

Presentation on Minor Project on topic-

# Automated Attendance System using Face Recognition



**Project Guide:**

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# Abstract

- The conventional method of taking attendance is done manually by the teacher or the administrator which requires considerable amount of time and efforts also involving errors and proxy attendance.
- As the number of students are increasing day by day, it is a challenging task for universities or colleges to monitor and maintain the record of the students.
- To overcome these issues, biometric feature like facial recognition can be used which involves the phases such as image acquisition, face detection, feature extraction, face classification, face recognition and eventually marking the attendance.
- The algorithms like Viola-Jones and HOG features along with SVM classifier are used to acquire the desired results. Various real time scenarios are needed to be considered such as scaling, illumination, occlusions and pose.
- The problem of redundancy in manual records and keeping attendance is solved by this system.

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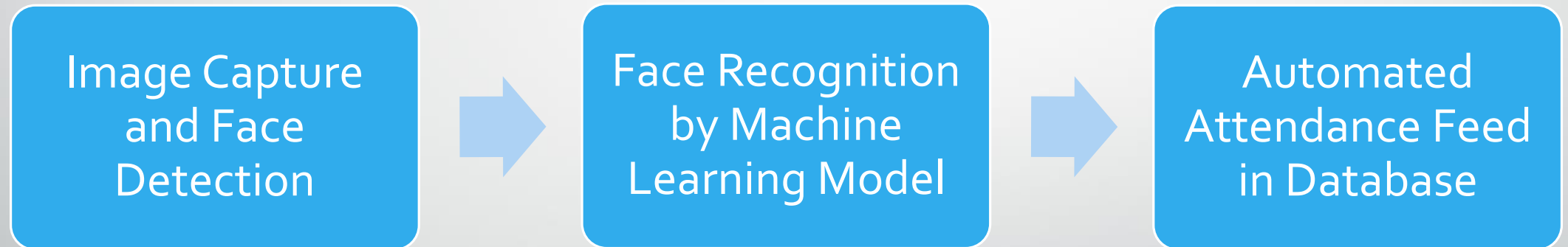
# Objective

In this project we aim to build an Attendance marking system with the help of facial recognition owing to the difficulty in the manual as well as other traditional means of attendance system

# Concept

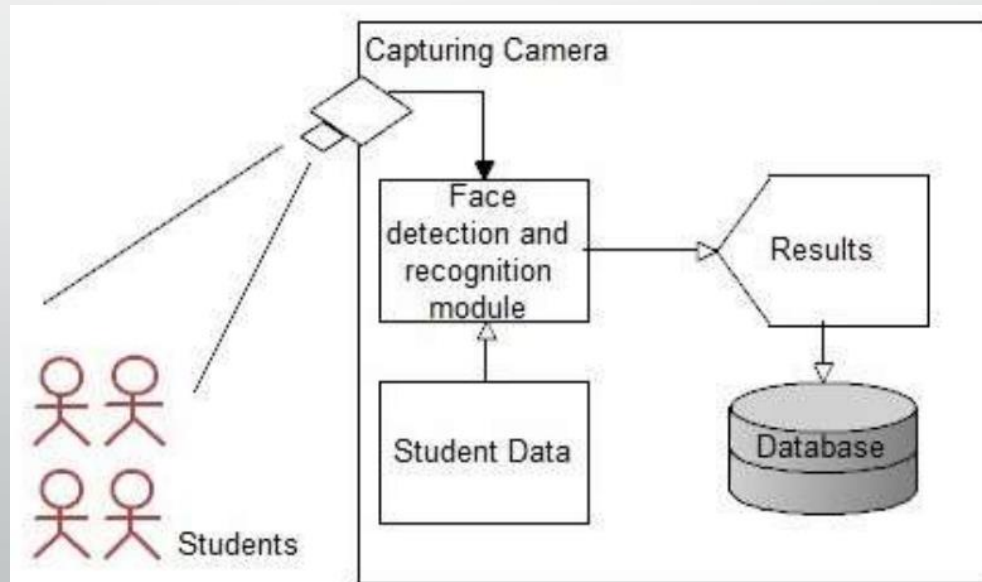
Automated Attendance System has been envisioned for the purpose of reducing the errors that occur in the traditional (manual) attendance taking system. The aim is to automate and make a system that is useful to the organization such as an institute. The efficient and accurate method of attendance in the office environment that can replace the old manual methods. This method is secure enough, reliable and available for use. No need for specialized hardware for installing the system in the office. It can be constructed using a camera (preferably CCTV) and computer.

# Working of our Web Application



# Methodology

- Camera captures the image of a classroom
- The faces are detected and cropped
- Cropped images are processed using Fisher face recognition algorithm
- The students whose faces are recognized are marked as present and the results are transferred to an excel sheet automatically.
- If any student whose face is not recognized, then their attendance can be entered manually.



# Viola-Jones Algorithm

- This is used for face detection process
- Three basic steps of algorithm
  - Integral image for feature computation
  - Adaboost algorithm for feature selection
  - Cascade classifiers
- These are applied directly by OpenCV library.



# Integral Image Feature Computation

- First step of the Viola-Jones face detection algorithm is to turn the input image into an integral image. This is done by making each pixel equal to the entire sum of all pixels above and to the left of the concerned pixel.

