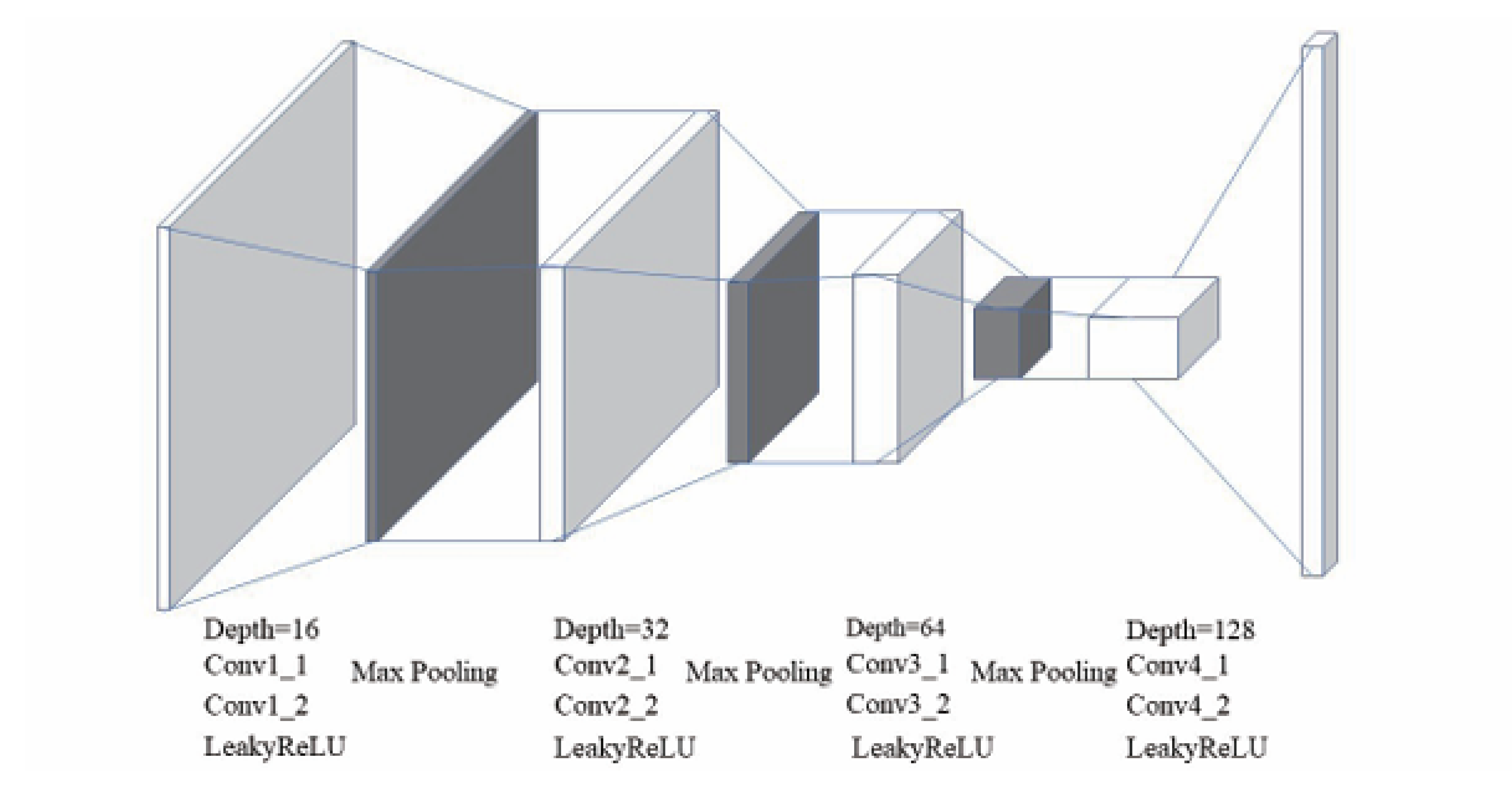
Feature Extraction: Generate face embeddings using the Siamese Network

↓

Matching: Compare extracted embeddings with the database of registered faces

↓

Output: Names/Roll Numbers of Recognized Faces



ref. Siamese NN Model.

