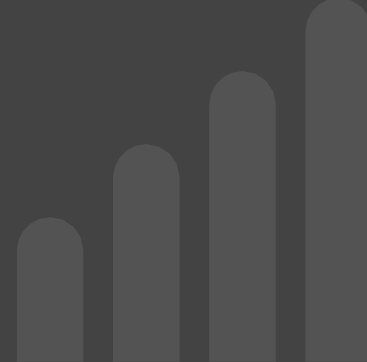# Biometric Attendance by Face Recognition

<u>INTRODUCTION</u>

Biometric Face Recognition Attendance System

In our model, we are using the biometric-based attendance system to mark the attendance of the students automatically by detecting and recognizing their faces. The face detection and recognition system is developed using python along with the OpenCV package. This system contains three modules which are detection, training and recognition. The system is linked with the server consisting of the database of the students. The model we are using is cascade classifiers which is basically used to train the images. This method helps reducing complexity of the system.

<u>ABSTRACT</u>

In this project the face of an individual is used for the purpose of attendance making automatically. Conventional methodology for giving attendance is by signing in the attendance record book and the attendance is recorded. Time consumption for this purpose is an important point of concern.

In this project the Open CV based face recognition approach has been proposed for the use of face detection and face recognition . The training database is created by training the system with the faces of the authorized students.

The features are extracted using LBPH algorithm. The database of all the students in the university is stored and when the face of the individual staff matches with one of the faces stored in the database then the attendance is recorded with components to the server

PROBLEM STATEMENT
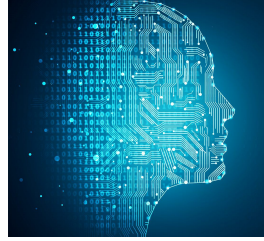
As the coronavirus pandemic continues to evolve, universities are encouraging their students to work remotely and to limit in-person interactions, replacing them with online classes. In this situation, whether from home or in the university, students need contactless and advanced technology that can work in any scenario.

The facial recognition system is a real-time and contact-less attendance tracking software exceptionally relevant in the current pandemic situation.

So the main purpose of this project is to build a biometric face recognition-based attendance monitoring system for the universities to enhance and upgrade the current attendance system into more efficient as compared to before as well as saving lives as well as time.

<u>OBJECTIVES</u>

- To develop a portable Smart Attendance System which is handy and self-powered.

- To ensure the speed of the attendance recording process is faster than the previous system.

- Able to recognize the face of an individual accurately based on the face database.

- Develop a database for the attendance management system.

- Allow new students to store their faces in the database by using a GUI.

- Able to show an indication to the user whether the face- recognition process is successful or not.

<u>LITERATURE SURVEY</u>

Regarding Face recognition & Face detection

Sl. no	Paper Title	Author Name	About
1.	Fast R-CNN	Ross Girshick	Fast Region-based Convolutional Network method (Fast R-CNN) for Face detection. Fast R-CNN is implemented in Python. https://openaccess.thecvf.com/content_iccv_2015/papers/Girshick_Fast_R-CNN_ICCV_2015_paper.pdf
2.	Evaluation of Haar Cascade Classifiers Designed for Face Detection	R. Padilla, C. F. F. Costa Filho	The human face contains important features that can be used by vision-based automated systems in order to identify and recognize individuals. Face location, the primary step of the vision-based automated systems, finds the face area in the input image. https://www.researchgate.net/publication/303251696_Evaluation_of_Haar_Cascade_Classifiers_for_Face_Detection

Regarding OpenCV & Smart system

Sl. no	Paper Title	Author Name	About
3.	Student attendance System in classroom using Face recognition technique	Samuel Lukas	This paper proposes a method for student attendance system in classroom using face recognition technique by combining Discrete Wavelet Transforms (DWT) and Discrete Cosine Transform (DCT) to extract the features of student's face which is followed by applying Radial Basis Function (RBF) for classifying the facial objects. https://ieeexplore.ieee.org/abstract/document/7763360
4.	Smart attendance System using OPENCV based on Facial Recognition	Sudhir Bussa	In this project, the Open CV based face recognition approach has been proposed.Attendance maintenance is a signifiant function in all the institutions to monitor the performance of the students. Every institute does this in its own way. https://www.researchgate.net/publication/341870242_Smart_Attendance_System_using_OPENCV_based_on_Facial_Recognition/fulltext/5ed7994045851529452a7dac/

