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Automated Face Recognition based Monitoring System

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Definition:-

Designing a Automated monitoring system to tell the existence of a user in the particular room on the basis of face recognition method from any CCTV Camera.



Introduction :-

This is a System which is able to detect a face of a person from any location while sitting in front of any camera . After the Successful detection the face recognition is performed . And then generate a Report of that particular persons existence in the room .

Overview :-

In our System We are going to register some of the faces . The Registration of face is done by some data point .Then a Specified value is obtained by face algorithms. After a Successful registration the face is Detected by any camera(recommended to use a high resolution camera).Here A timer is started. Using the data point information of the faces it will extract the features of the face to a value which is then looked up in a dataset of all faces .The Successful Comparison result to face identity which is unique. Then the specified face is assigned to that timer .

Now After all the process admin is able to see the information of all user in a particular room like Duration hours, No. of peoples.

PURPOSE :-

“Automated Face Recognition based Monitoring System” helps in maintaining a record of persons entered in the premises by identifying the face and recording the time of that person spent in the premises. Which is then further used to verify any condition just by simply entering the date and name of the person. And by implementing this we don't have to put up physical person to monitor the area. The system can automatically keep track.



Tool and Technologies



Python:

Python is an interpreted, high-level, general-purpose programming language. Created by Guido van Rossum and first released in 1991, Python's design philosophy emphasizes code readability with its notable use of significant whitespace. Its language constructs and object-oriented approach aim to help programmers write clear, logical code for small and large-scale projects

PyCharm IDE:

PyCharm is an integrated development environment (IDE) used in computer programming, specifically for the Python language. It is developed by the Czech company JetBrains. It provides code analysis, a graphical debugger, an integrated unit tester, integration with version control systems (VCSes), and supports web development with Django as well as Data Science with Anaconda.



Hardware and Software Requirements

Hardware Requirements

Hardware	Recommended System Requirements
Processor	Intel Core i5 CPU & above, 2.50 GHz
Memory	8 GB
Hard Disk	50 GB
GPU	GTX or RTX series of NVidia to perform efficiently

Software Requirements

Software	Recommended System Requirements
Front End	Python Tkinter
Back End	Python 3
OS	Windows 10 and other os

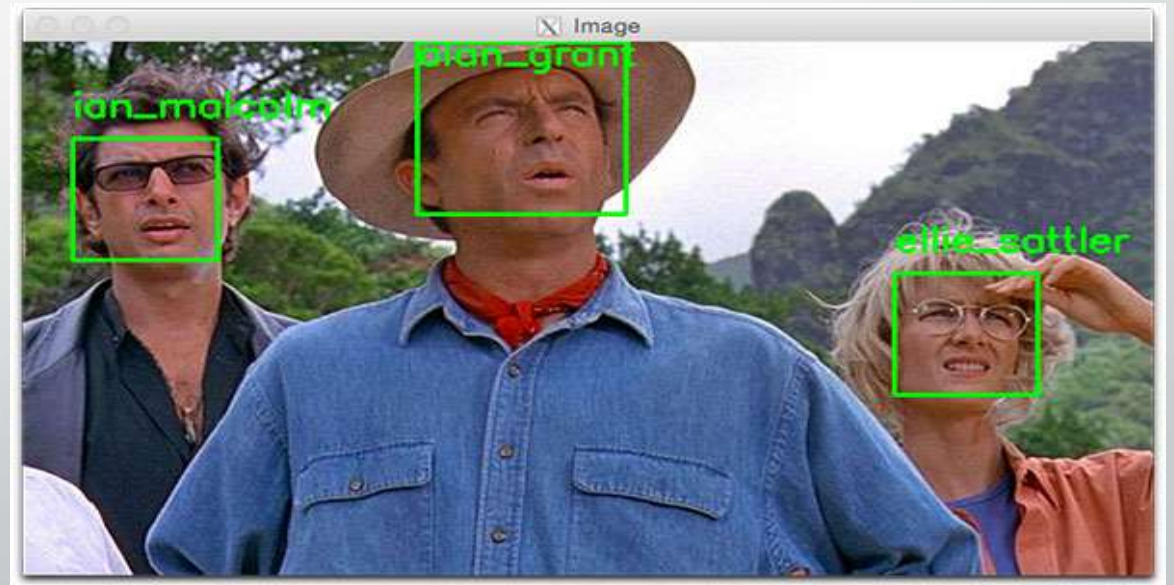
Current System :-

In this fast pacing world, every sector is increasing in a fast and smooth way. But concern related to monitoring and security is always a major concern of all this infrastructure. Nowadays for security and monitoring of people we majorly rely on Closed-Circuit Television (CCTV) for monitoring. But the only problem is that it requires the man labour to investigate the activities which are in question. This is a very time-consuming process as one has to watch the whole story to generate a track and its very time consuming. And technologies like face recognition is now very efficient in monitoring and tracking the daily activities.



New system:

- Monitor using a camera and physical machine without any man labour or effort only you have to start the monitoring process.
- It uses hog model to recognize which uses less computational power to give more results.
- Its trainer is an efficient one which generate encodings on the basis many criteria like eyes noses faces etc.



Requirement:

- Dataset of images.
- Camera for live video.
- High computation power for good result.