- Input Image

1 1 1

1 1 1

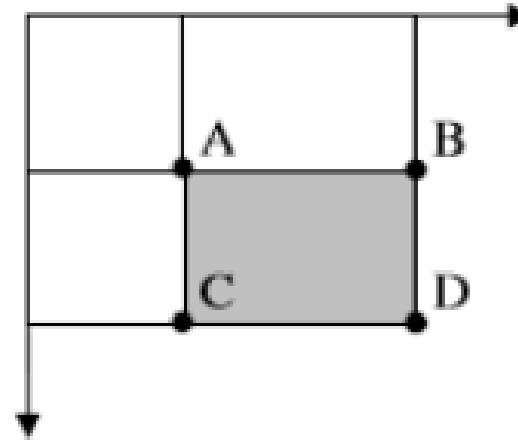
1 1 1

- Integral Image

1 2 3

2 4 6

3 6 9



$$\text{Sum of gray value} = D - (B + C) + A$$

# Adaboost Algorithm

- AdaBoost is a machine learning boosting algorithm capable of constructing a strong classifier through a weighted combination of weak classifiers. A weak classifier is mathematically described as:

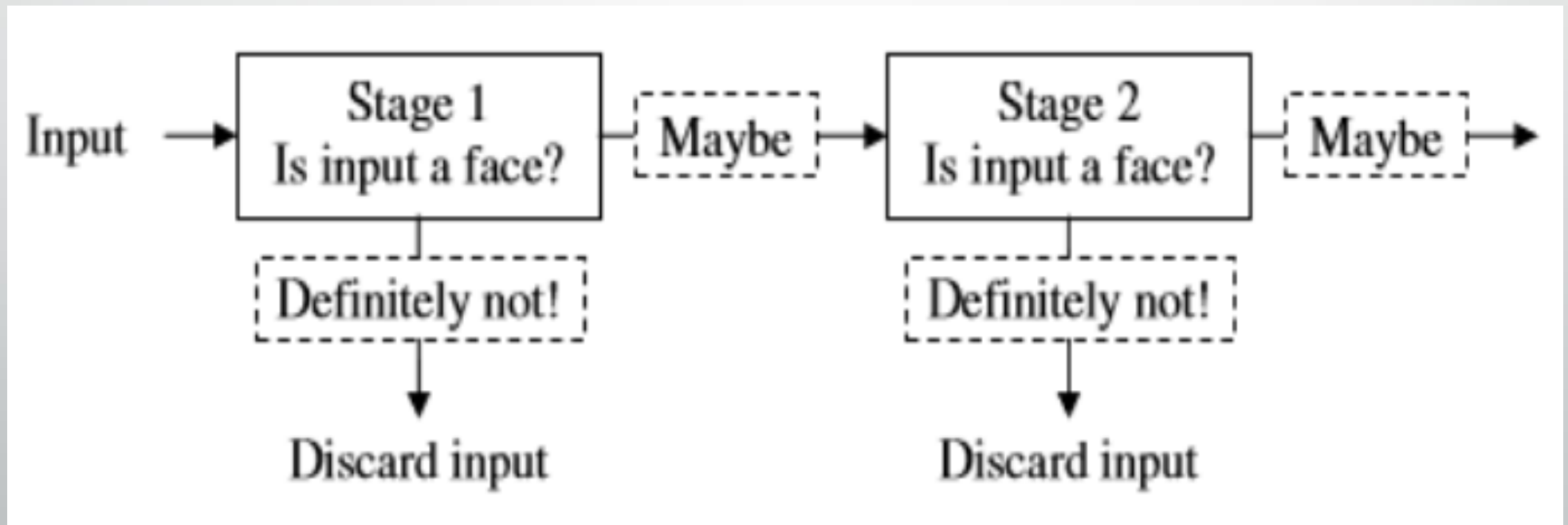
$$h(x,f,p,t)=1 \text{ if } p f(x) > t$$

0 else

- Where  $x$  is a  $24 \times 24$  pixel sub-window,  $f$  is the applied feature,  $p$  the polarity and  $t$  the threshold that decides whether  $x$  should be classified as a positive (a face) or a negative (a non-face)..

