

# Deep Neural Network Based Smart Attendance Monitoring System

<sup>1</sup>Karan Gadodia, <sup>2</sup>Ishita Koradia, <sup>3</sup>Sayali Patil, <sup>4</sup>Vaibhav Kotecha, <sup>5</sup>Prof. Aniket Shahade

<sup>1,2,3,4</sup>Student, Department of Information Technology, Shri Sant Gajanan Maharaj College of Engineering, Shegaon, Maharashtra, India

<sup>5</sup>Assistant Professor, Department of Information Technology, Shri Sant Gajanan Maharaj College of Engineering, Shegaon, Maharashtra, India

## ABSTRACT

Students admitted to educational institutions are raising every year and taking each student's attendance plays a crucial role. Manually taking attendance is a great burden to the management of the Institute. To solve the above issue, a smart attendance management system comes into the picture. But maintaining privacy and security in the model is a big challenge. Biometrics is generally used to take smart attendance. One of the biometric methods is Face Recognition which we are using in our model. Face Recognition, which is the principal component of biometric verification is being used widely in various applications such as video monitoring and CCTV footage system. The issue of proxies is resolved using this proposed method. Detection and Recognition of the Face are the prime execution stages in this proposed system. In this paper, we are proposing a Smart Attendance monitoring System by using methods such as OpenCV, Haar-Cascade Classifier, and Convolutional Neural Network (CNN). After these, the detected faces are compared with the data stored in the database. The proposed system will be successfully implemented for organizing the attendance of students.

**Keyword :** - Attendance, Convolutional Neural Network, Deep Learning, Image Processing

## 1. INTRODUCTION

As we are moving towards digitalization, our tasks are shifted from human-operated tasks to machine operating tasks.[1] We have accommodated processes of a smart approach like in tourism, bank, and health care. We have algorithms developed for computer vision but we felt a need for the smart attendance monitoring system.[1] To record the attendance, we need an appropriate system to maintain consistency.[2] Two categories of the attendance monitoring system are used i.e. Manual Attendance System (MAS) and Automated Attendance System (AAS). Practically in the Manual Attendance System, taking attendance is a hectic task because we have to manage attendance sheets and records which is time-consuming. So to deal with this, we need an automated attendance management system. AAS reduces the burden on the management of attendance. [2] Automated attendance can be taken through biometrics such as face recognition, iris recognition, GAIT analysis, etc. From which we have implemented on Face Recognition Based Attendance Monitoring System. The identification quality is improved by two methods: face detection and identification of human faces. In the face detection model, HOG (Histogram of Oriented Gradient) is used for feature extraction and CNN is used for face recognition.

## 2. LITERATURE REVIEW

Halder, et. al [1] implemented a system that can be categorized as a real-time perspective. The system takes no extra time for any organization. This system will observe the in and out timings of people in an organization. When an individual enters, his/her face is captured and detected and entry time will get captured. In the same way, our time is also stored.

Pranav KB, et. al [2] proposed a system in which the initial evaluation is performed using standard AT&T datasets and after same is forwarded to the real-time method. Various parameters of CNN are used to improve the recognition accuracy of the proposed system. Sharma, et. al [3] proposed a system in which the image is directly fed as input, and CNN performs 2-D transformations such as translation, rotation, and scaling. Overall, fed image as input and divide it into two sets: Training image and Tested image. Later BOW approach is applied to extract features. Sawhney, et. al [4] implemented a System using Face Recognition Techniques by using Eigen face values, Principle Component Analysis (PCA), and Convolutional Neural Network (CNN). Thanh, et. al [5] proposed a system in which the face detection model used HOG (Histogram of Oriented Gradient) to extract facial features and CNN is used for the face recognition model.

### 3. METHODOLOGY

#### 3.1 Architecture

The Architecture of the Automated Attendance system is fluent to execute. The proposed method contains one database, containing employees' information as labels of their names and photographs. However, for marking attendance and maintaining attendance an excel sheet is displayed.

A High-Definition camera is installed on the main gate to take attendance. As the employee enters the organization, his/her face is scanned by the camera. Now as a face captured in the camera at the main gate, this face is cross-checked with the previously fed photographs in the database by using the face detection and recognition algorithm. Now if the face is verified the attendance is marked.

#### 3.2 Methodology

For a successful attendance management system, a few stages are taken into consideration. They are as follows:

- Image Acquisition
- Face Detection
- Feature Extraction
- Face Recognition
- Attendance

#### 3.3 Image Acquisition

A high-definition camera is placed at the main gate of the organization for image acquisition purposes. This image is fed to the system as an input.

#### 3.4 Face Detection

In the Face Detection process, features of the face like eyes, nose, and mouth are detected, and the Face recognition process initiates. These basic facial features are necessary to identify a person. Face Recognition technology also needs to know about the face and how it looks. This process is generally done using Deep learning and Machine Learning Algorithms. For this system, we have implemented using CNN and HOG. Now face is detected successfully. We will move on to the next phase of the process which is Feature Extraction.

