

# Multi Face Detection and Gender Classification Based Attendance System

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## Abstract

*Time management is critical in today's hectic classroom, and keeping track of attendance can take up valuable class time. Utilizing technologies like facial recognition and detection can greatly expedite this procedure. While face recognition algorithms compare the detected faces with known faces kept in a database, face detection algorithms can recognize human faces within a group photo or video stream. Without the need for human interaction, teachers can effectively record attendance by incorporating these technologies into an automated attendance system. By adding multi-face detection capabilities to your project, you can further increase efficiency—especially in larger class sizes—by having the system scan numerous faces at once. This shortens the time required for the process by enabling the recording of attendance for every student in the frame at once. An image or video stream of the class is usually captured, face detection is used to find faces in the frame, and face recognition is used to compare these faces with the student database. A match is automatically recorded as present in the student's attendance record. It is crucial to deploy robust face detection and identification algorithms that can tolerate fluctuations in illumination, facial expressions, and occlusions to assure accuracy and reliability. The storage and use of facial data should also take data security and privacy concerns into account. By putting in place an automated attendance system, educators can guarantee precise and effective attendance monitoring while freeing up important class time for more productive activities.*

**Keywords:** Face detection, attendance, automatic, multifaced detection, robust face.

## INTRODUCTION

In today's world, a lot of methods are currently present, which takes attendance through various means. The manual method where human interaction is required is time consuming and, at times, inefficient due to reasons like a proxy. Now-a-days many institutions are using biometric systems like fingerprint scanners, facial recognition, etc. But, in all these methods, time consumption is the main issue because each student must go and give their attendance, be it a fingerprint scanner or through facial recognition [6–7]. To automate this process, multiple face recognition is used. In this project

multiple faces are detected and recognized at a time to mark a student absent or present. This process eliminates human interaction, which ultimately saves time while taking attendance class. This system also segregates faces based on gender. The conventional method of managing extensive student records proves to be inefficient and labor-intensive. Hence, the rationale behind our system is to minimize manual workload, decrease the likelihood of errors in record-keeping, and ensure the accuracy of data. Additionally, our aim is to diminish the reliance on paperwork and enhance communication with parents by keeping them well-informed about their child's progress [8–9].

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## OBJECTIVES

The objective of a multi-face detection and gender classification-based attendance system is to automate the process of taking attendance in various settings, such as classrooms or workplaces, by detecting and recognizing multiple faces in an image or video stream and then classifying the gender of everyone. The goal of this system is to decrease the amount of manual input required for attendance management while increasing accuracy and efficiency. Additionally, it can provide valuable insights into attendance patterns and demographics [10].

## LITERATURE REVIEW

The abstract for the paper "Facial Recognition using Haar Cascade and LBP Classifiers" by A. Shetty et al. in 2021 outlines their approach in utilizing Haar Cascade and LBP (Local Binary Patterns) classifiers for facial recognition. It likely describes the methodology, results, and conclusions of their research. If you need more detailed information, you may need to access the full paper [1].

The paper titled "Face Recognition based Smart Attendance System" by A. Arjun Raj, M. Shoheb, K. Arvind, and K. S. Chethan was presented at the 2020 International Conference on Intelligent Engineering and Management (ICIEM) in London, UK. It discusses a smart attendance system utilizing face recognition technology [2].

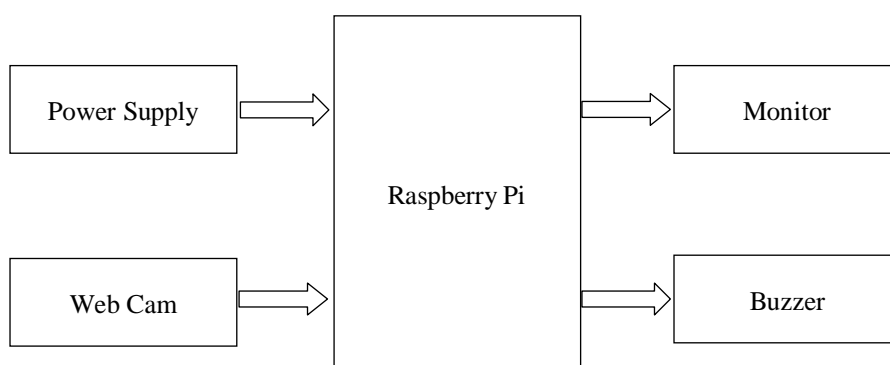
This paper presents a facial recognition system employing Haar Cascade for feature detection. Haar Cascade classifiers are utilized for efficient object detection, particularly suited for facial feature extraction. The system's architecture and implementation details are discussed, along with experimental results demonstrating its effectiveness in real world scenarios [3].