# Cascade Classifiers

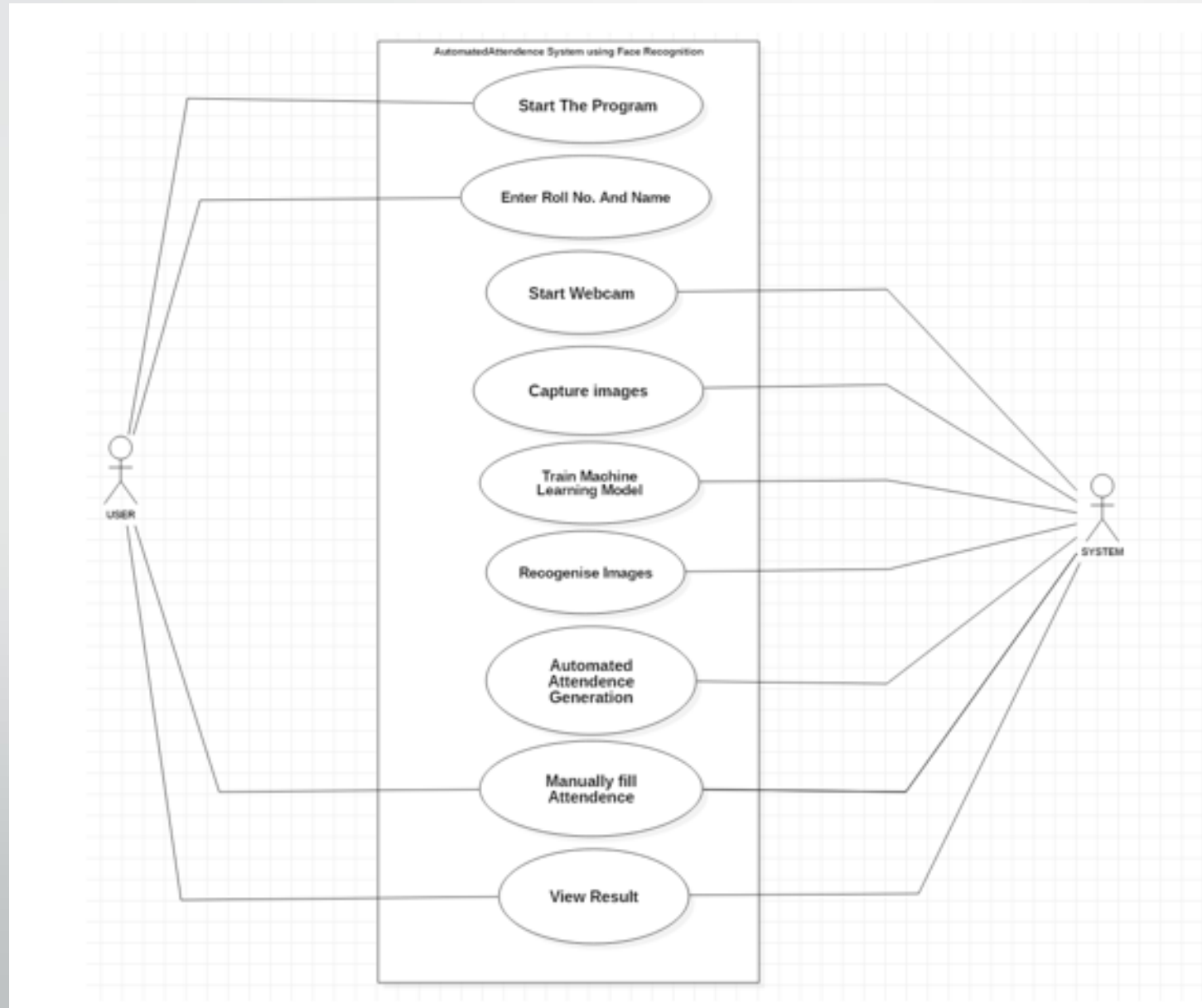
- Instead of finding faces, the algorithm discards those inputs, which are not faces.



# Face Recognition Approach: FisherFace

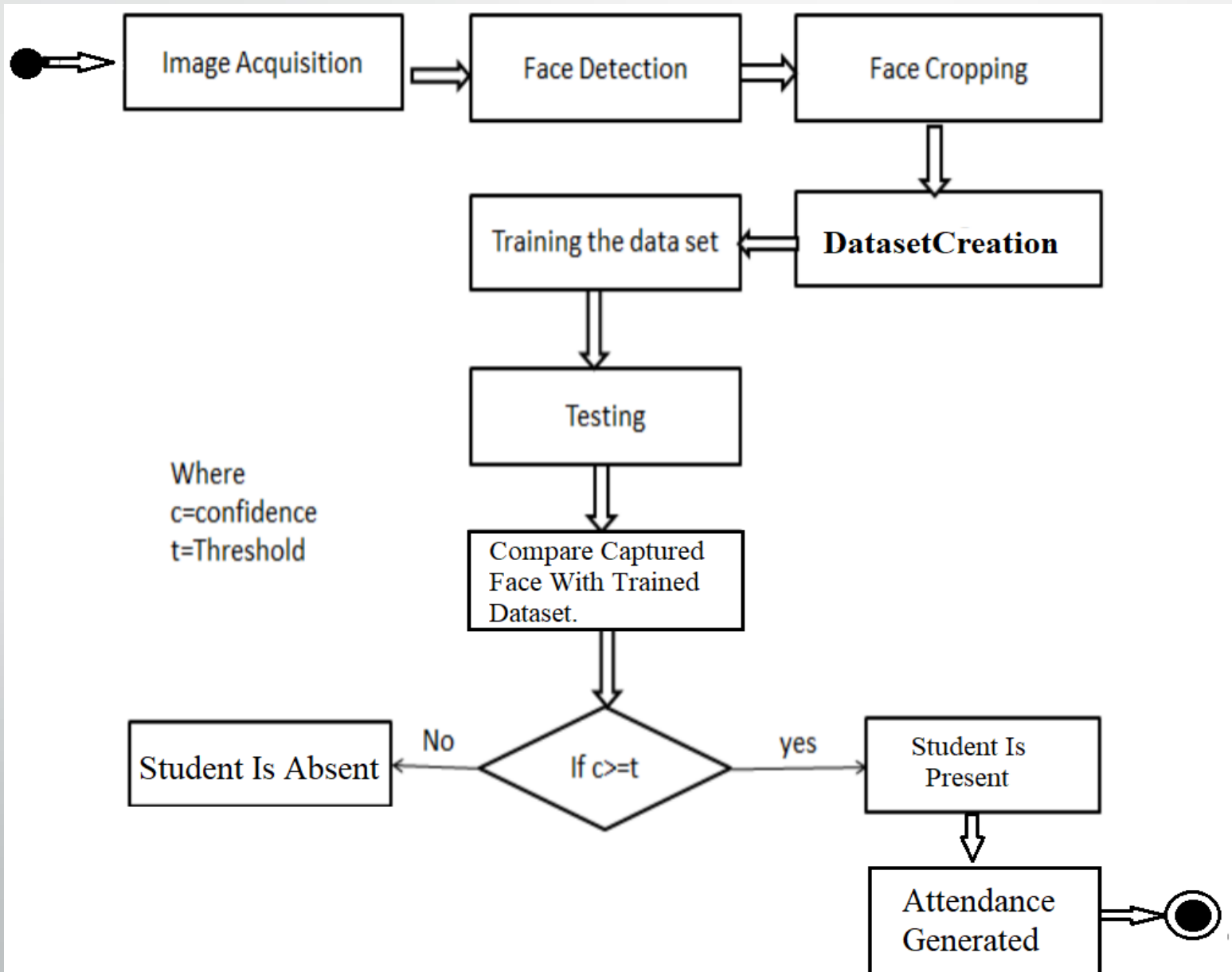
- Face is a typical multidimensional structure and needs good computational analysis for recognition.
- Many face features make development of facial recognition systems difficult.
- This problem is solved by the method called Principal Component Analysis or so called fisher face approach.
- This approach transforms faces into a small set of essential characteristics, fisherfaces, which are the main components of the initial set of learning images (training set).
- Recognition is done by projecting a new image in the fisherface subspace, after which the person is classified by comparing its position in fisherface space with the position of known individuals.