METHOD USED

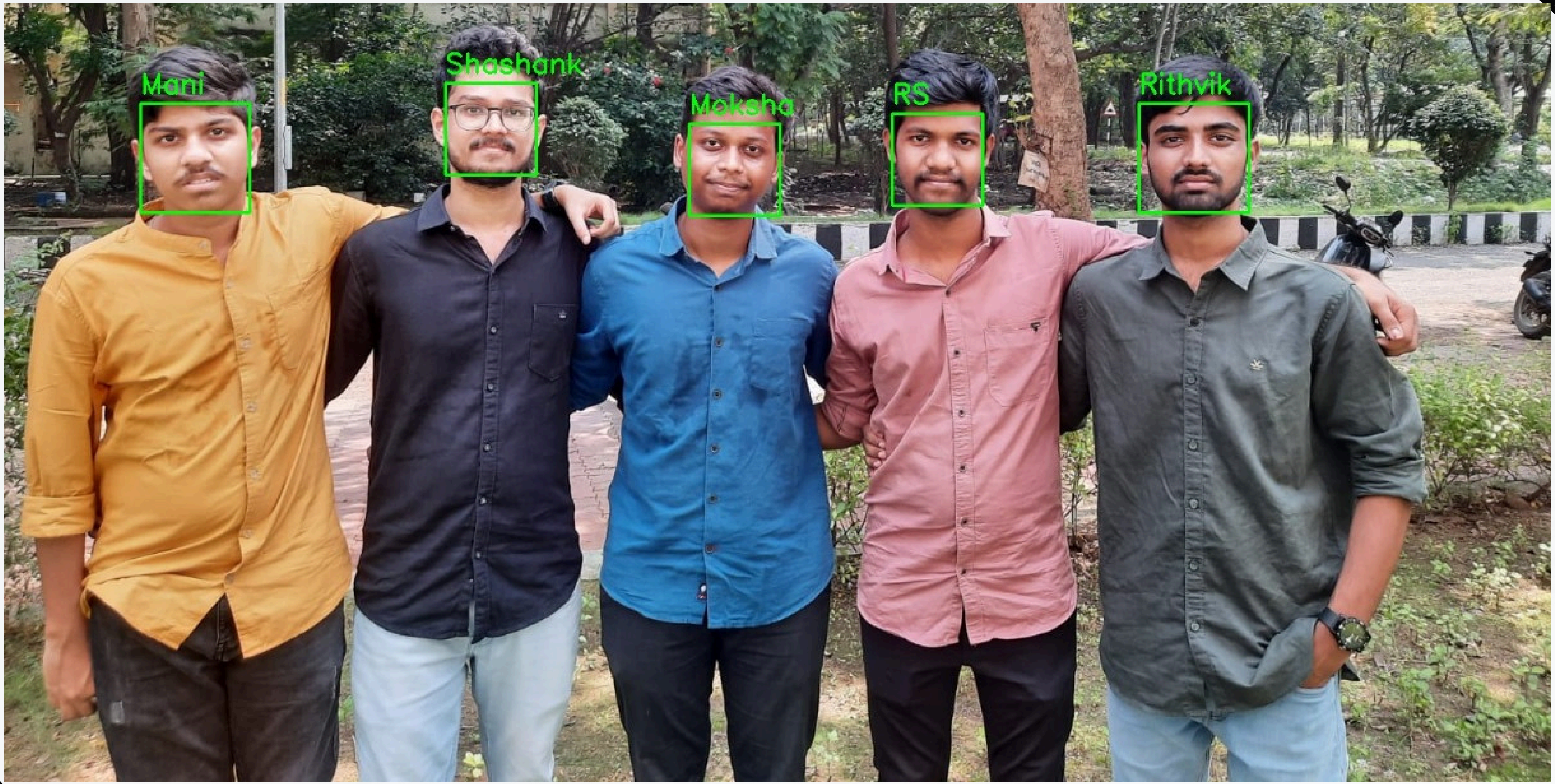
Haar Cascade Classifier: Detects and crops faces from the classroom image.

Siamese Network: Generates unique embeddings for each face and compares them with the database to identify matches.