#### 3.5 Feature Extraction

After Face Detection, we will implement computer-vision algorithms for the detection of Facial features such as eyebrow corners, the tip of the nose, eyes gap, mouth corners, etc. These features are unique for each person and used to differentiate each person in the database.

#### 3.6 Face Recognition

After the facial features are extracted, the key elements of the face are fed to the system. The first process is a comparison of faces captured by the camera and previously stored data in the database. For Face Recognition we have implemented an inbuilt face recognition python library.

#### 3.7 Attendance

After completion of face detection and recognition, the attendance is recorded accordingly. The attendance is displayed on the CSV file to the authorized person.

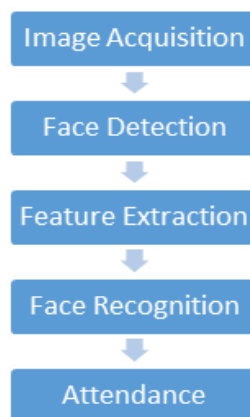


Fig- 1 Figure for Implemented Method

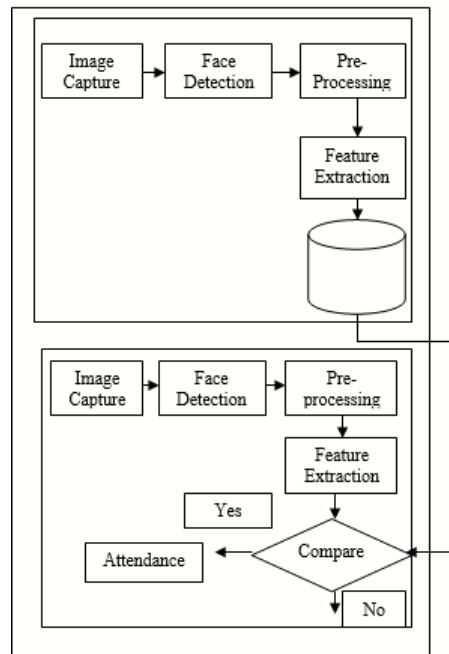


Fig -2: Attendance Management with Face Recognition

## 4. TECHNOLOGIES

### 4.1. Django REST frameworks:

Django in python is the web development framework and the library used in Django is Django Rest Framework which is used to build Rest APIs. Django Rest Framework is mainly used to make the CRUD operations easy. It is simple to implement your Django Server as a REST API using Django Rest Framework. We have implemented the front end of our system using Django Framework.

### 4.2. HTML(Hyper Text Markup Language)

HTML is the simplest structure of the Webpage. HTML specifies the meaning and structure of the webpage. We can set images, data tables, paragraphs, and also a list of bulleted points.

### 4.3. CSS(Cascading Style Sheet):

It is used to explain a document written in HTML or XML. CSS specifies how the webpage will look and feel. CSS is used for styling and fixing the layout of the webpage.

### 4.4. SQLite3:

It is a file-based SQL database and is integrated with Python for which we don't need to install SQLite3 additionally. SQLite is a Relational Database Management system built in ANSI-C. Internal data storage is the main application of SQLite.

### 4.5. Open CV:

Open CV is an open-source package that is supported by various programming languages such as C++, Java, and Python. It is used in Computer vision, Machine Learning, and Image Processing. It is used for identifying faces, images, and handwriting in images and videos.

### 4.6. Numpy (Numerical Python):

It is a Python library that is used to work with arrays. Array object in Numpy is faster than traditional Python lists to process. It is written in Python but C/C++ is used for the element which needs faster computation.

### 4.7. CNN(Convolutional Neural Network):

It is a neural network that is specially used for image classification. It has two main elements, feature extraction, and classification. It detects features without human intervention.