# System Implementation



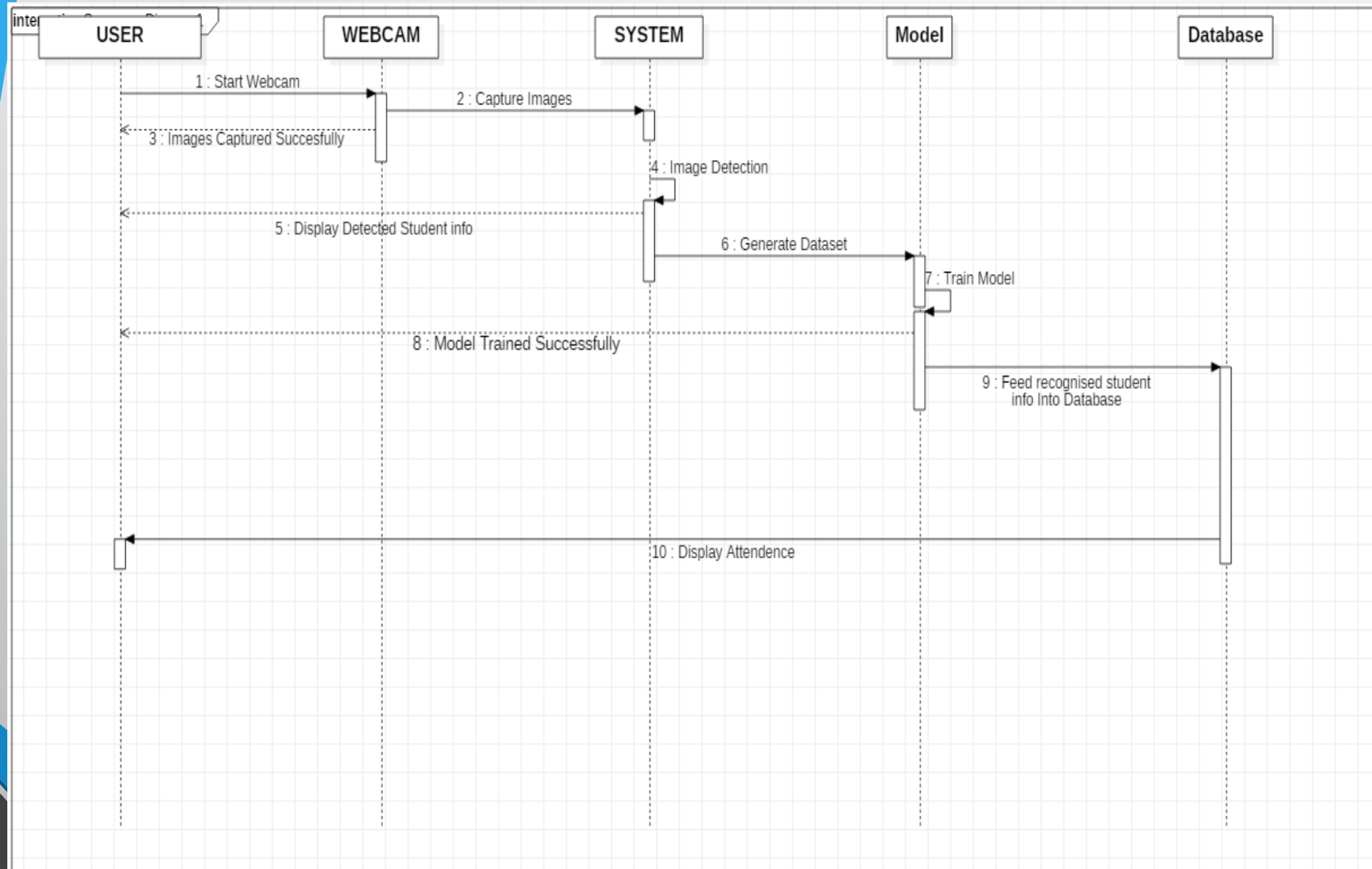
Use Case Diagram

# System Implementation



Activity Diagram

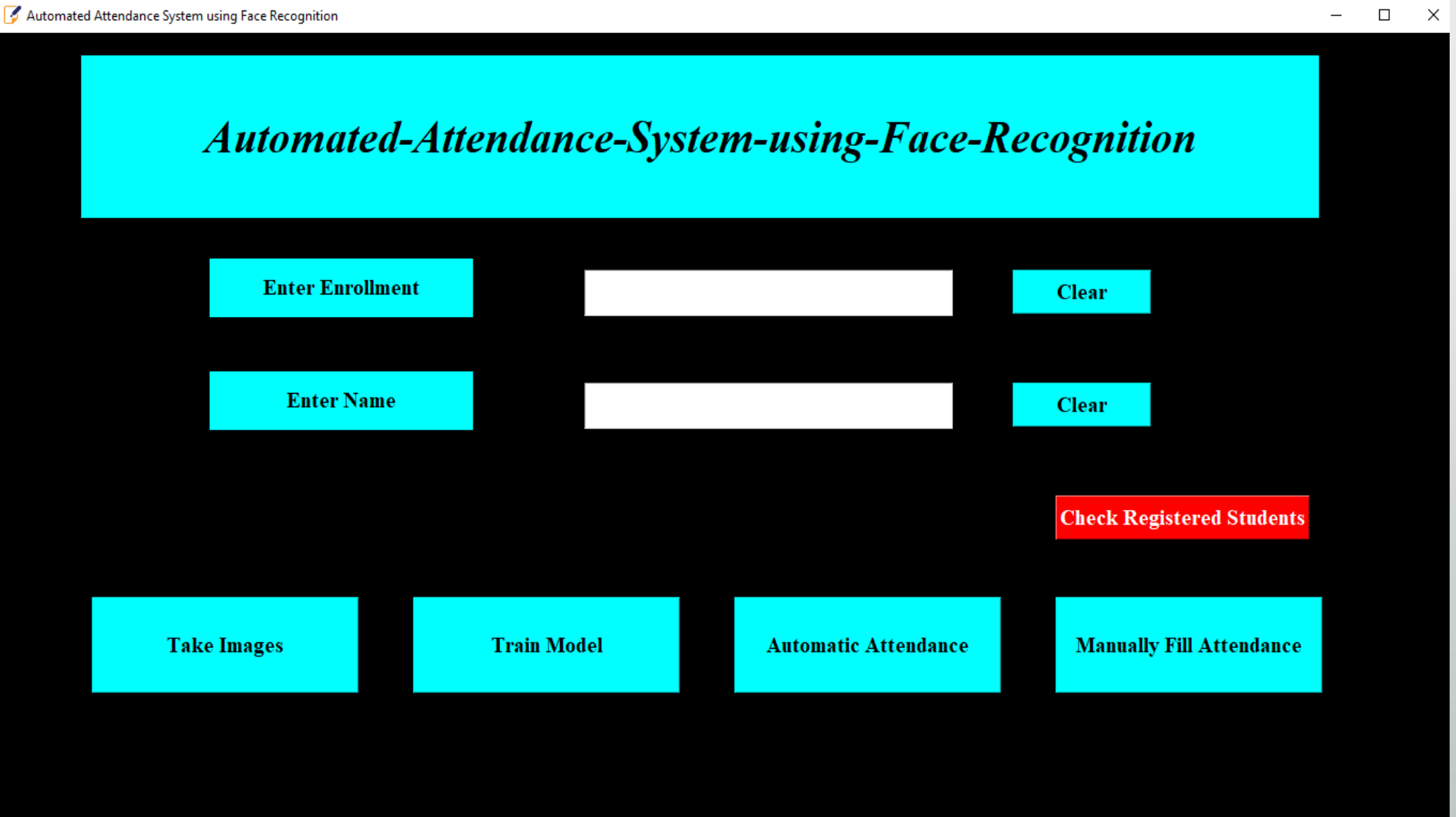
# System Implementation



Sequence Diagram

# Results and Analysis

- Graphical User Interface



The screenshot displays a web-based graphical user interface for an "Automated Attendance System using Face Recognition". The interface is set against a black background. At the top, a cyan banner contains the title *Automated-Attendance-System-using-Face-Recognition* in a black, italicized serif font. Below this, there are two rows of input fields. Each row consists of a cyan button with white text ("Enter Enrollment" and "Enter Name" respectively), a white text input field, and a cyan button with white text ("Clear"). To the right of these input fields is a red button with white text labeled "Check Registered Students". At the bottom of the interface, there is a row of four cyan buttons with white text: "Take Images", "Train Model", "Automatic Attendance", and "Manually Fill Attendance". The window's title bar at the top left reads "Automated Attendance System using Face Recognition" and includes standard minimize, maximize, and close window controls.