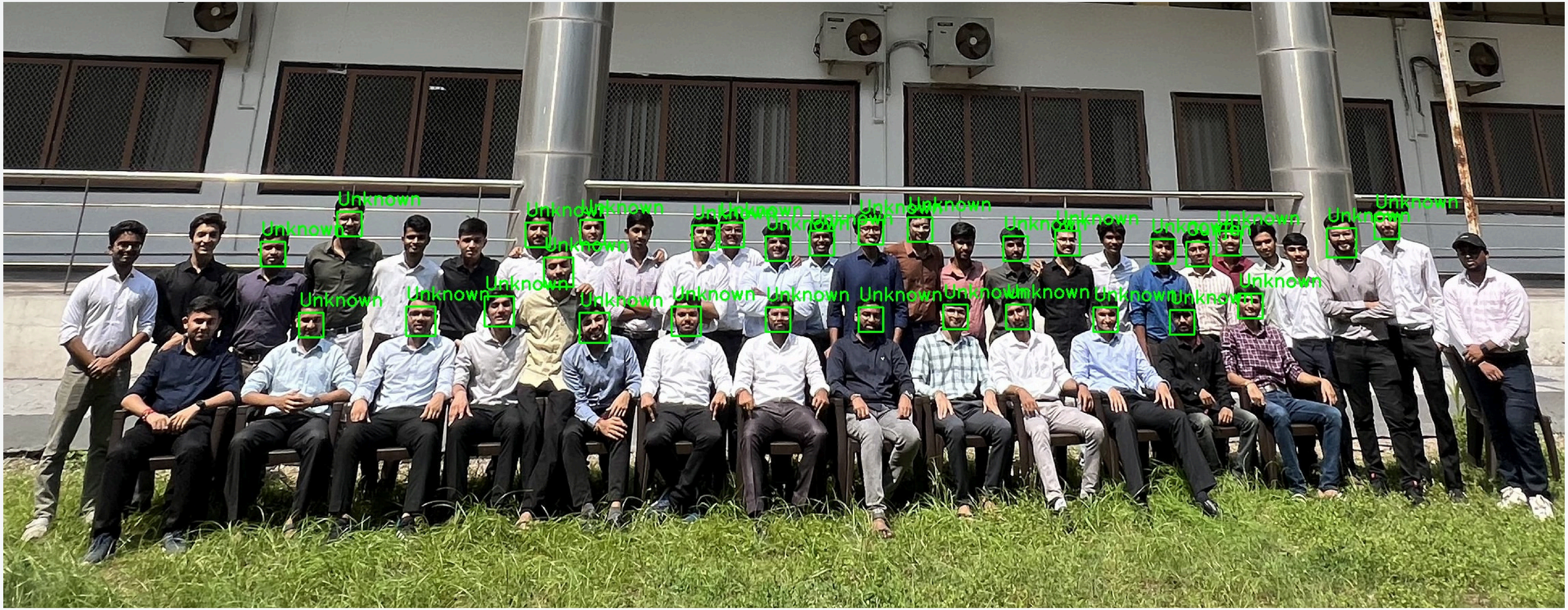
RESULTS


Unknown
Unknown
Rishi
Mani
Unknown
Unknown
Rithvik
Prasanth
Shashank
Aswin
joy
Pardhiv
RS
Ansah

RESULTS



RESULTS



FUTURE WORK

- Enhance accuracy by training the model on larger, diverse datasets to handle lighting, angles, and occlusions.
- Improve scalability to process multiple classroom images efficiently for larger groups.
- Incorporate automated report generation and attendance trend analysis.

CHALLENGES

- Managing variations in real-world conditions like uneven lighting, occlusions, and similar facial features.
- Ensuring data privacy and ethical handling of student images during dataset creation and model deployment.
- Reducing false positives and false negatives while maintaining high-speed processing.

INDIVIDUAL CONTRIBUTIONS

DEEPAK JOY

- Learning and Research
- Literature Review
- Model development
- Report making

ASWIN

- Learning and Research
- Model enhancement
- Report making

PRAJWALA

- Learning and Research
- Data collection
- Model enhancement
- PPT making

PRASANTH

- Learning and Research
- Literature Review
- Model development
- PPT making

THANK YOU