SMART ATTENDANCE SYSTEM USING CNN

Chandrashekar Katral
USN:02fe21bec025 Roll no:22
Abhinandan Malaji
USN:02fe21bec001 Roll no:01
Brunda G
USN:02fe21bec023 Roll no:20
Parvati Halse
USN:02fe21bec057 Roll no:52

***Abstract*—Convolutional Neural Networks (CNNs) have played a significant role in various applications, including surveillance, object detection, and object tracking. Face recognition using CNNs is a key aspect of surveillance applications and is widely employed in University automation systems, Smart Entry management systems, etc. In this paper, a novel CNN architecture for a face recognition system is proposed, including the process of collecting face data from students. Experimentally, it is shown that the proposed CNN architecture provides 99 percentile accuracy. Furthermore, the CNN framework is utilized to develop a web-based "Smart Attendance Management System (SAMS)," providing real-time attendance of students using face recognition. The proposed application is easy to deploy and maintain.**

***Index Terms*—CNN, face recognition, attendance system, SAMS, web-based application**

I. Introduction

Face Recognition is a popular physiological biometric technique known for its high security. In comparison to other physiological biometric techniques like Fingerprint Recognition, Iris Recognition, and behavioral biometric techniques such as Signature Recognition, Voice Recognition, and Keystroke Recognition, face recognition is considered more secure. Convolutional Neural Network (CNN) is a category of neural network architectures [4], which extracts features implicitly without any prior intuition, in contrast to conventional machine learning algorithms where feature selection or feature extraction is necessary. The CNN has gained a lot of attention due to its generalizable nature in providing feasible solutions to computer vision-related problems such as face recognition [5], object detection [6], image segmentation, etc. Over the years, CNN architectures have evolved to address challenges in computer vision.

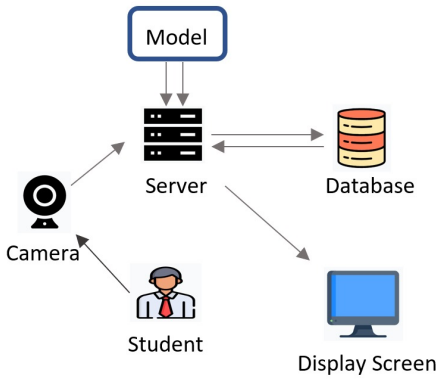

Fig. 1. Overview of the Application

II. Literature Review

Several studies have contributed to the field of face recognition-based attendance systems using CNN. Winarno et al. proposed a CNN-PCA method and real-time camera system achieving 99.86 percentile accuracy [**?**]. Chowdhury et al. developed an automatic class attendance system using CNN-based face recognition [1]. Damale and Pathak presented a face recognition-based attendance system using machine learning algorithms [2]. Kakarla et al. introduced a smart attendance management system based on face recognition using CNN [3]. Selvi et al. proposed a face recognition-based attendance marking system [4]. Smitha et al. designed a face recognition-based attendance management system [5].

III. Block Diagram with Explanation

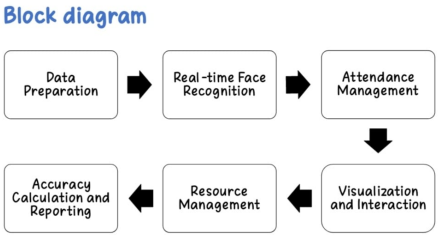

Fig. 2. Block Diagram

The block diagram illustrates the following key components:
Data Preparation: Load images from a specified directory. Extract known faces' encodings using face recognition. **Real-time Face Recognition Pipeline:** Continuously capture frames from the webcam. Detect faces and recognize them in real-time. **Attendance Management:** Mark attendance if a recognized face is found. Update attendance records. **Visualization and Interaction:** Display the real-time webcam feed with face recognition results. Capture keyboard input for user interaction. **Resource Management:** Release the webcam and close OpenCV windows. Ensure proper cleanup of resources. **Accuracy Calculation and Reporting:** Calculate the accuracy of the face recognition system. Print statistics such as total faces and correct predictions.

IV. Future Scope

1. **Database Integration:** Enhance the system by integrating a database for efficient attendance record management and integration with other systems.

2. **Real-time Analytics:** Implement analytics to provide insights into attendance patterns, aiding decision-making based on real-time data.

3. **Multi-Camera Support:** Improve face recognition accuracy by supporting multiple cameras, suitable for larger spaces and diverse environments.

4. **User-Friendly Interface:** Develop an intuitive interface for easy configuration, enhancing user experience and administrative control.

5. **Security Enhancements:** Explore and implement additional security features, including anti-spoofing measures, to ensure system robustness.

6. **Cloud Integration:** Integrate with cloud services for scalability, remote management, and seamless updates, ensuring data accessibility from anywhere.

V. Results

Fig. 3.

VI. Data set

Fig. 4. Training data set

Fig. 5. Testing data set

VII. Conclusion

This paper formally introduces the role of CNN in Face Recognition and adaption of CNN in attendance posting. The workflow of the web application, Smart Attendance Management System (SAMS), is explained in detail. The data collection and data augmentation for developing the CNN model are discussed. This paper also proposes a novel CNN model for face recognition, which is further used in developing SAMS. The experimental results show the efficiency of the proposed CNN model and the web application SAMS. SAMS is easy to deploy and maintain. The future scope of the paper is to build a robust application for smart attendance management for more numbers of students, in real-time.

VIII. References

References

[1] S. Chowdhury, S. Nath, A. Dey, A. Das, "Development of an Automatic Class Attendance System using CNN-based Face Recognition."

[2] R. C. Damale, Prof. B. V. Pathak, "Face Recognition Based Attendance System Using Machine Learning Algorithms."

[3] S. Kakarla, P. Gangula, M. S. Rahul, C. S. C. Singh, T. H. Sarma, "Smart Attendance Management System Based on Face Recognition Using CNN."

[4] K. S. Selvi, P. Chitrakala, A. A. Jenitha, "Face Recognition Based Attendance Marking System."

[5] Smitha, P. S. Hegde, Afshin, "Face Recognition based Attendance Management System."