

Automatic Classroom Attendance System

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Abstract— This project presents a real-time attendance management system using image processing techniques. A camera captures student images at the classroom entrance, and facial features are detected and processed for recognition. The system uses Convolutional Neural Networks (CNN) to identify students automatically and mark attendance in a database. This approach reduces manual effort, improves accuracy, and enhances classroom management efficiency.

Index Terms—Student Attendance Monitoring, Face Recognition, Convolutional Neural Networks.

I. INTRODUCTION

Attendance is an important parameter in schools and colleges. Traditionally, it is recorded manually, which is time-consuming and difficult to maintain.

To overcome these issues, the attendance process can be automated using image processing techniques. The proposed system uses facial recognition to identify students. A camera captures images at the classroom entrance, and the system compares them with stored data to mark attendance automatically.

Face recognition is a widely used biometric technology that does not require physical contact. However, factors such as lighting, facial pose, and occlusion can affect accuracy. Therefore, advanced deep learning techniques are used to improve system performance.

II. PROBLEM DEFINITION

The traditional attendance system requires manual effort and is prone to errors. The proposed system aims to enhance the attendance process by using face recognition technology based on Convolutional Neural Networks (CNN) and image segmentation methods.

III. PROPOSED METHODOLOGY

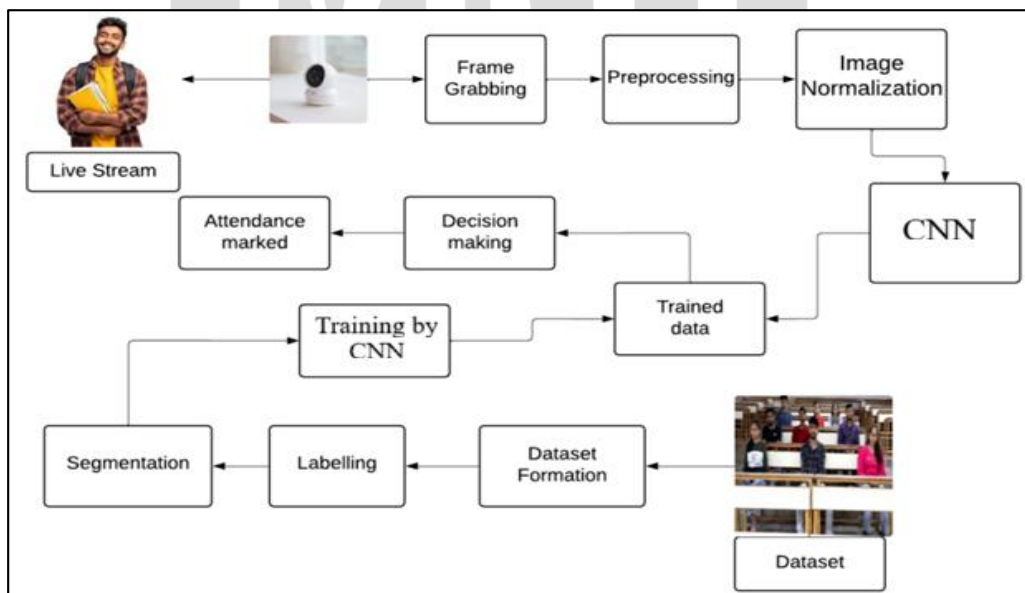


Figure 1: System Overview Design

A. System Overview

The system captures real-time images using a camera placed at the classroom entrance. The images are preprocessed and passed through a CNN model for identification. Once recognized, attendance is marked in the database automatically.

B. Module Description

Module A: Image Capture

- Captures live images
- Frame processing and normalization
- Extracts image frames

Module B: CNN Model

- Input layer initialization
- Hidden layer processing
- Output prediction
- Model training