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The paper titled "Comparison of Face Recognition Algorithms using OpenCV for Attendance System" by Sudha Narang, Kriti Jain, Megha Saxena, and Aashna Arora, published in the International Journal of Scientific Research Publications in 2018, explores the comparison of various face recognition algorithms implemented using OpenCV for attendance systems. The short abstract provides an overview of the study's objectives, methodologies, and key findings regarding the effectiveness and performance of different face recognition techniques for attendance tracking purposes [5].

## METHODOLOGY

This block diagram depicts the working as well as showing the components that we are using during this project. Various components that are being used in this project are Raspberry Pi, Webcam, LCD, etc are shown in Figure 1. The power source provides power to the whole circuit.



**Figure 1.** Block Diagram.

*Hardware Development:* The hardware for the attendance system based on gender classification and multifaced detection must be developed first. To do this, the following components will need to be designed and prototyped:

- Attendance system hardware
- Face detection
- Communication modules

The Multifaced attendance and gender classification-based attendance system hardware should be designed to be robust and withstand the demands of the attendance monitoring system. The Webcam should be able scan and identify the registered faces based on stored data. The communication modules should be able to transmit data to the cloud reliably and securely.

## HARDWARE REQUIREMENTS

*RASPBERRY Pi:* It's true that the Raspberry Pi is a small, flexible computer that has become more and more well-liked due to its low cost. From simple computational operations to more complex applications like the ones you outlined, it can handle a broad variety of jobs.

Regarding the Raspberry Pi board in Figure 2, it probably shows the different parts and ports that are on the circuit board. Features like the USB ports for keyboards and mice, the HDMI ports for connecting to displays, the Ethernet port for network connectivity, the GPIO (General Purpose Input/Output) pins for connecting external devices, and perhaps other parts like the microSD card slot for storage could be included in this.

*WEBCAM:* A webcam, often referred to as a video web camera, is a device utilized for capturing video footage and transmitting it to a computer or computer network. Webcams can either be integrated into computer hardware or exist as separate peripheral devices. They are typically connected to a computer via USB or wireless protocols. Figure 3 shows webcam.



**Figure 2.** Raspberry Pi.



**Figure 3.** Webcam.

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## Software Requirements

*Python IDE:* An integrated development environment (IDE) designed specifically for Python programming is called IDLE. Since version 1.5.2b1, it has been a part of the Python language distribution as standard equipment. IDLE is an optional installation that is included with many Linux distributions, although it should be noted that it is fully written in Python and makes use of the Tkinter graphical user interface (GUI) toolkit.

*NOOBS OS:* NOOBS, which stands for New Out Of the Box Software, serves as a user-friendly bootloader specifically designed for the Raspberry Pi. With NOOBS, users can effortlessly install various operating systems on their Raspberry Pi devices. Furthermore, NOOBS enables the installation of multiple operating systems and facilitates booting from them, providing enhanced flexibility and convenience.

## Algorithms

The following algorithms will be used in the smart vending machine system: *Image detection:* Detection of registered images for recording attendance. *Read Image Data:* the data of scanned face will be analysed from storage.

*Classification of gender:* Faces will be classified based on gender as male or female.

## FUTURE SCOPE

The future scope for multiple face detection and gender classification is vast, especially with the advancements in computer vision and machine learning. It can be applied in various fields like security surveillance, retail analytics, healthcare, and even in social media for targeted advertising. As technology progresses, we can expect improved accuracy, speed, and robustness in these applications, making them more reliable and widely adopted. For a more thorough study and insights, more customization and interaction with other AI technologies may be possible.

