

National Institute Of Technology, Andhra Pradesh

Automatic Class Attendance System Based On Face Detection And Recognition

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Artificial Intelligence



*A way of
making a
computer,
robot, or
software
think and act
like a human.*



"Hi, computer."

**"Hello,
Sue. Pam's
coming at
3pm."**



Applications of AI



Healthcare



Automobile



Finance



Surveillance



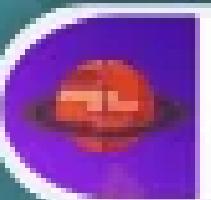
Social Media



Entertainment



Education



Space Exploration



Gaming



Robotics



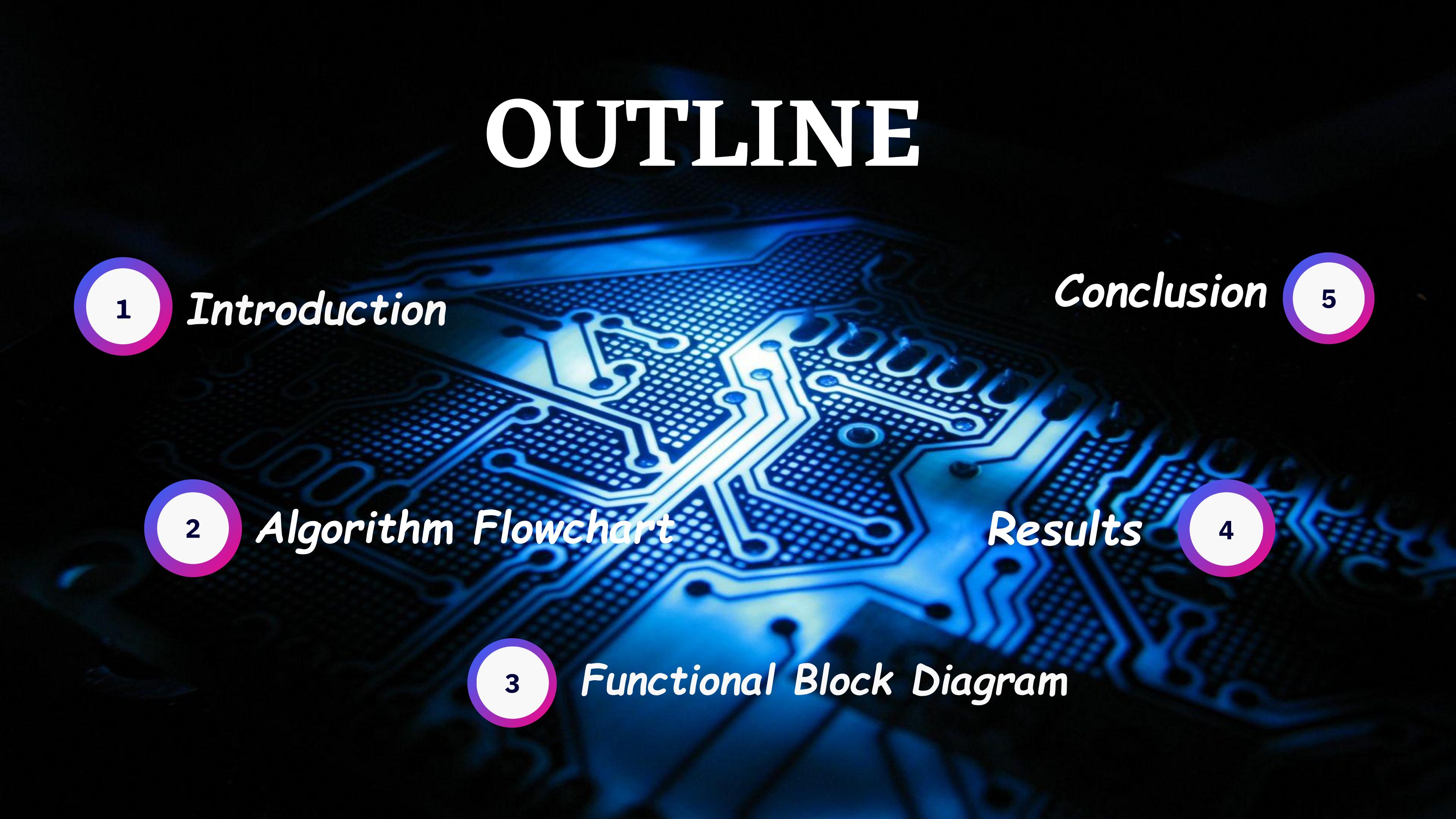
Agriculture



E-commerce



OUTLINE



1

Introduction

2

Algorithm Flowchart

3

Functional Block Diagram

Results

4

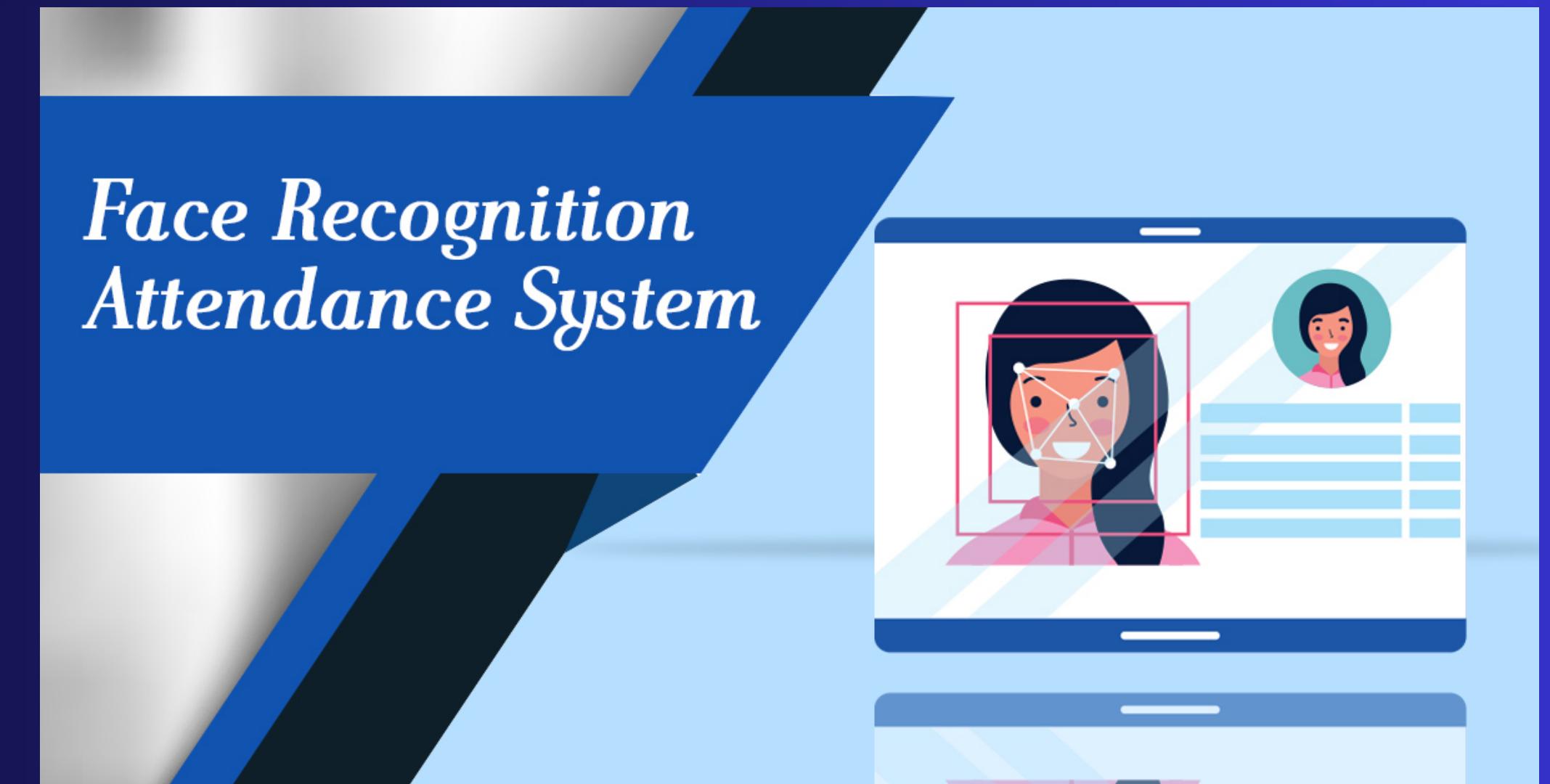
Conclusion

5

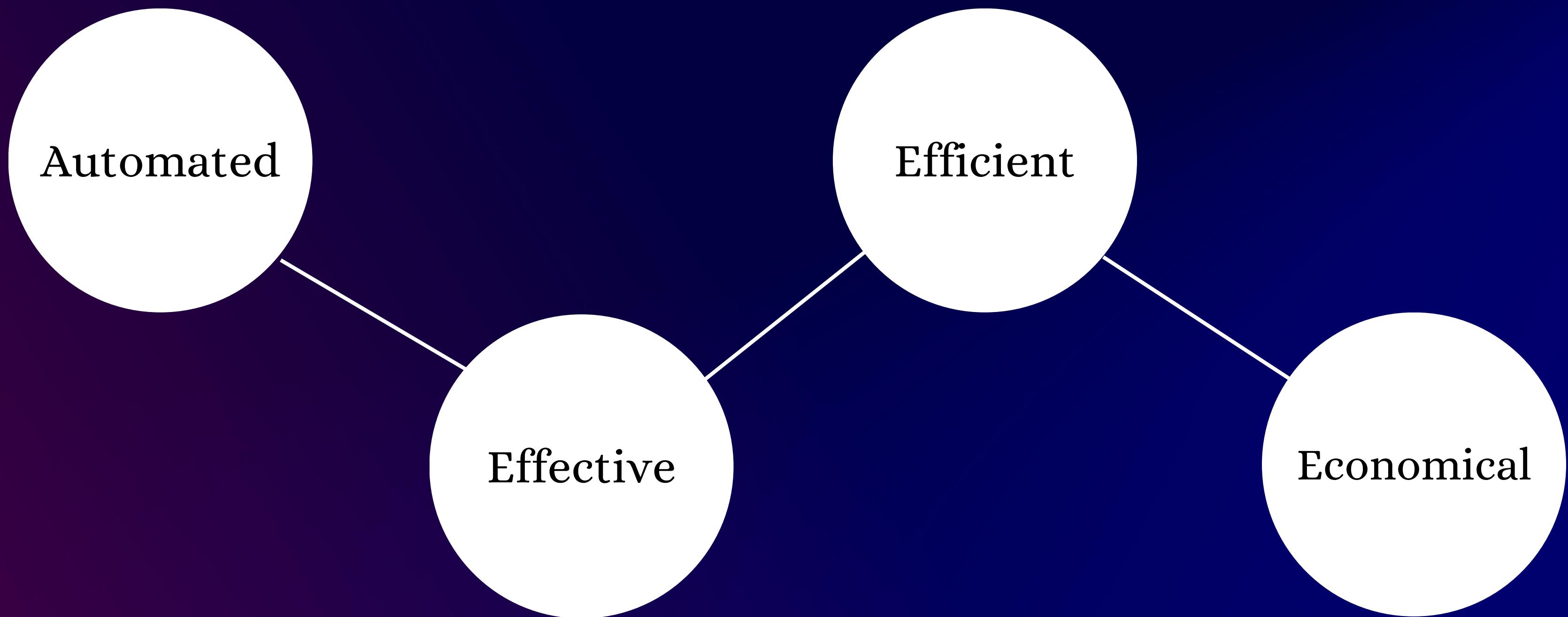
INTRODUCTION

Traditionally attendance is marked manually by teachers and they must make sure that correct attendance is marked for respective student. This whole process wastes some of the lecture time and part of the correct information is missed due to fraudulent and proxy cases.