<u>MODULES</u>

1. **Get Images Module -** This module provides a class with the same name which is used to represent an image

2. **Track Images Module -** This module allows us to track images in a sequential frame of a series of images

3. **Train Images Module -** In this module ,the images are saved in gray scale after being recorded by camera

4. **Clear Module -** This module clears all the information which has been entered earlier

5. **Take Image -** This module takes images of the user and detects faces on bounding boxes and loads the images into a database.

6. **Display Window Module -** This module will help open a window named Face Recognition and asks for details.

7. **Valid Id Module -** This module will check whether the roll number of the user matches with the previously stored data on the database

REQUIREMENT ANALYSIS

SOFTWARE REQUIREMENTS:

| Operating System	Windows
Supported Editions	32 bit and 64 bit
Preinstalled with the OS	Pymysql Xampp
Interpreter	Python and above
Python packages	OpenCV, Numpy, Pandas, Pymysql ,tkinter, Pip, Pillow

REQUIREMENT ANALYSIS

HARDWARE REQUIREMENTS:

| Processor	1 GHz or faster processor
RAM	512 MB of RAM or Higher
Disk Space	850 MB of available hard-disk space (x86)
External Disk Space	2 GB hard drive (x64)

REQUIREMENT ANALYSIS

 FUNCTIONAL REQUIREMENTS:
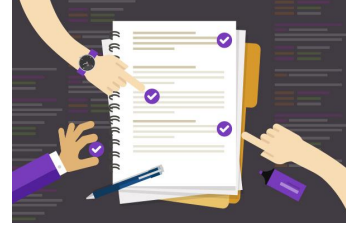
Sl. no	FUNCTIONS
1	Capture face images via webcam or external USB camera.
2	The faces must be detected in bounding boxes.
3	Compute the attendance based on detected faces.
4	Crop the total number of faces detected.
5	Resize the cropped faces to match faces the size required for recognition.

REQUIREMENT ANALYSIS

FUNCTIONAL REQUIREMENTS:
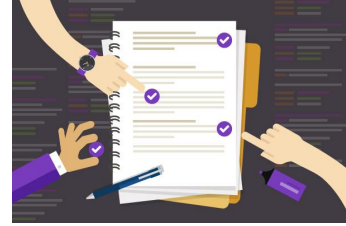
| Sl. no	FUNCTIONS
6	Store the cropped faces to a folder.
7	Load faces on the database.
8	Train faces for recognition.
9	Perform recognition for faces stored on the database.
10	Perform recognition one after the other for each face cropped by Face Detector.
11	Display attendance in the database

DESIGN

ALGORITHM: LBPH Algorithm:

Local Binary Patterns Histogram algorithm. It is based on local binary operator.