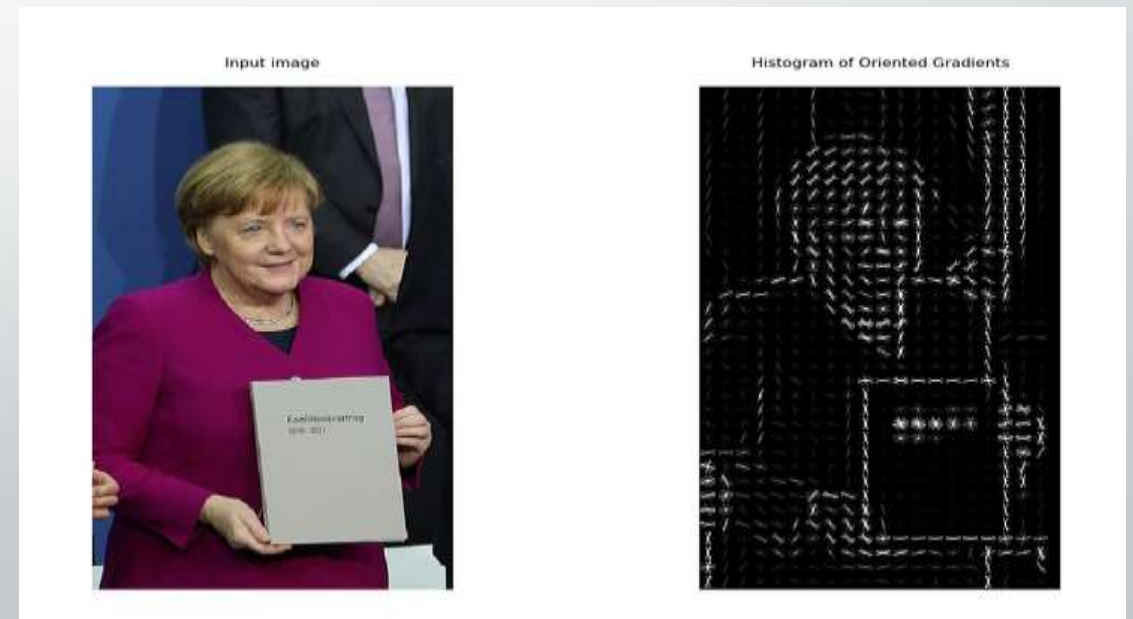
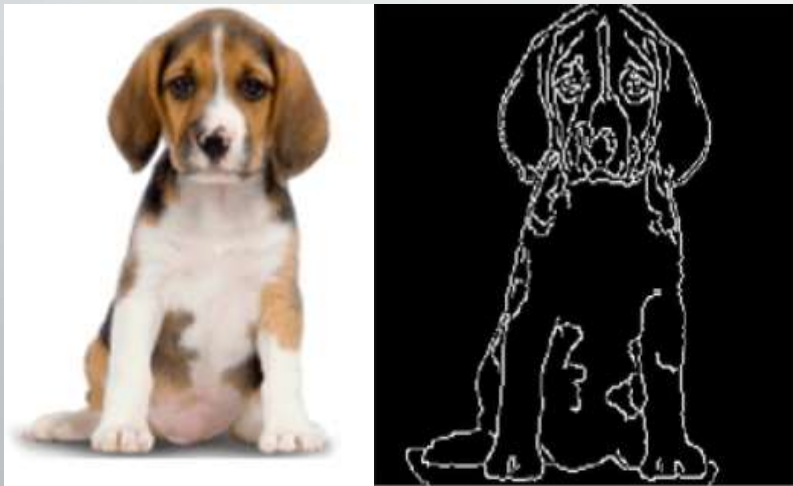
Register face:

- 1) Capture face with different angle
- 2) Reshape image size
- 3) Filter image
- 4) Create user in dataset and save image

Hog feature descriptor:

A HOG is a feature descriptor generally used for object detection. HOGs are widely known for their use in pedestrian detection. A HOG relies on the property of objects within an image to possess the distribution of intensity gradients or edge directions. Gradients are calculated within an image per block

As above statement, it points the value where intensity is highly changes as you can see below on edges the intensity of images is changes and after connection those point it gives us a shape of object



Generate encoding :

Encoding is the process of converting data into a format required for a number of information processing needs, including: Program compiling and execution.

As per the above statement we convert the data in range of -1 to 1 so it will be easy for machine to process the data.

```
[ -0.14663997  0.07730892 -0.00998708 -0.12346537 -0.10341501 -0.06755085
-0.07738705 -0.09074566  0.18798737 -0.13960811  0.25100997  0.06669474
-0.15104327 -0.13915275  0.03391121  0.07010324  0.14350408  0.15611301
-0.0190462   -0.13531435  0.02685901  0.00243133  0.01340351  0.07329115
-0.22309873 -0.26636869 -0.08636526 -0.03454096  0.01544892 -0.09741057
 0.08390073  0.05709527 -0.26092231 -0.05740358  0.00395828  0.13185228
-0.04309798 -0.00856253  0.18504328  0.04256885  0.12624769  0.06759767
 0.01347216  0.26597434  0.17919302  0.03528558  0.01445494  0.06220956
 0.14945842 -0.23603192  0.11180782  0.14462389  0.09443   0.00194937
 0.06415237 -0.1376377  0.0644428  0.13909163 -0.1846831  0.00118771
 0.02012495 -0.0665051  -0.04505374  0.00440548  0.24500076  0.14519644
-0.06201124 -0.10306988  0.18312842 -0.09867001 -0.06468538  0.10908747
-0.09570986 -0.17955446 -0.31093282  0.05516707  0.40552852  0.15166034
-0.1089415   0.07154627 -0.06602311  0.00498694  0.0943602  0.00085405
-0.15403707 -0.00627905 -0.09758651  0.11678088  0.20552996  0.05914513
-0.10439923  0.16728635  0.02893975  0.07876006  0.08825836 -0.00630783
-0.06772637 -0.00224548 -0.1187828  -0.02449569  0.09123281 -0.02859614
 0.02479031  0.12384149 -0.165427   0.15448602  0.03668112  0.03140884
-0.05082892  0.03678656 -0.12426557 -0.04245797  0.07633193 -0.25038928
 0.22389084  0.10895523  0.00997051  0.20563328  0.1249458  0.0289389
-0.01605751 -0.07127888 -0.08356638 -0.04219011  0.0530321  -0.0240508
 0.19086348  0.03657304 ]
```


Face Detection Steps:

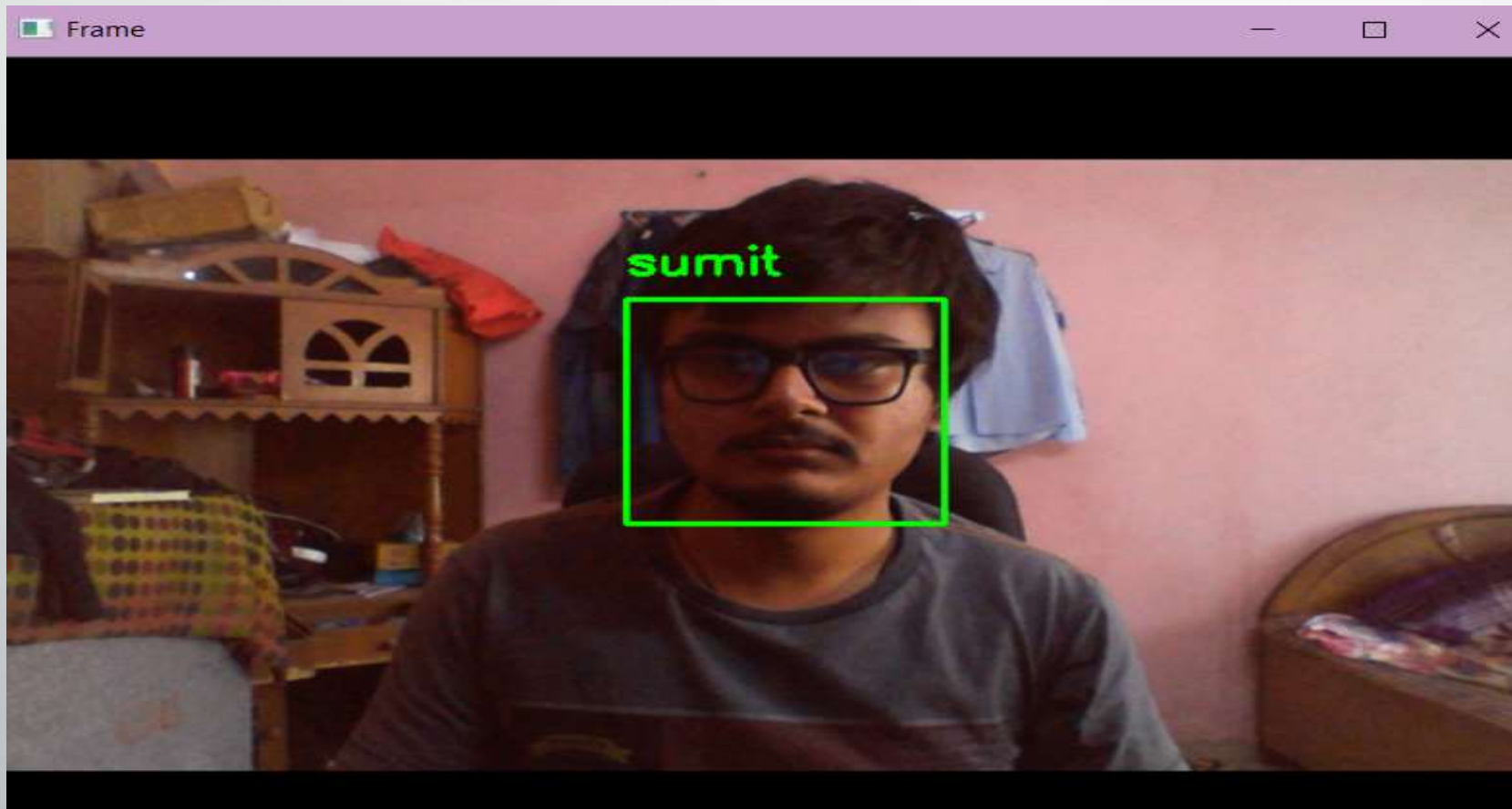
- 1) Reshape image size
- 2) Apply hog face descriptor
- 3) Detect face in image base on hog descriptor using dlib library
- 4) Crop detected face location
- 5) Generate encoding
- 6) Make file which contain all generated encoding

Face Recognition Steps:

- 1) Capture each frame of video
- 2) Use face detection to locate the faces in image
- 3) Generate encoding of faces
- 4) Compare encoding with dataset encoding by using face_compare function

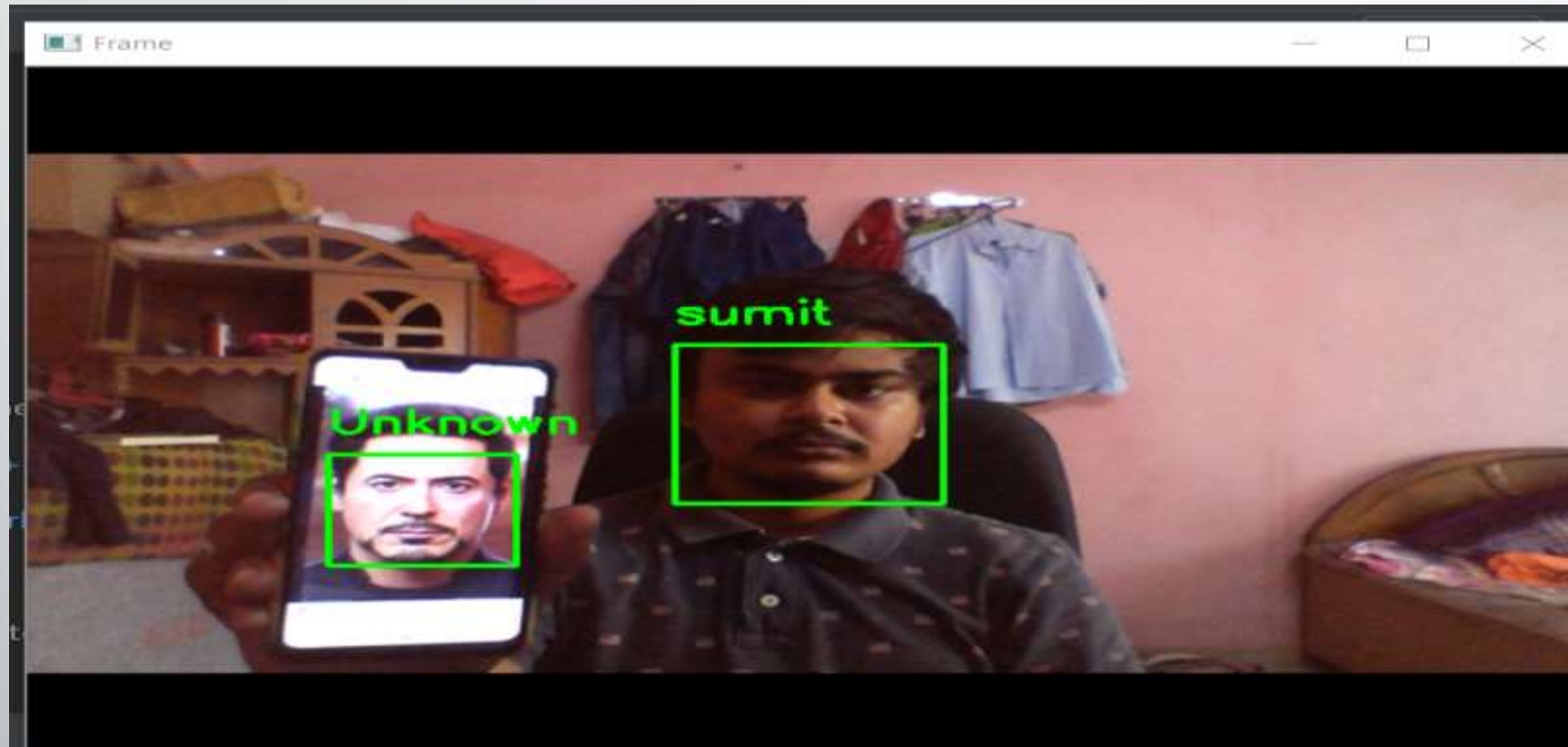
Result:-

Below is the result of image we get for known faces .



Result:-

Below is the result of image we get for unknown faces .