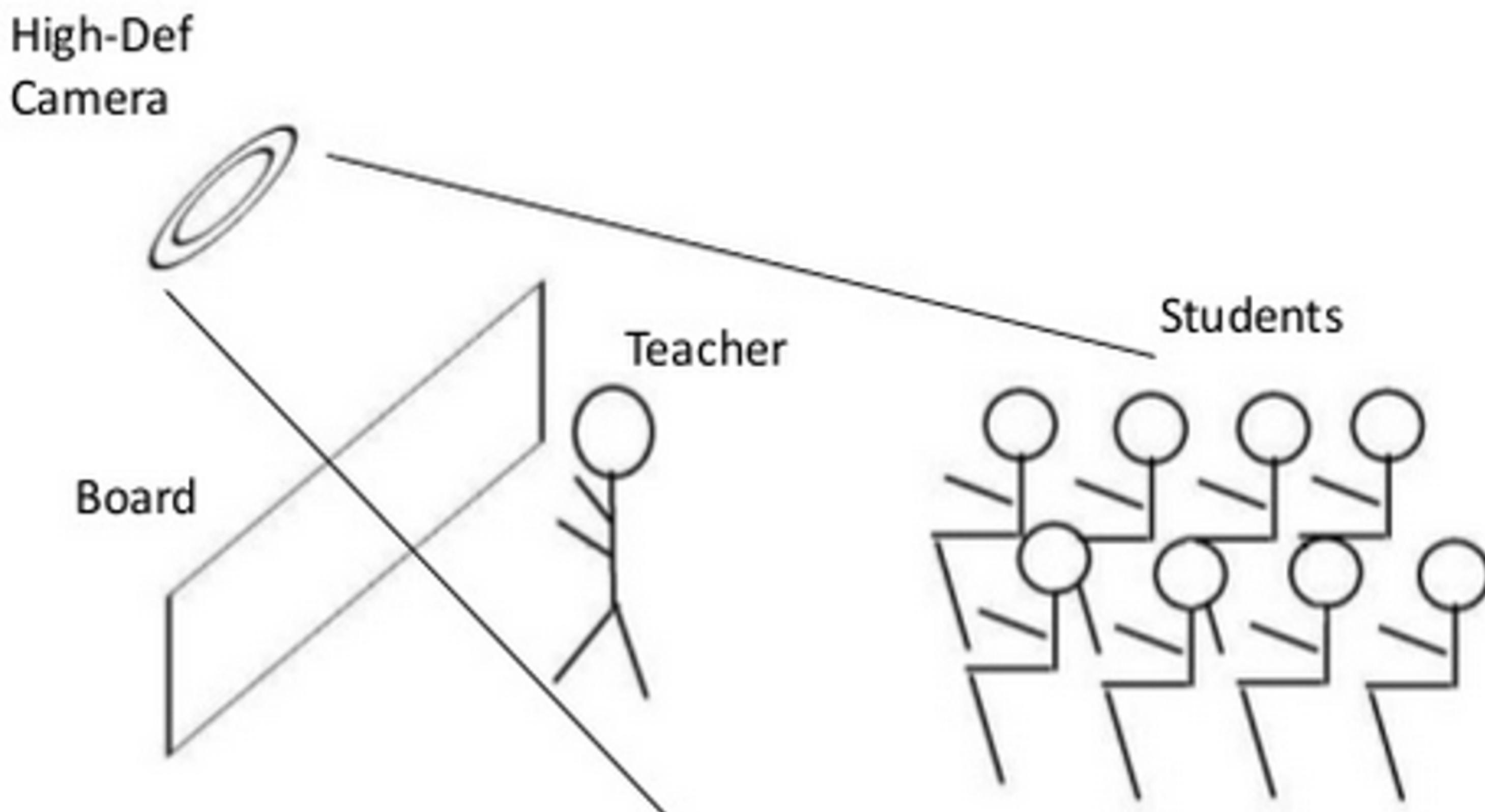
In order to determine classroom attendance, face detection and face recognition are performed. Face detection is used to determine the location of the faces in the classroom image and extract sub images for each face. Then, in face recognition, the face images detected will be compared with the data base consisting of images of students in the class, and attendance will be recorded accordingly.