It is widely used in facial recognition due to its computational simplicity and discriminative power.
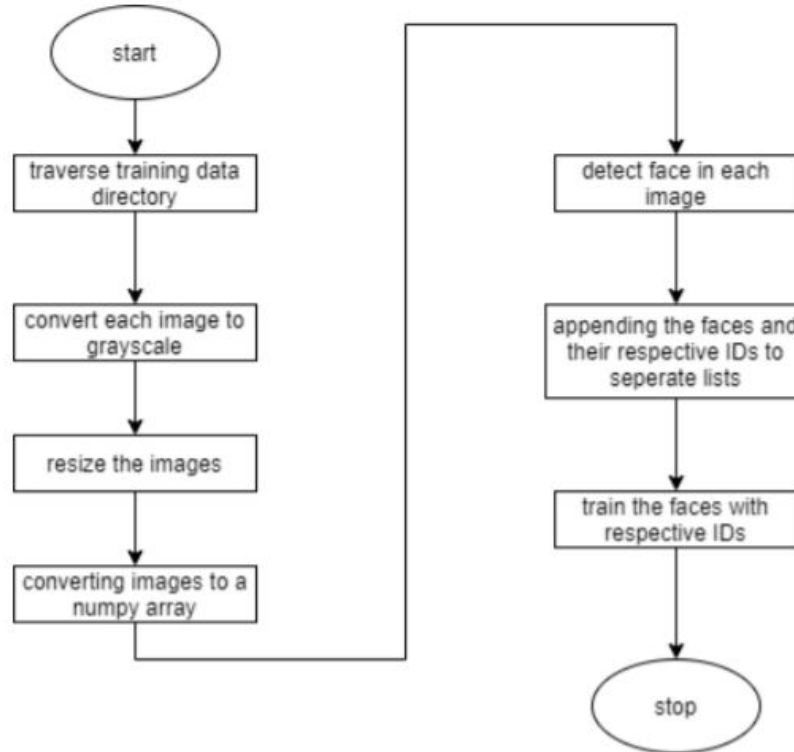
The steps involved to achieve this are:

- creating dataset
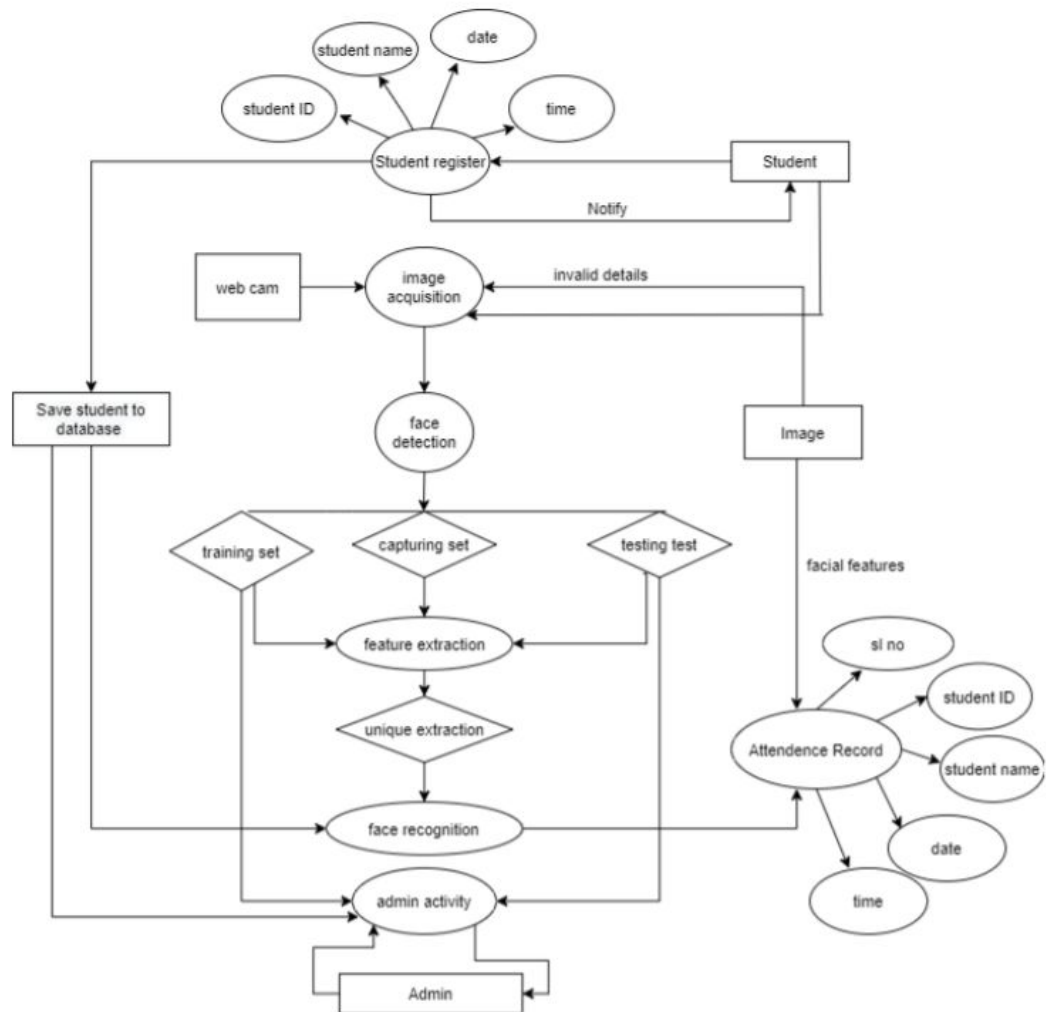- face acquisition
- feature extraction
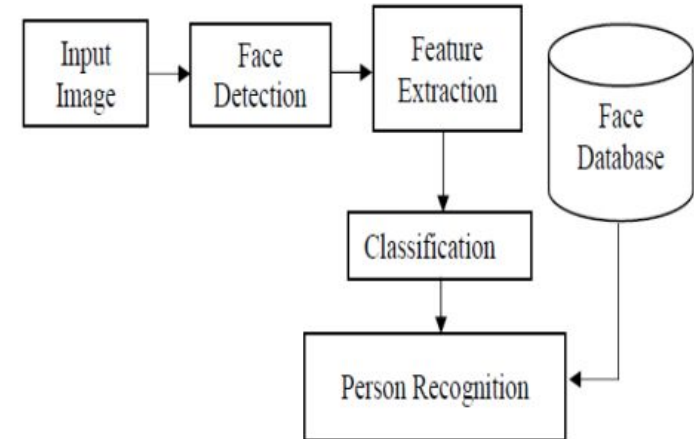
DESIGN