Automated Attendance System using Face Recognition

*Automated-Attendance-System-using-Face-Recognition*

Enter Enrollment  Clear

Enter Name  Clear

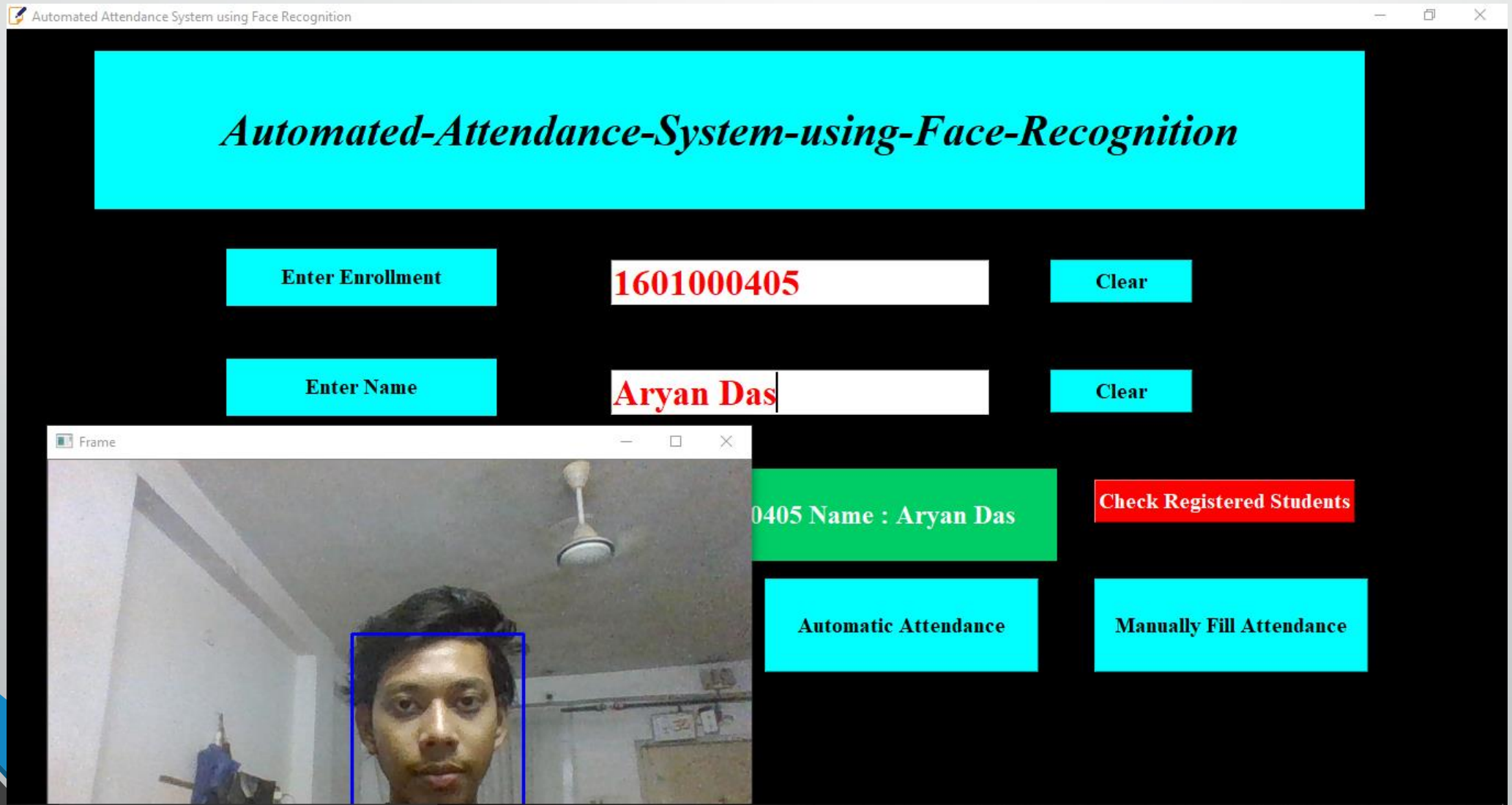
Check Registered Students

Take Images Train Model Automatic Attendance Manually Fill Attendance



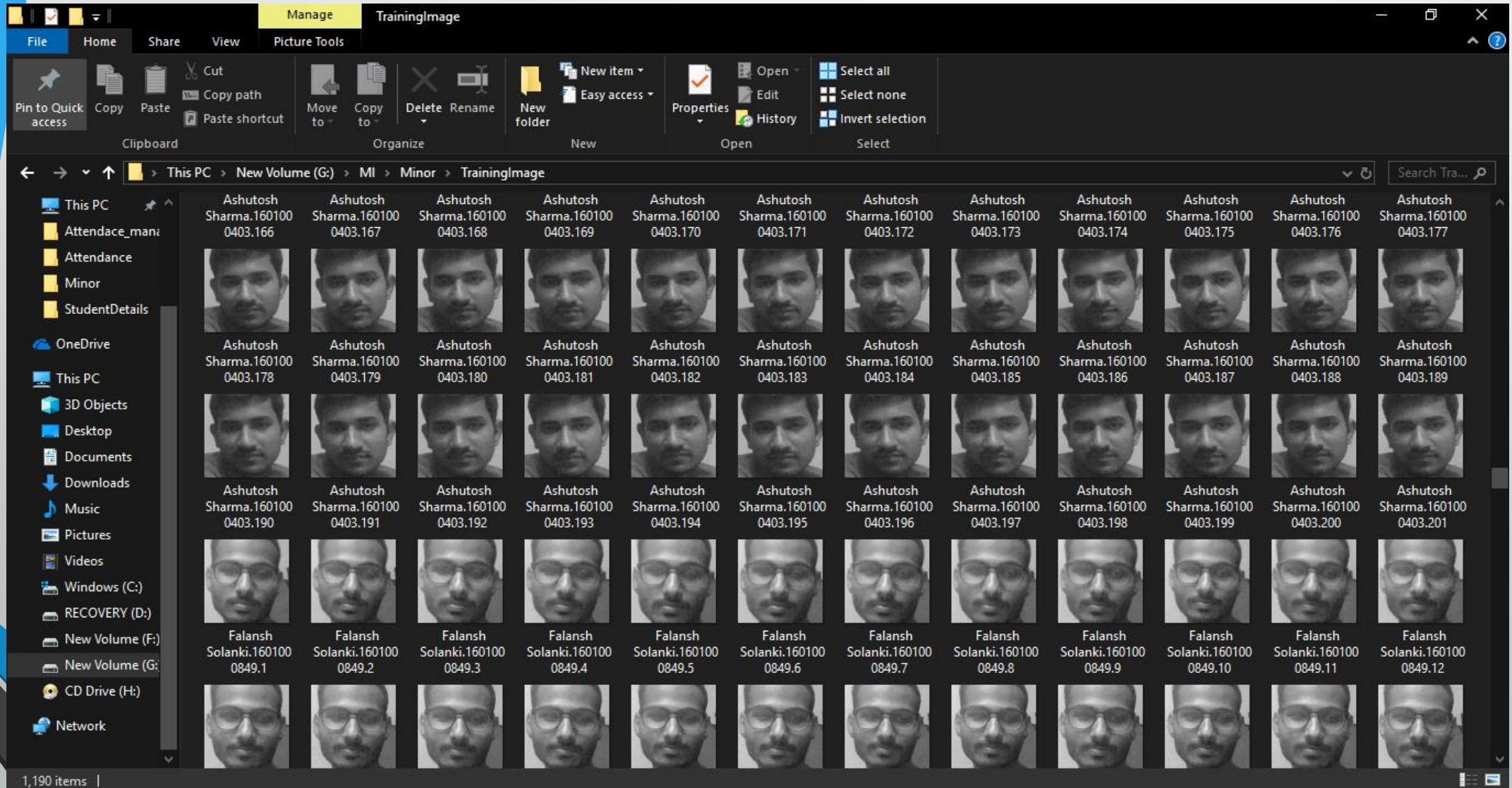