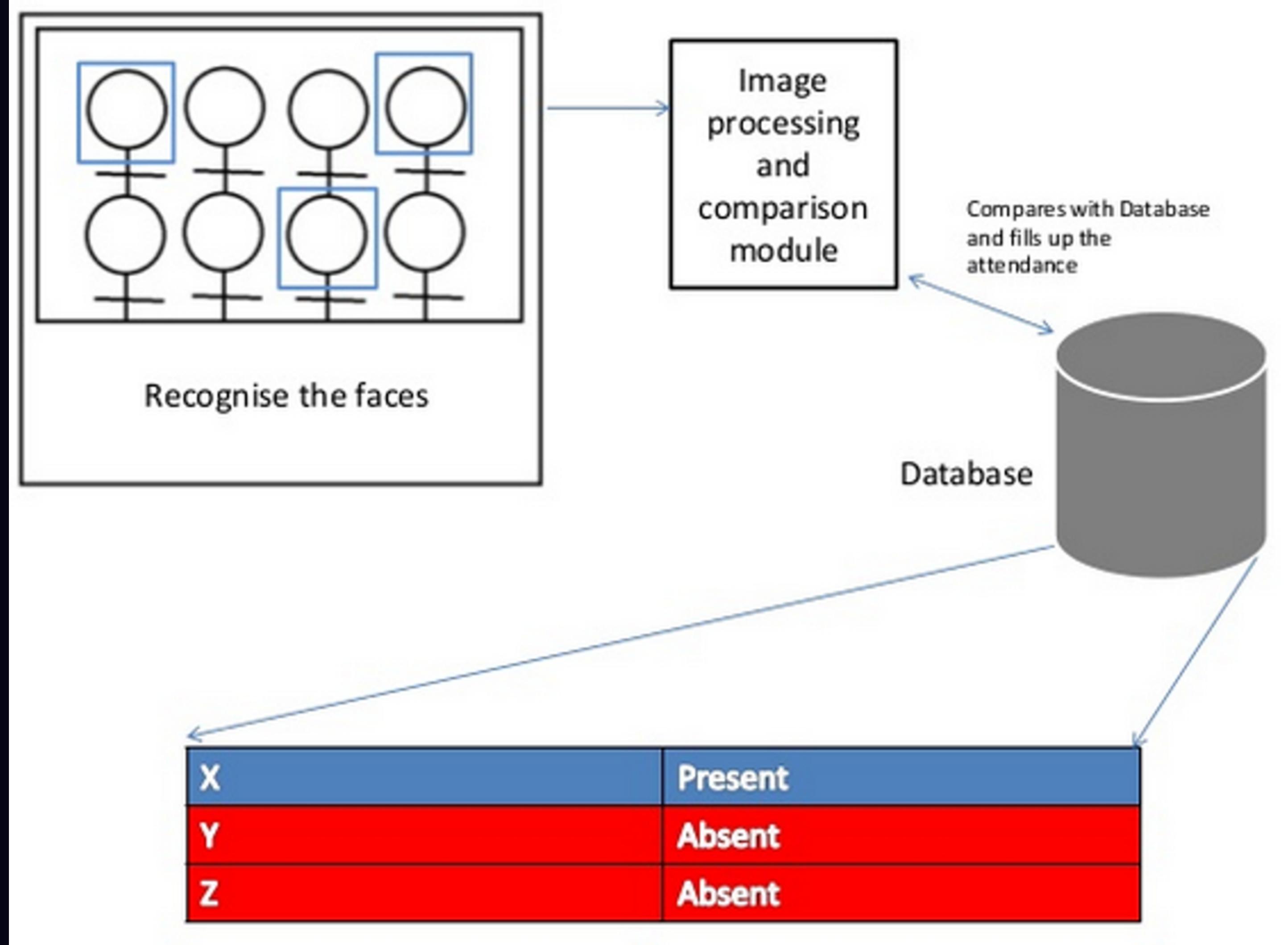


Significance



Basic Structure

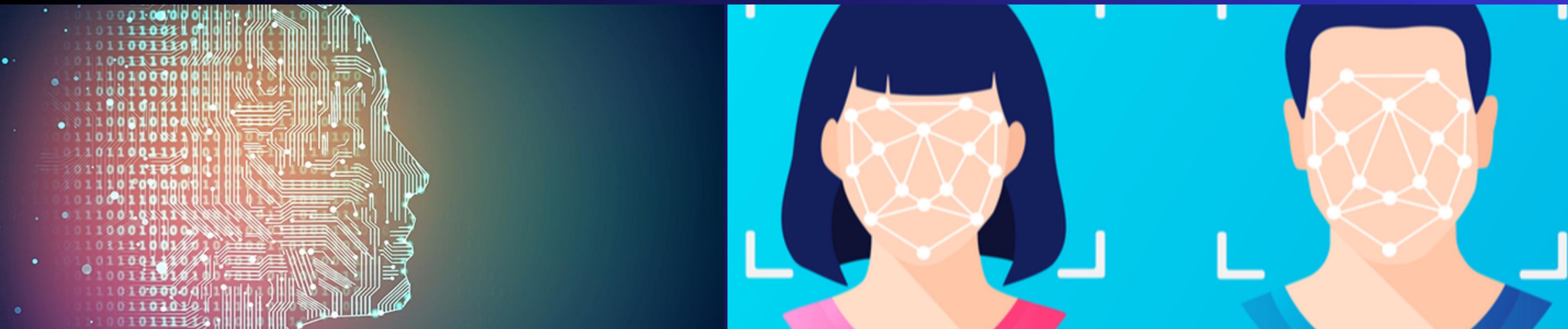