Fig- 5.4 Test Image

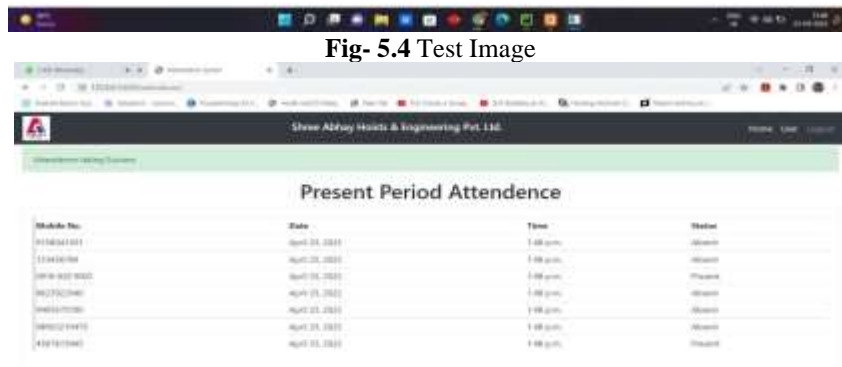


Fig- 5.5 Attendance is marked

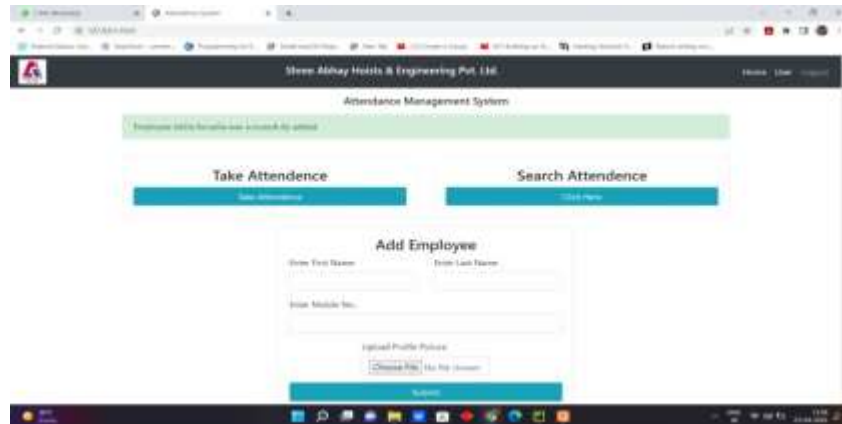


Fig- 5.6 Message is displayed that attendance is marked

Mobile No.	Date	Time	Status
9896 822 9889	April 22, 2022	12:52 pm	Absent
9896 822 9889	April 22, 2022	12:51 pm	Absent
9896 822 9889	April 22, 2022	9:49 am	Present
9896 822 9889	April 22, 2022	9:54 am	Present
9896 822 9889	April 22, 2022	10:00 am	Present
9896 822 9889	April 22, 2022	10:27 am	Present
9896 822 9889	April 22, 2022	10:42 am	Present
9896 822 9889	April 22, 2022	10:48 pm	Present
9896 822 9889	April 22, 2022	10:54 am	Present
9896 822 9889	April 22, 2022	10:59 am	Present

Fig- 5.7 Attendance report

#### 4. CONCLUSION

For marking the attendance, our proposed smart attendance monitoring system is a great choice. This system solves the problem of proxies and fake attendances. Face recognition is the best option for attendance management when we count it in terms of performance and accuracy. The face recognition system eliminates human interference. We don't need any specific hardware for this system. We just need a camera, a Computer System, and a database server for the implementation of our proposed model.

#### 5. FUTURE SCOPE

The proposed system has a very vast future scope. These proposed systems can be implemented on an intranet for any organization for attendance management. Updates are easy when needed. Expansion of the system is feasible and transparent.

#### 6. REFERENCES

- [1] Rohit Haldar, Rajdeep Chatterjee "Deep Learning-based Smart Attendance Monitoring System", September 2019.
- [2] Pranav KB, "Design and Evaluation of Real-time face Recognition System Using Convolutional Neural Networks", Third International Conference on Computing and Network Communications", 2020.
- [3] Megha Sharma, Parul Vats, "Face Recognition by CNN using HOG and Bow Feature Extraction Approach ", Turkish Journal on Computer and Mathematics, 2021.
- [4] Shreyak Sawhney, " Real-Time Smart Attendance System Using Face Recognition Technique", 9<sup>th</sup> International Conference on Cloud Computing and Data Science & Engineering, 2019.
- [5] Bui Tanh Hung, "Face Recognition Using Hybrid HOG-CNN Approach", Research in Intelligent and Computing Engineering, 2021.
- [6] S. Lukas, A. R. Mitra, R. I. Desanti, and D. Krisnadi, "Student Attendance System in Classroom Using Face Recognition Technique," in ICTC 2016, Karawaci, 2016.
- [7] P. Wagh, S. Patil, J. Chaudhari, and R. Thakare, "Attendance System based on Face Recognition using Eigenface and PCA Algorithms," in 2015 International Conference on Green Computing and Internet of things(ICGCIoT), 2015.
- [8] M. Arsenovic, S. Skadojevic, and A. Anderla, "FaceTime- Deep Learning-Based Face Recognition Attendance system.," in IEEE 15th International Symposium on Intelligent Systems and Informatics, Serbia, 2017.
- [9] A. Jha, "Class Room Attendance System Using Facial Recognition System.," in International Journal of Mathematical science technology and management 2(3), 2017.
- [10] K. Goyal, K. Agarwal, and R. Kumar, "Face Detection and tracking using OpenCV," in International Conference on Electronics, Communication, and Aerospace Technology, ICECA, 2017.
- [11] N Borkar, S kuwelkar, " Real-Time Implementation of Face Recognition System", IEEE International Conference on Computing Methodologies and Communication, 2017.
- [12] J Dhanaseely, Himavathi, Srinivasan " Principle component analysis based cascade neural network for face recognition" Emerging trends in science, Engineering and Technology, IEEE 2012.
- [13] Sukaya Sagarika Meher & Pallavi Maben Face recognition and facial expression identification using PCA Advanced Computing Conference(IACC), 2014 IEEE International.
- [14] M Sahu and R Sahu, "Study on Face Recognition Techniques", International Conference on Communication and Signal Processing, 2020.
- [15] Ma, Songyan, and Lu Bai. "A face detection algorithm based on Adaboost and new Haar-Like feature." 2016 7th IEEE International Conference on Software Engineering and Service Science (ICSESS). IEEE, 2016.