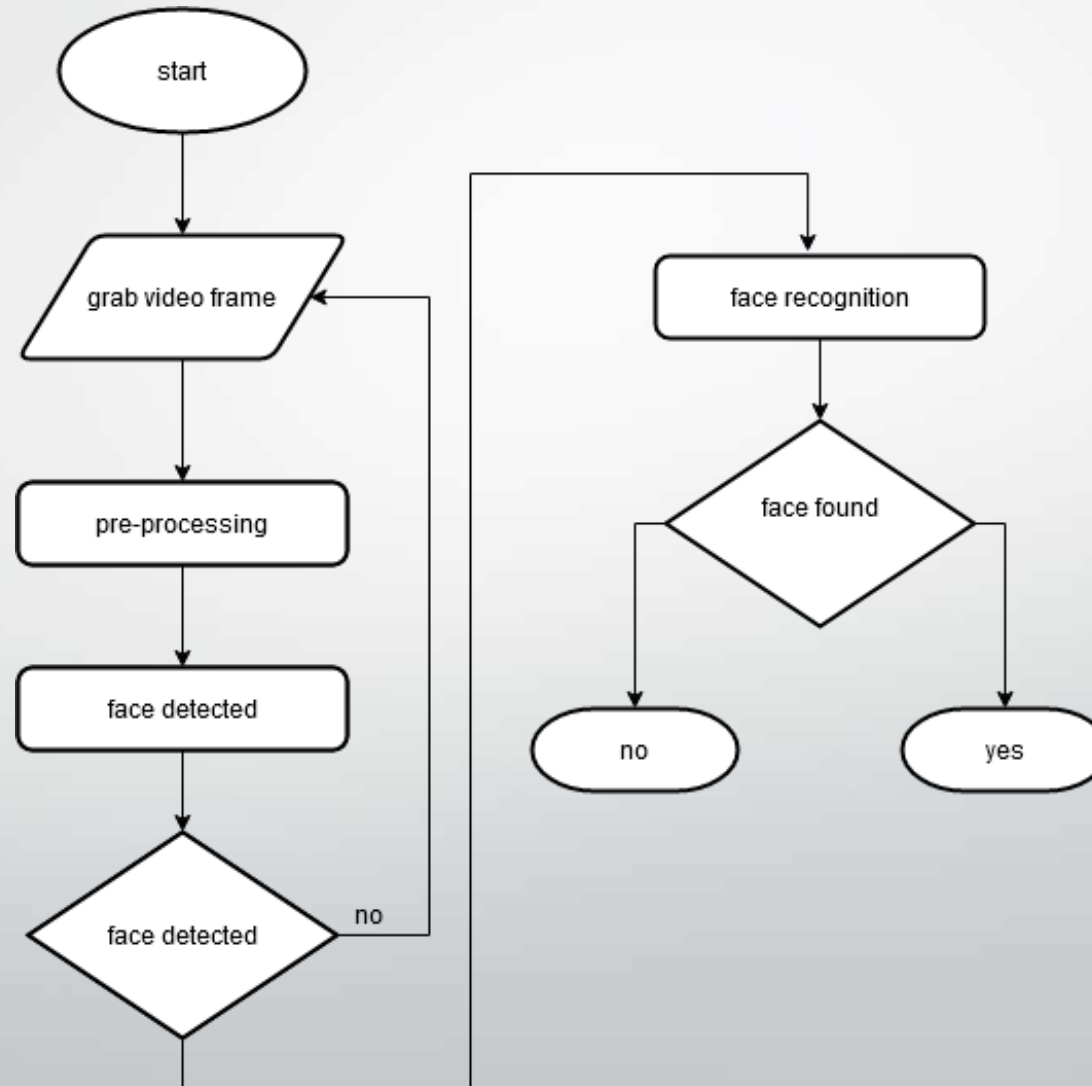
Requirement :-

- Image dataset for training
- Camera

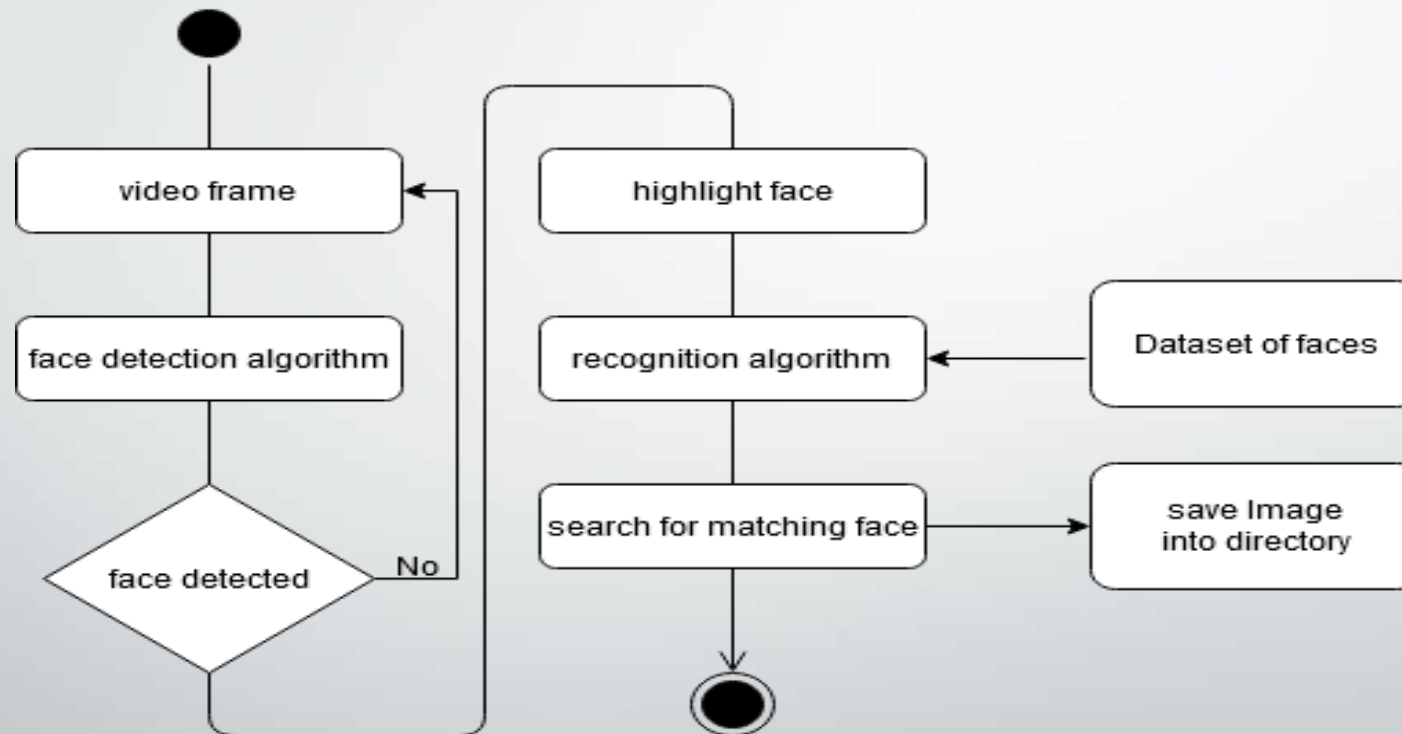


Diagrams

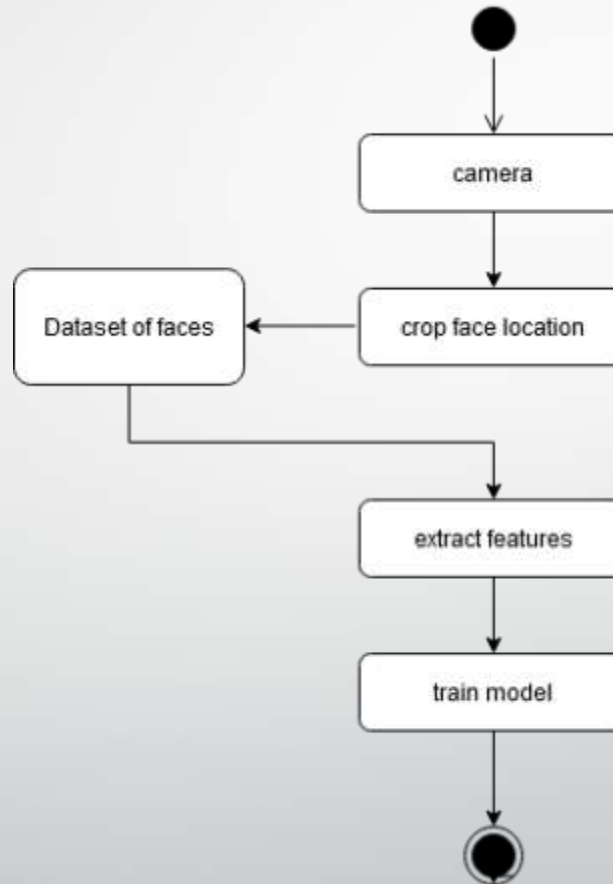
Flowchart :-



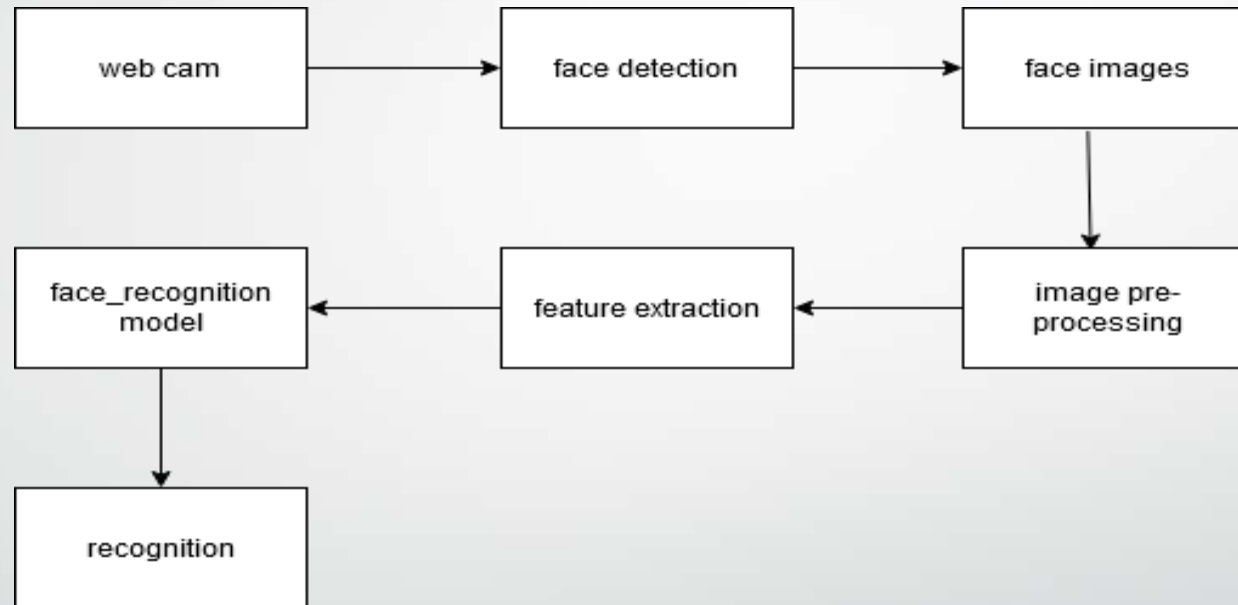
Activity of face Recognition