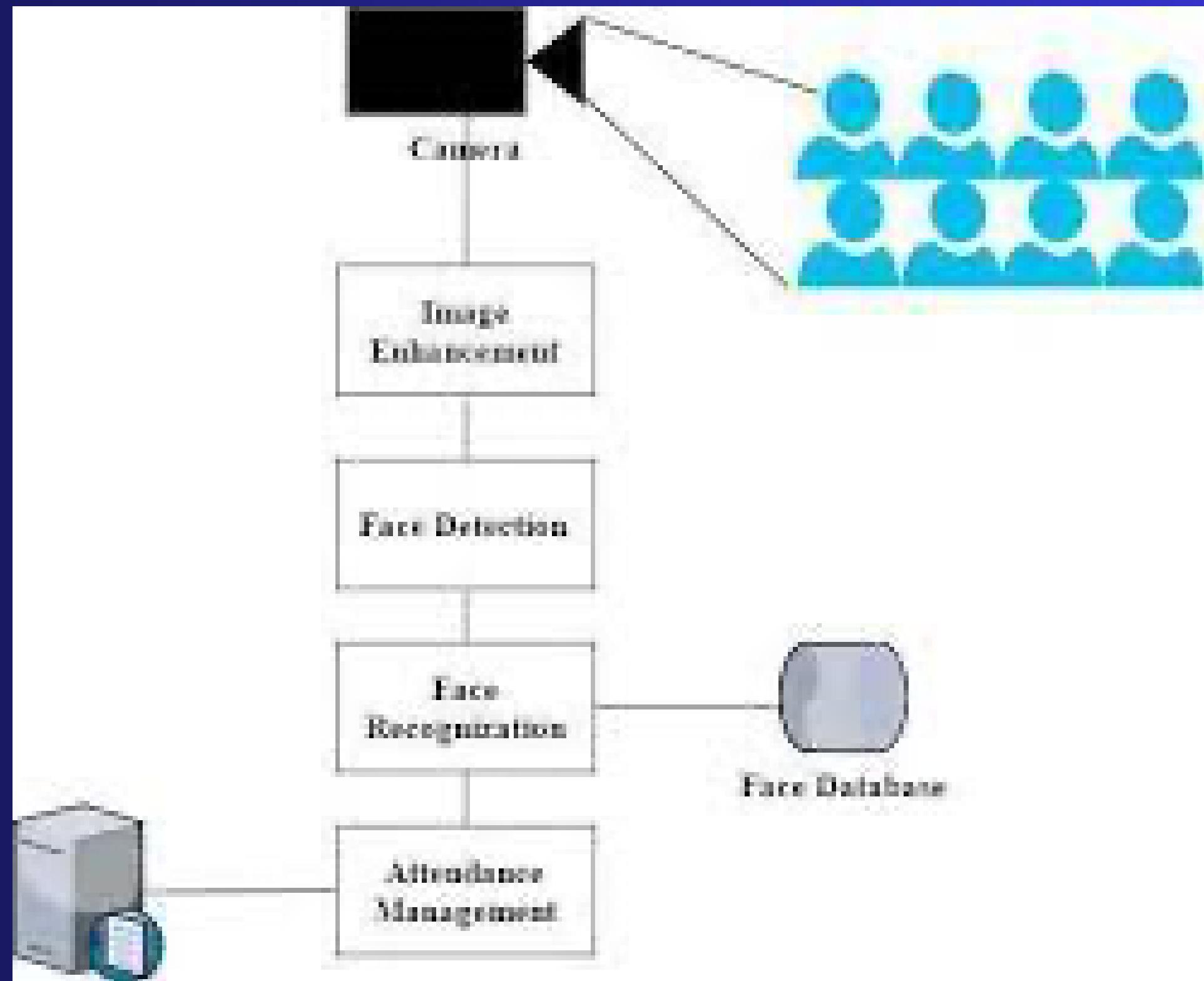
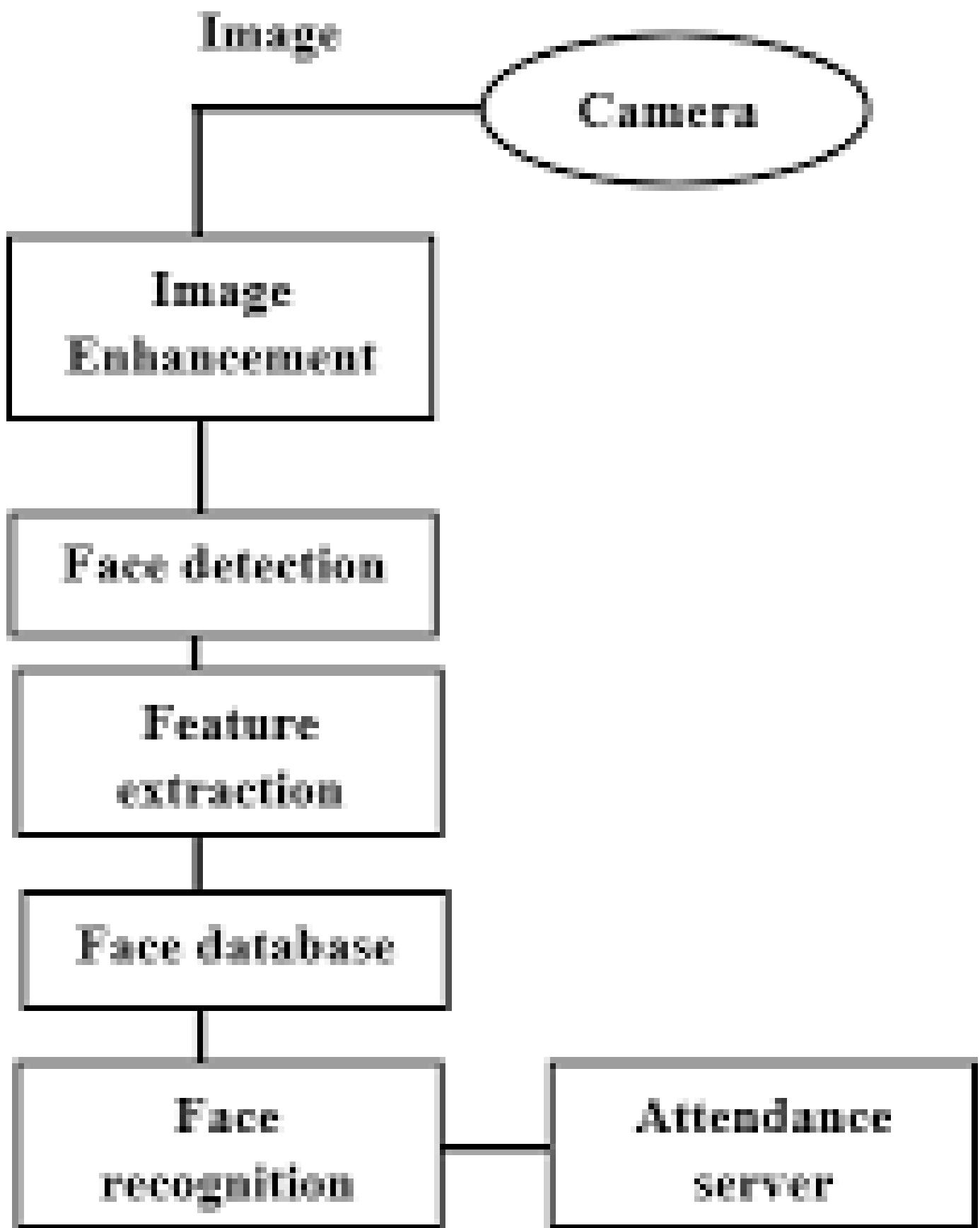