# Results and Analysis

- Image Capturing, Face Detection and Image Cropping for the entered Enrollment No & Name



# Results and Analysis

- Generated Datasets



# Results and Analysis

- Training the Model on the generated dataset

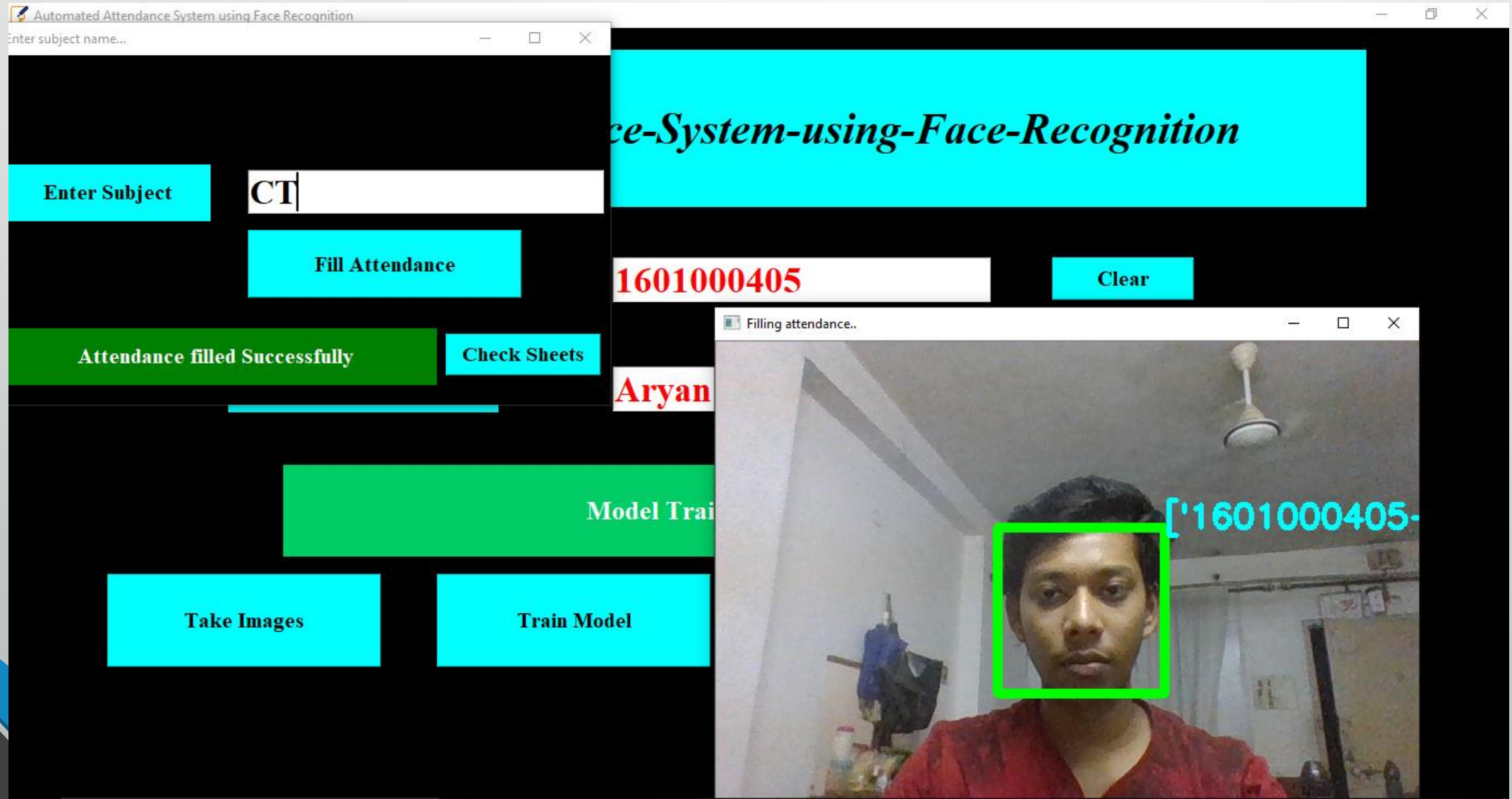
Automated Attendance System using Face Recognition