## Acknowledgement

We are extremely modest in our expression of thanks. To sum up the priceless assistance and encouragement we received from several people, in a few sentences would be unfair. However, words are the only means by which one can communicate their emotions, and our thankfulness goes well beyond words. We would be proud to use this chance to express our gratitude. First of all, we would like to express our gratitude to our dear mentor *Dr. R.P. Patil* for her invaluable advice, tolerance, and encouragement. She was constantly there to push us a little bit further so that we could finish the task correctly and on schedule. He has always allowed us to work independently on projects and with her supervision. We would want to thank *Prof. C.R. Kuwar* from the bottom of our hearts.

## RESULT

Images are captured using a defined camera, and each captured image is subsequently saved. To enhance accuracy, multiple images are taken using the 'take image' option. Upon successful capture and saving of each image, a notification message is displayed. Throughout this process, an external webcam connected to the Raspberry Pi is utilized. Captured image is shown in Figure 4

When the 'track images' option is clicked, the camera initiates the process of capturing multiple images to analyze facial features. Subsequently, this information is utilized to mark the individual's attendance in a spreadsheet, along with the associated time and date, ID number, and name. Dataset of trained images are shown in Figure 5.

In this system multiple faces are scanned simultaneously as shown in Figure 6. Attendance is monitored and further classified according to gender

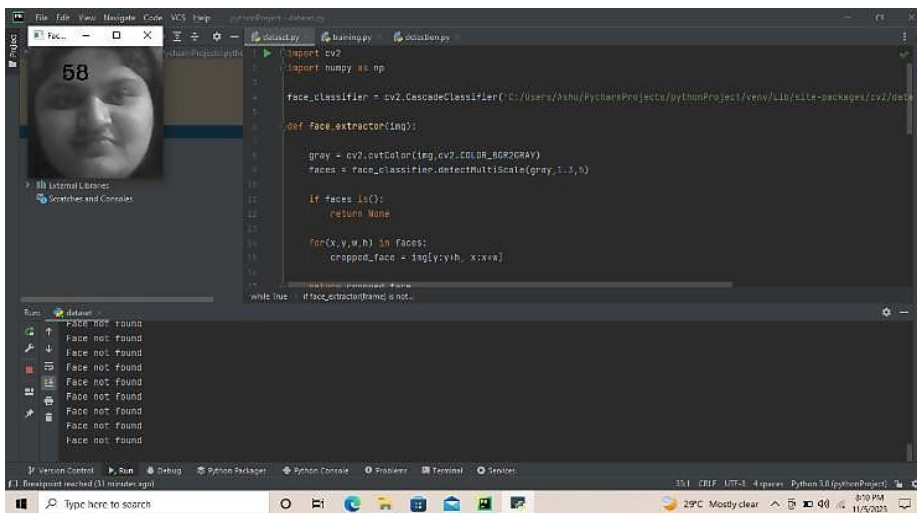


Figure 4. Captured Image.