FACE DETECTION

Face detection is a computer technology used to identify human faces in digital images by determining the location of the faces in the image and extract sub images for each face.

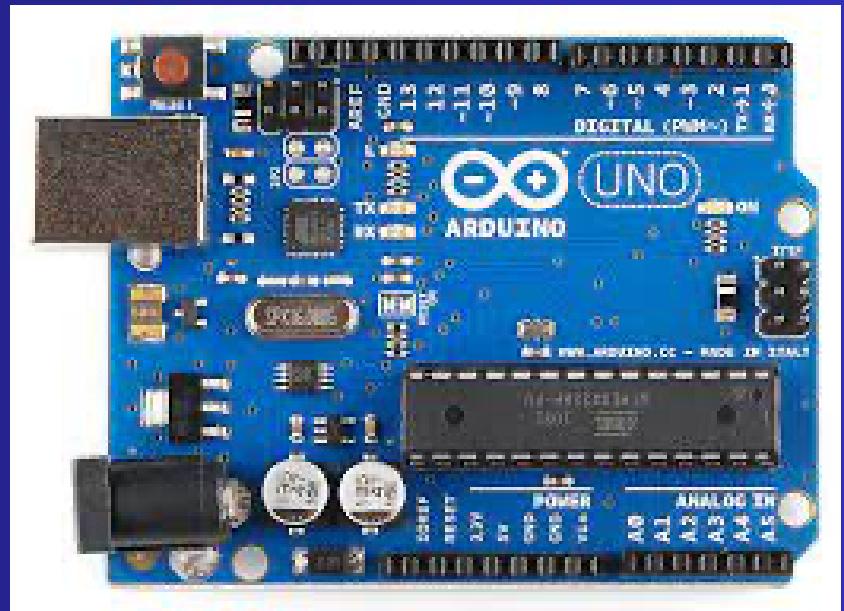
Viola Jones algorithm will be implemented to recognize face and non-face patterns and enable us to identify locations of the faces in the image.