Module C: Image Preprocessing

- Image resizing
- Image segmentation
- Image conversion
- Normalization

Module D: Decision Making

- Input test image
- Model evaluation
- Decision process
- Attendance marking

IV. SYSTEM DIAGRAMS

1. DFD Level 0

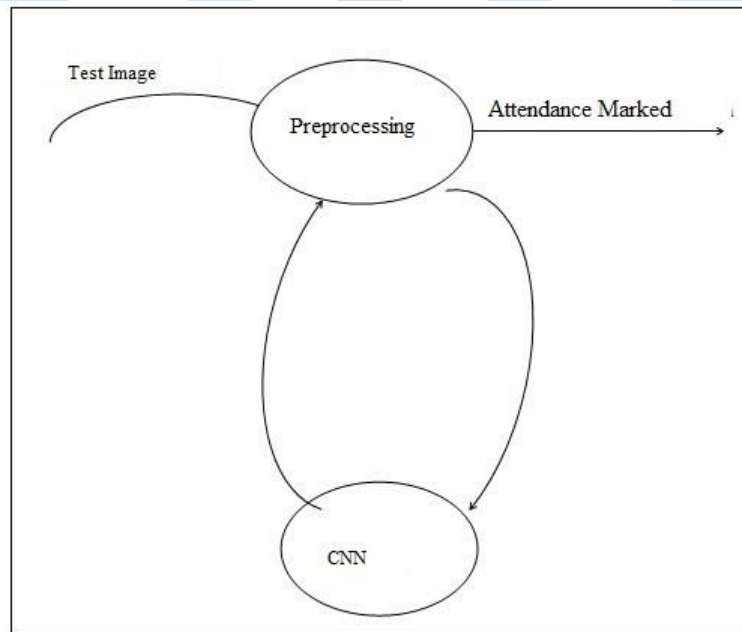


Figure 2: Data Flow Diagram (DFD Level 0)

2. Activity Diagram

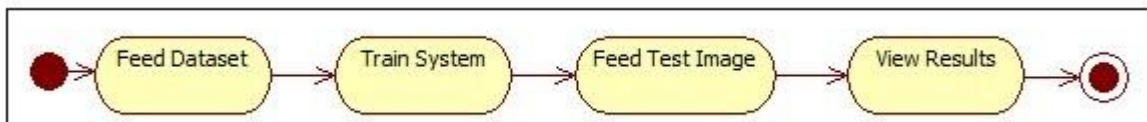


Figure 3: Activity Diagram

3. Use Case Diagram

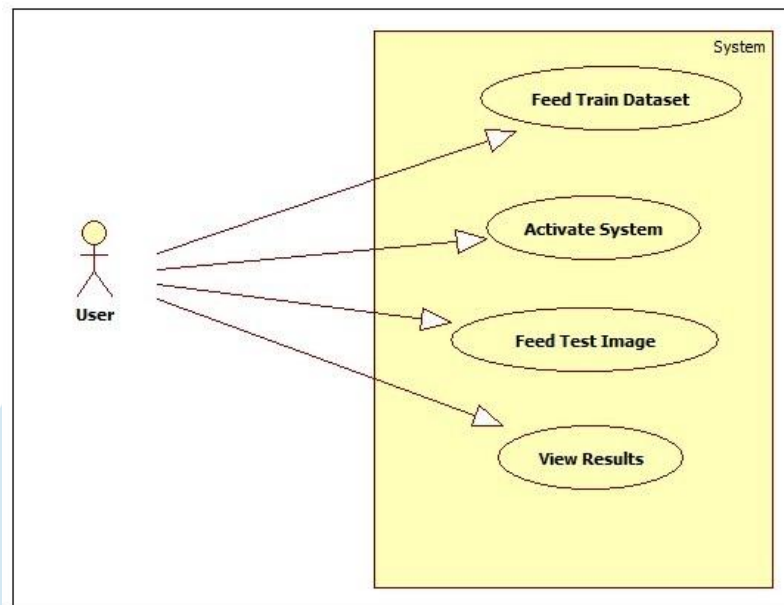


Figure 4: Use Case Diagram

V. SOFTWARE REQUIREMENTS

A. Hardware Requirements

- CPU: Intel Core i5
- RAM: 8 GB
- Hard Disk: 500 GB
- Camera: 48 MP

B. Software Requirements

- Programming Language: Python
- Development Kit: Python 3.9
- Front End: Tkinter
- IDE: Spyder 5.2
- Database: MySQL
- Libraries: OpenCV, TensorFlow, Keras, MySQL Connector

VI. RESULTS AND DISCUSSION

The system successfully detects and recognizes student faces in real time. Attendance is automatically recorded in the database. The system reduces manual effort and improves accuracy compared to traditional methods.

VII. CONCLUSION

The proposed system automates attendance using face recognition and CNN techniques. It captures images, identifies students, and records attendance efficiently. This improves classroom management and reduces errors. Future improvements may include enhanced accuracy under varying lighting conditions and integration with cloud-based systems.

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