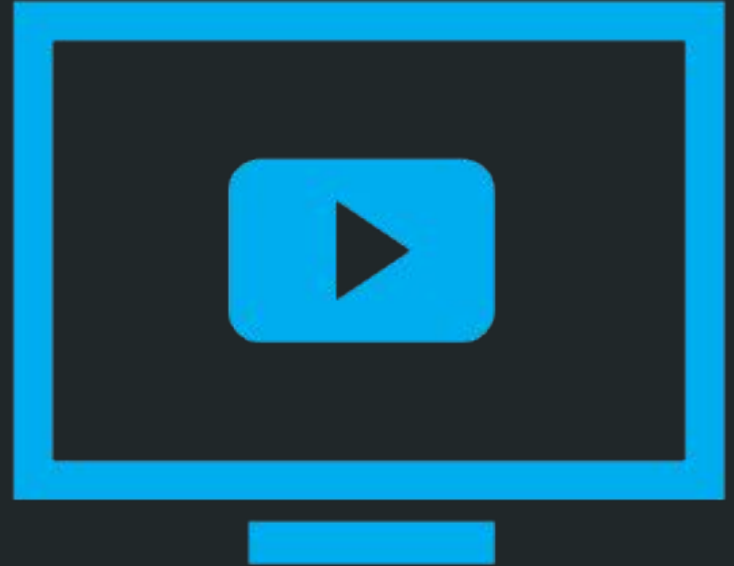ALGORITHM DESIGN:

DESIGN

DATA FLOW:

IMPLEMENTATION

1. Get Images Module
2. Track Images Module
3. Train Images Module
4. Clear Module
5. Take Image
6. Display Window Module
7. TakeAttendance Module

DEMONSTRATION

TESTING

1 - No input
2 - Blank camera
3 - Single face
4 - Multiple face

CONCLUSION

Face recognition provide passive identification that is a person which is to be identified does not to need to take any action for its identity

Face recognition technologies have been associated generally with very costly top secure applications. Certain applications of face recognition technology are now cost effective, reliable and highly accurate.

THANK YOU

"Biometrics is certainly the most secure form of authentication,
It is hardest to imitate and duplicate"