Components used

1. Arduino



Arduino is an open-source microcontroller equipped with sets of digital and analog input/output to connect with different circuits. Very quickly, the Arduino project slanted towards the headway of showing fundamental computer programming in schools and in rural countries. Later, the principal model got certainly more renowned than anticipated, selling outside its target market for uses like mechanical innovation. It is presently comprehensively used in various spaces, for instance, for environment checking, considering its simplicity, disposition, and open arrangement.

2. ESP32 CAM

The **ESP 32 camera module** is a convenient lightweight camera that upholds Arduino Uno. The **ESP32-CAM** can be widely used in intelligent IoT applications such as wireless video monitoring, Wi-Fi image upload, QR identification, and so on.



3. OpenCV2



OpenCV (Open-Source Computer Vision Library) is an open-source PC vision and AI programming library. OpenCV worked to give a typical foundation to PC vision applications and to speed up the utilization of machine discernment in the business items. Being a BSD-authorized item, OpenCV makes it simple for organizations to use and change the code. The library has more than 2500 advanced calculations, which incorporates an exhaustive arrangement of both work of art and cutting-edge PC vision and AI calculations. These calculations can be utilized to distinguish and perceive faces, distinguish objects, group human activities in recordings, track camera developments, track moving items, extricate 3D models of articles, produce 3D point mists from sound system cameras, fasten pictures together to deliver a high goal picture of a whole scene, discover comparative pictures from a picture information base, eliminate red eyes from pictures taken utilizing streak, follow eye developments, perceive view and set up markers to overlay it with increased reality, and so on OpenCV has in excess of 47 thousand individuals.

4. Face Detection Library

This is one of the world's simplest face detection and recognition library. It is built using dlib's state-of-the-art face recognition library which is built using deep learning. It has an accuracy of 99.38% on the Labeled Faces In The Wild benchmark which is a public benchmark for face verification also called as pair matching. It provides us simple `face_recognition` command line tool which allows us to do face recognition on a folder of images. First, you need to provide a folder with one picture of each person you already know. There should be one image file for each person with the files named according to who is in the picture. Next, you need a second folder with the files you want to identify. Then in you simply run the command `face_recognition`, passing in the folder of known people and the folder (or single image) with unknown people and it tells you who is in each image.

HOW DO WE CREATE DATABASE?

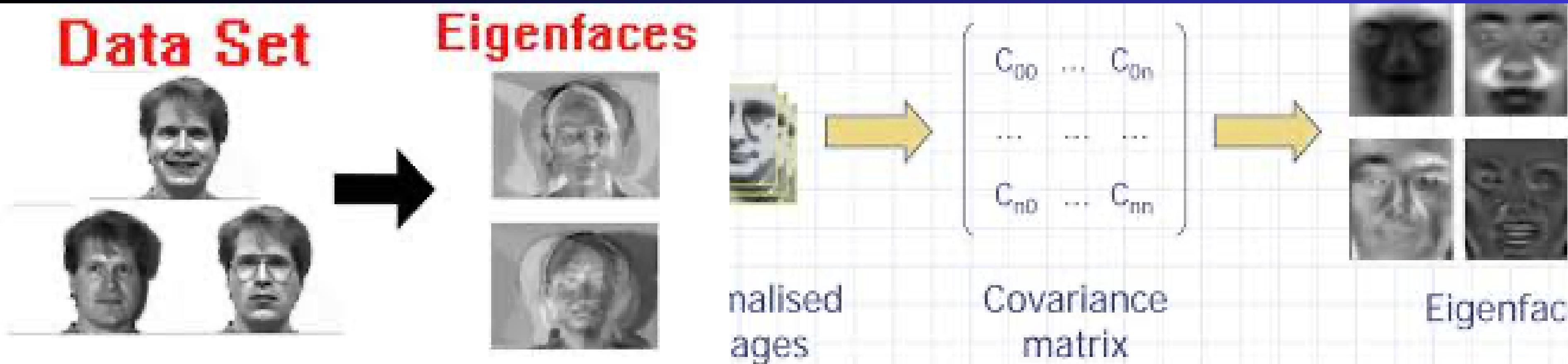
DATABASE IS THE COLLECTION OF FACE IMAGES AND EXTRACTED FEATURES. AND THE DATABASE INCLUDES NAMES OF STUDENTS & REGISTRATION NUMBER FOR EACH STUDENT .

WE CREATED A DATA BASE FOR 5-6 PEOPLE, WHERE WE TOOK 10 IMAGES PER PERSON USING ESP32 CAM. THESE IMAGES WERE TAKEN AT DIFFERENT TIMES AND WITH VARIATIONS IN ILLUMINATION, FACIAL EXPRESSIONS, AND FACIAL DETAILS.



Eigen Face for Recognition face

1. Create a training set and concatenate columned images into one matrix.
 2. Normalize the images and calculate the covariance matrix.
 3. Calculate the eigenvalue and the weights for all images.
 4. Input an unknown face image.
 5. Normalize and calculate weights for input image.
 6. Calculate the distance.



