AI-Powered Facial Recognition System for Automated Student Attendance Management

Abstract

This project presents a comprehensive solution to streamline and modernize student attendance management using advanced artificial intelligence (AI) technologies, specifically facial recognition. The system employs a dataset of pre-collected student face images, uniquely linked to student IDs and names, to identify and mark attendance in real time. By leveraging cutting-edge deep learning models for facial feature extraction, the system generates and stores unique facial embeddings for every student. These embeddings are compared against real-time video feed inputs captured via a high-definition camera. Upon successful recognition, the system automatically logs the attendance of the identified students, complete with timestamps, into a centralized database.

Unlike traditional attendance systems, which are often prone to errors and inefficiencies, this solution ensures accuracy and reliability by using advanced facial recognition algorithms capable of analyzing 3D facial features. This reduces issues caused by variations in lighting, facial angles, and expressions. The centralized database not only stores daily attendance records but also enables seamless retrieval of historical data for each student. Administrators and educators can use an intuitive software interface to monitor attendance trends, calculate attendance percentages, and generate detailed reports for individuals or entire classes.

Key features of this system include the ability to handle large datasets, robust real-time recognition performance, and a user-friendly dashboard for data visualization and reporting. The system is designed to be scalable, accommodating both small classrooms and large institutions. By automating attendance management, this project aims to save time, reduce manual errors, and provide a reliable framework for educational institutions to maintain accurate attendance records. In doing so, it enhances operational efficiency and ensures that student monitoring becomes a seamless part of the learning environment. This innovative approach to attendance management represents a significant step toward integrating AI-driven automation into educational processes.