*Automated-Attendance-System-using-Face-Recognition*

|                  |             |                           |                          |
|------------------|-------------|---------------------------|--------------------------|
| Enter Enrollment | 1601000405  | Clear                     |                          |
| Enter Name       | Aryan Das   | Clear                     |                          |
| Model Trained    |             | Check Registered Students |                          |
| Take Images      | Train Model | Automatic Attendance      | Manually Fill Attendance |

# Results and Analysis

- Automated Attendance Generation





# Results and Analysis

- Manual Attendance Addition for Unrecognized faces

Automated Attendance System

Manual attendance of PHP

| ID | ENROLLMENT | NAME            | DATE       | TIME     |
|----|------------|-----------------|------------|----------|
| 1  | 160100849  | Falansh Solanki | 2019_04_17 | 21:51:05 |

Enter Enrollment  Clear

Enter Student name  Clear

Enter Data Convert to CSV

CSV created Successfully Check Sheets Registered Students

Take Images Train Model Automatic Attendance Manually Fill Attendance



# Results and Analysis

- Automated Attendance Feed in Database

The screenshot displays the phpMyAdmin web interface. On the left, the 'Database: attendance\_system' is selected, showing a list of tables. The main panel shows the 'Structure' tab for the selected database, listing various tables with their columns, data types, and storage engines. The tables are listed in a table format with columns for table name, actions (Browse, Structure, Search, Insert, Empty, Drop), engine, character set, collation, and size.

| Table Name                   | Actions                                   | Engine | Character Set     | Collation | Size    |
|------------------------------|---|--------|-------------------|-----------|---------|
| ct_2019_04_17_time_15_50_44  | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 1 KiB   |
| ct_2019_04_17_time_16_00_20  | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 2.1 KiB |
| ct_2019_04_17_time_17_17_26  | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 2.1 KiB |
| ct_2019_04_17_time_17_53_09  | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 2.1 KiB |
| ct_2019_04_17_time_18_04_53  | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 2.1 KiB |
| ct_2019_04_17_time_18_07_12  | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 2.1 KiB |
| ct_2019_04_17_time_21_49_09  | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 1 KiB   |
| php_2019_04_17_time_15_31_08 | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 2.1 KiB |
| php_2019_04_17_time_17_09_53 | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 1 KiB   |
| php_2019_04_17_time_19_11_26 | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 2.1 KiB |
| php_2019_04_17_time_21_48_34 | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 2.1 KiB |
| php_2019_04_17_time_21_51_05 | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 2.1 KiB |
| _2019_04_17_time_09_20_49    | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 1 KiB   |
| _2019_04_17_time_09_20_54    | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 1 KiB   |
| _2019_04_17_time_09_22_19    | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 1 KiB   |
| _2019_04_17_time_09_22_56    | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 1 KiB   |
| _2019_04_17_time_09_23_04    | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 1 KiB   |
| _2019_04_17_time_09_23_48    | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 1 KiB   |
| _2019_04_17_time_09_24_03    | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 1 KiB   |
| _2019_04_17_time_09_24_12    | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 1 KiB   |
| _2019_04_17_time_09_27_17    | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 1 KiB   |
| _2019_04_17_time_09_37_52    | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 1 KiB   |
| _2019_04_17_time_09_38_08    | Browse Structure Search Insert Empty Drop | MyISAM | latin1_swedish_ci |           | 1 KiB   |

# Pros and Cons

- Pros
  - Easy integration
  - Simple algorithm
  - Easy to use output format
  - Proxy attendance is eliminated
  - Saves time
- Cons
  - Sensitive to lighting variations
  - Distance required for detection from camera is short
  - Booting Time of Web App is High



# Future Enhancement Suggestions

- The speed can be further enhanced .
- The distance limit up to which the camera would be able to recognize faces can be increased.
- The data set used to train the model can be further improvised by adding more samples corresponding to each face. This would increase the accuracy.




# Future Scope

The system we have developed has successfully able to accomplish the task of marking the attendance in the classroom automatically and output obtained in an excel sheet as desired in real time. Another important aspect where we can work is towards creating an online data base of the attendance and its automatic updating, keeping in mind growing popularity of internet of things.

# Conclusion

In the system we have implemented an attendance system for a lecture, section or laboratory by which lecturer or teaching assistant can record student attendance. Its saves time and effort, especially if it is a lecture with huge number of students.



Thanks!