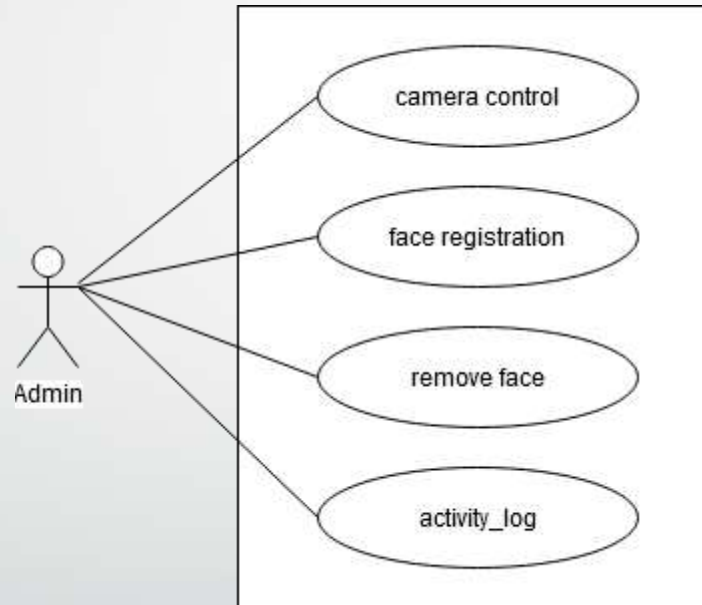
Activity of face Registration



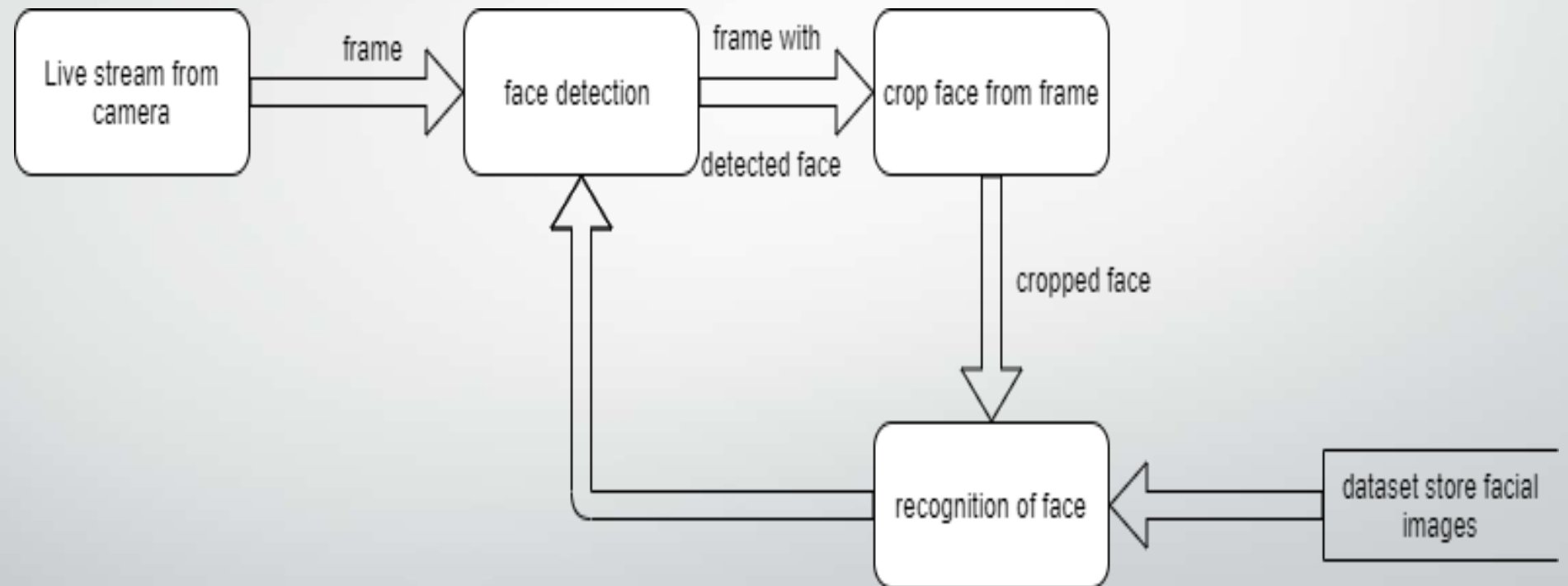
Block Diagram



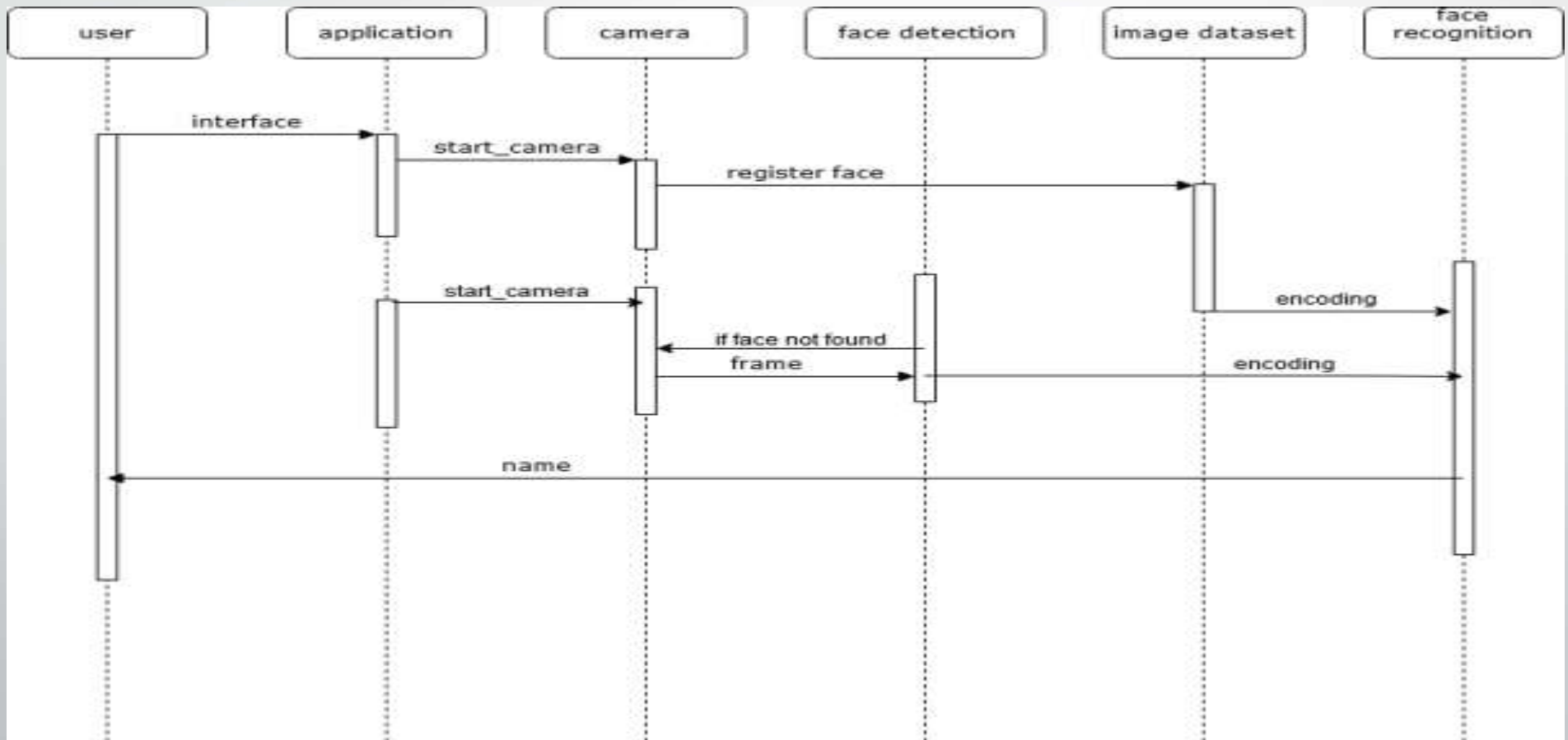
Use Case :-



Dataflow :-



Sequence Diagram:-



Uses :-

- Monitoring is done automatically.
- No physical person is required to monitor.
- Can be used in Schools and colleges to monitor student existence in a room or campus.
- Can be used in Business firms to avail information like duration hours of working on the basis of day, week, month or year.