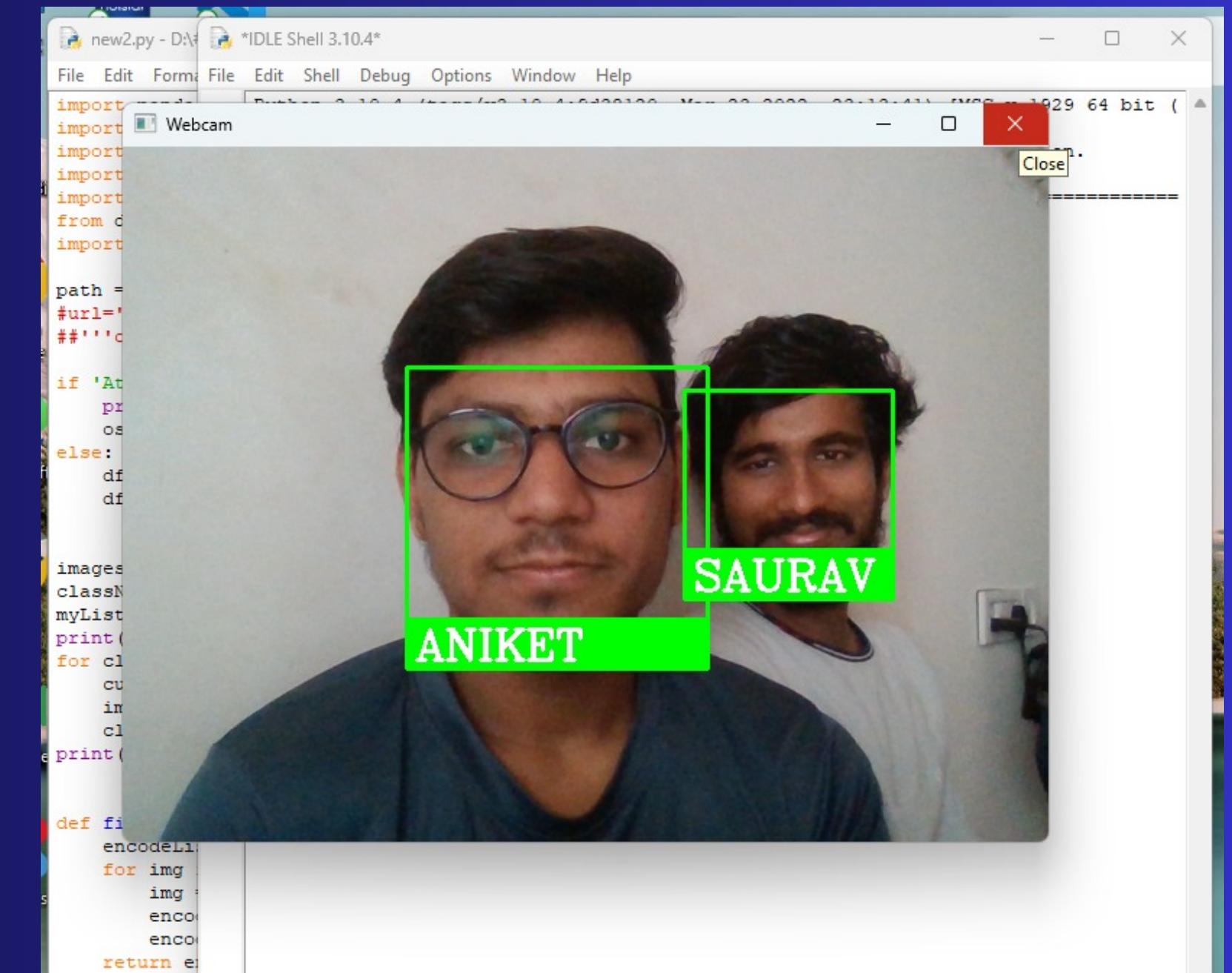
Python Results

By using a PYTHON code, which used Eigenfaces method to recognize faces. We entered the data base for some people, we got successful results.

When we run this code with our database a new file will appear (my_model.pkl) this model contains the eigen faces for students in data base.



When we applied the openCV python code, the code was able to successfully recognize the faces, it detect the faces and write the names of recognized persons as shown:



A screenshot of Microsoft Excel showing a table of student attendance. The table has columns for Name and Time. Row 3 contains ANIKET and 13:15:52. Row 4 contains SAURAV and 13:15:52. Row 5 is empty. The table is located on a sheet titled 'Attendance'.

	A	B	C	D	E	F	G	H	I	J
1										
2										
3	ANIKET	13:15:52								
4	SAURAV	13:15:52								
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										

Then the code will add the data to excel sheet for present students as shown:

CONCLUSION

From our experiment, we noticed the face recognition was sensitive to face background, light, and head orientations.

This technique described the accurate and efficient method of automatic attendance in the classroom which could replace the traditional method. An automatic attendance has many advantages, most of the existing systems are time consuming and require semi manual interference from lecturers, our system seeks to solve these issues by using face recognition in the process to save the time and labor. And No need for installing complex hardware for taking the attendance in classroom, all we need is a camera and laptop. We used algorithms that can detect and recognize faces in the image.



Future Work

Automatic attendance system can be improved by increasing the number of features which can be extracted to increase accuracy of face recognition. Once the software is developed and tested properly, it could be improved to cover full institutions such as the faculty of engineering.



THANK
YOU