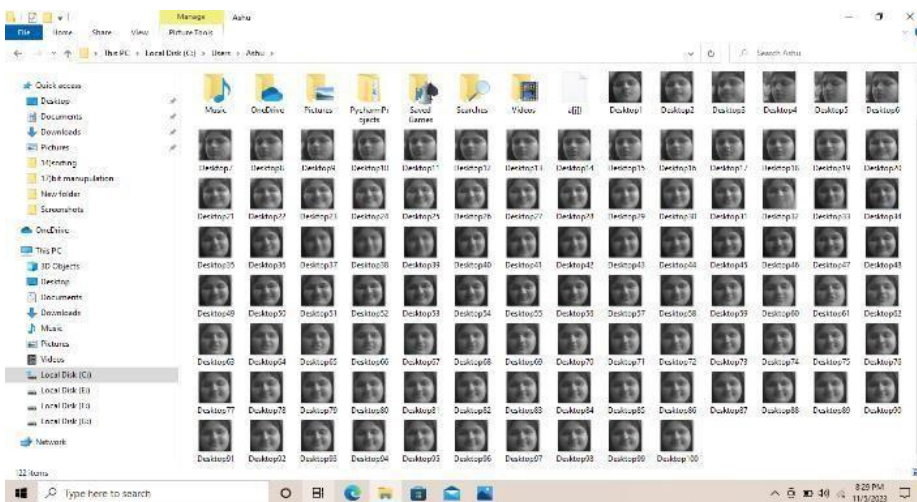


Figure 5. Dataset of trained images.



Figure 6. Multiface detection.

**Table 1.** Overall Result.

Total	4
Male	2
Female	2

**Table 2.** Attendance Marked.

Name	Roll Number	Absent/Present
Tony	18	Present
Pretty	29	Present
John	34	Present
Twinkle	45	Present

From the above tables it can be noted that:

1. Faces of four students are detected simultaneously through multi face detection and gender classification system as shown in the image.
2. The first table shows the total number of people in the picture and also sorts it based on their gender.
3. In the second table their name and roll number is printed along with their attendance after detection of face.

## CONCLUSION

An automated system with multi face detection will be developed by us, which marks attendance based on face detection and further sorts them based on gender. The system can be used at various public places for gender segregation. The project is an excellent option for schools and institutions where time cannot be wasted on taking attendance; instead, it can be focused on more productive things. The data taken will be stored for long time as it will be stored in sheets which will be more efficient than the attendance which is taken on paper. This will also improve accuracy. Easy to access as it will be stored on sheets which can be accessed from wherever we want. The present attendance system lacks proper time management and accuracy, and our proposed system overcomes this limitation.

## REFERENCES

1. A.shetty,bhoomika, Deeksha,J.Rebeiro and Ramyashree, "facial recognition using Haar Cascade And LBP classifier",2021.
2. A,Arjun Raj ,M.shoheb, k. Arvind and K.S Chetan,"facial recognition based smart attendance System,"2020 International Conference on Intelligent Engineering and Management (ICIEM),London UK,2020,pp,354-357, doi:10.1109/ICIEM48762-85689,2021.
3. A Garain B Ray," GRANet: A Deep Learning Model for classification of Age and Gender From Facial Images." IEEE Access Volume,09 pp.85672-85689,2021.
4. Sudha Narang, Kriti Jain,Megha Saxena,Aasharna Arora (2018) ;comparison of face recognition Alogorithms using OpenCv for Attendance System; Int J Sci Res Publ 8(2)(ISSN:2250-3153)
5. Karthikeya C.S and Murugeswari S,2013." Anytime anyplace-remote monitoring of student's attendance based on students attendance based on RFID and GSM network ". International Journal of Advance Research in Electrical, Electronics and Instrumentation Engineering, Volume 2,pp.615-6159.
6. Sanli O, Ilgen B. Face detection and recognition for automatic attendance system. InIntelligent Systems and Applications: Proceedings of the 2018 Intelligent Systems Conference (IntelliSys) Volume 1 2019 (pp. 237-245). Springer International Publishing.
7. Wati V, Kusri K, Al Fatta H, Kapoor N. Security of facial biometric authentication for attendance system. Multimedia Tools and Applications. 2021 Jun;80(15):23625-46.
8. Siddiqui MF, Siddique WA, Ahmedh M, Jumani AK. Face detection and recognition system for

- enhancing security measures using artificial intelligence systems. *Indian Journal of Science and Technology*. 2020 Mar;13(09):1057-64.
9. Ismail NA, Chai CW, Samma H, Salam MS, Hasan L, Wahab NH, Mohamed F, Leng WY, Rohani MF. Web-based university classroom attendance system based on deep learning face recognition. *KSII Transactions on Internet and Information Systems (TIIS)*. 2022;16(2):503-23.
  10. Patil, A., Shukla, M.: Implementation of classroom attendance system based on face recognition in class. *Int. J. Adv. Eng. Technol.* **7**(3), 974 (2014)