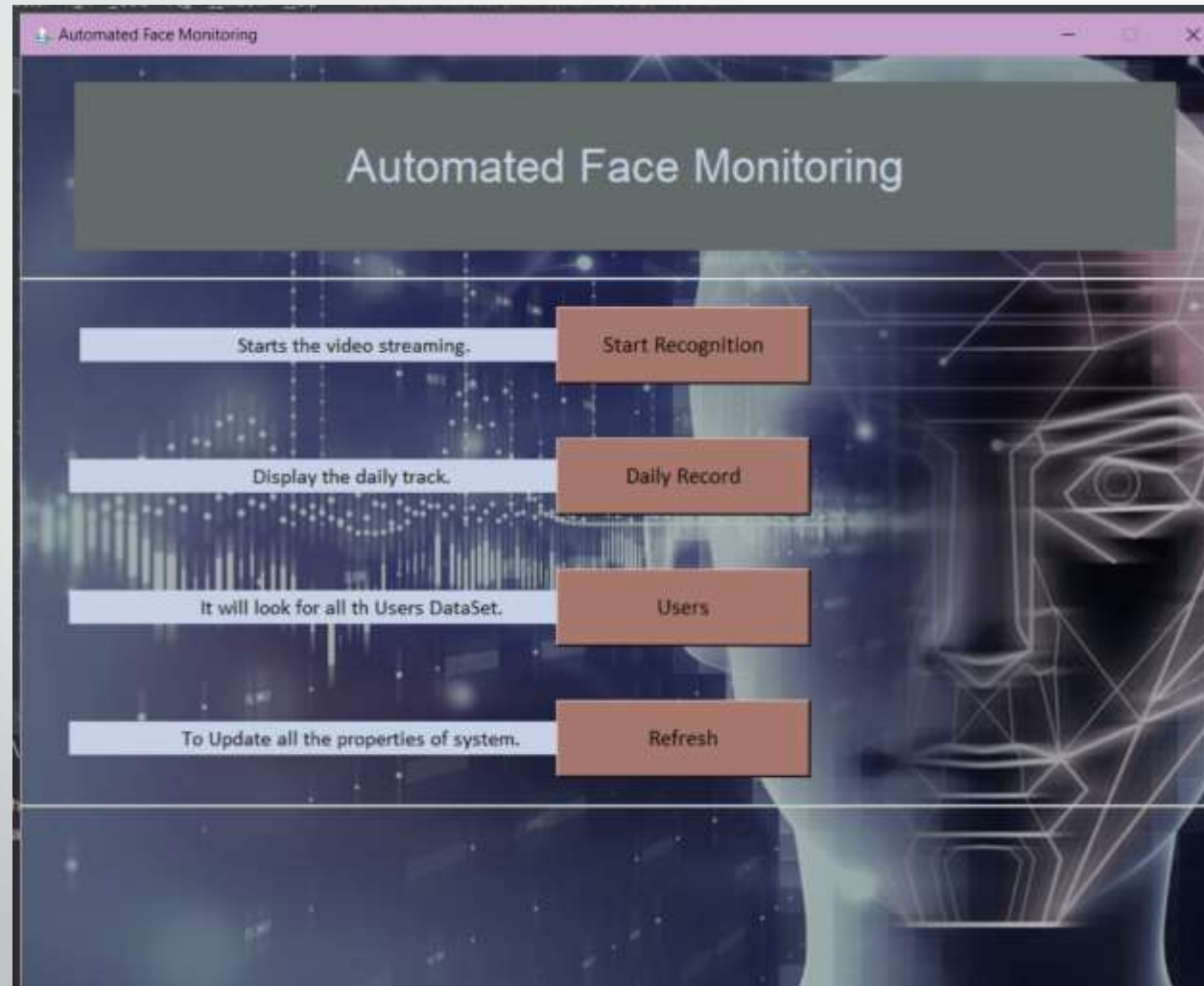
Limits :-

- A high resolution camera is required to get more accuracy..
- Not work in dark rooms.
- A system with high configuration is requires.

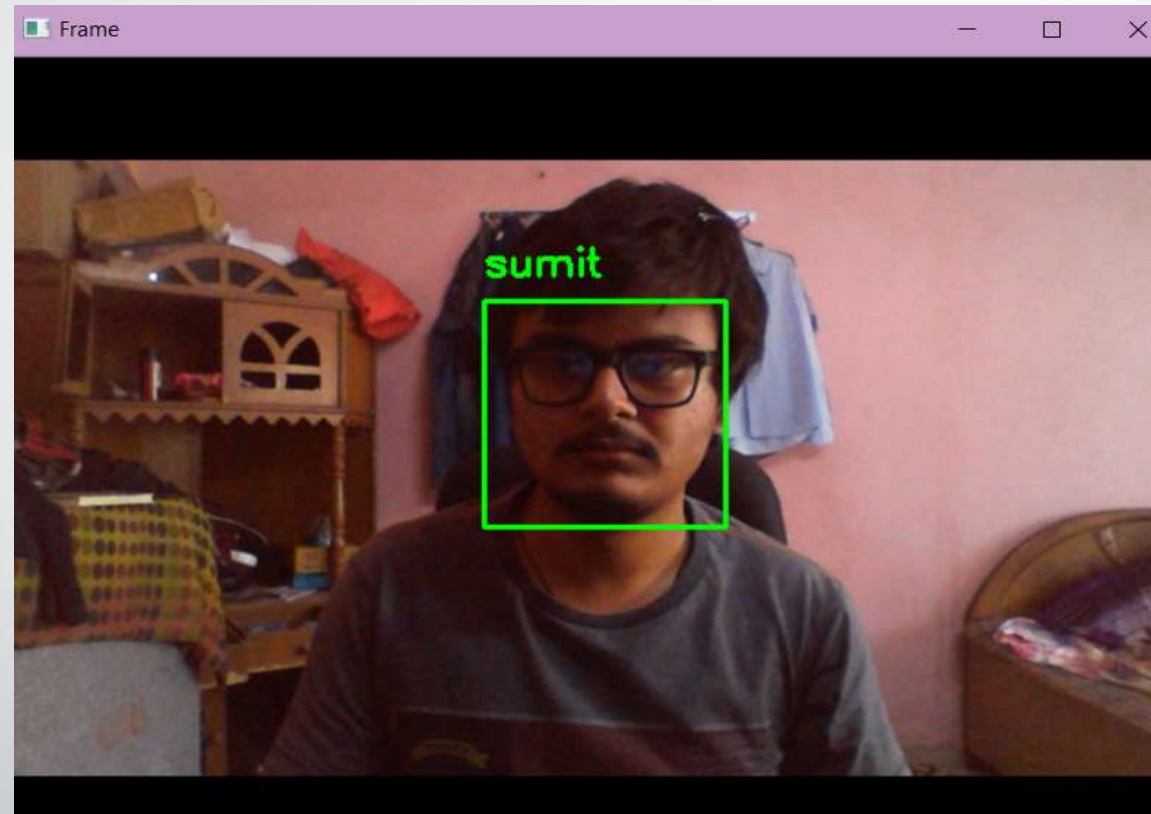


Snapshots

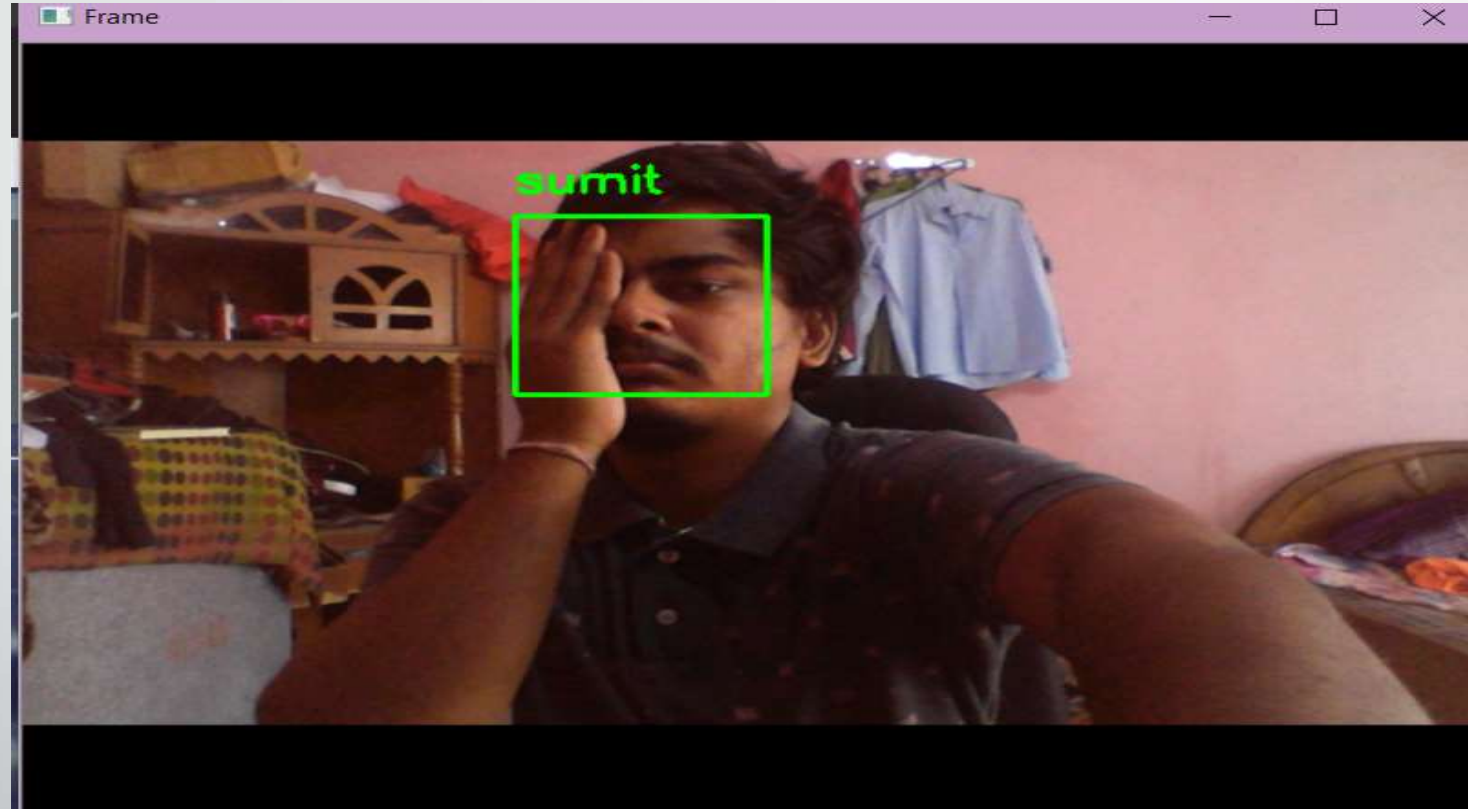
Main Menu Screen



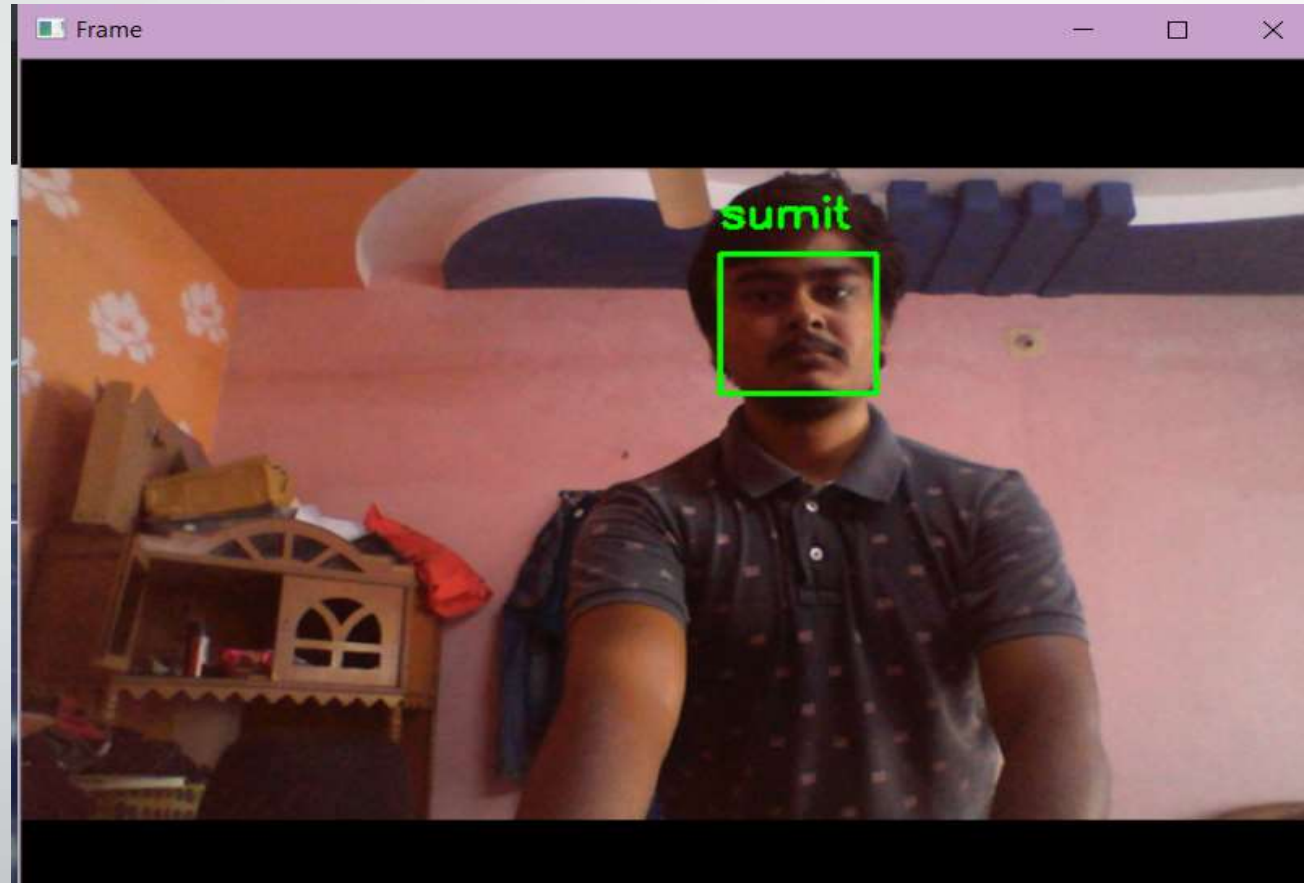
Recognition Screen Normal



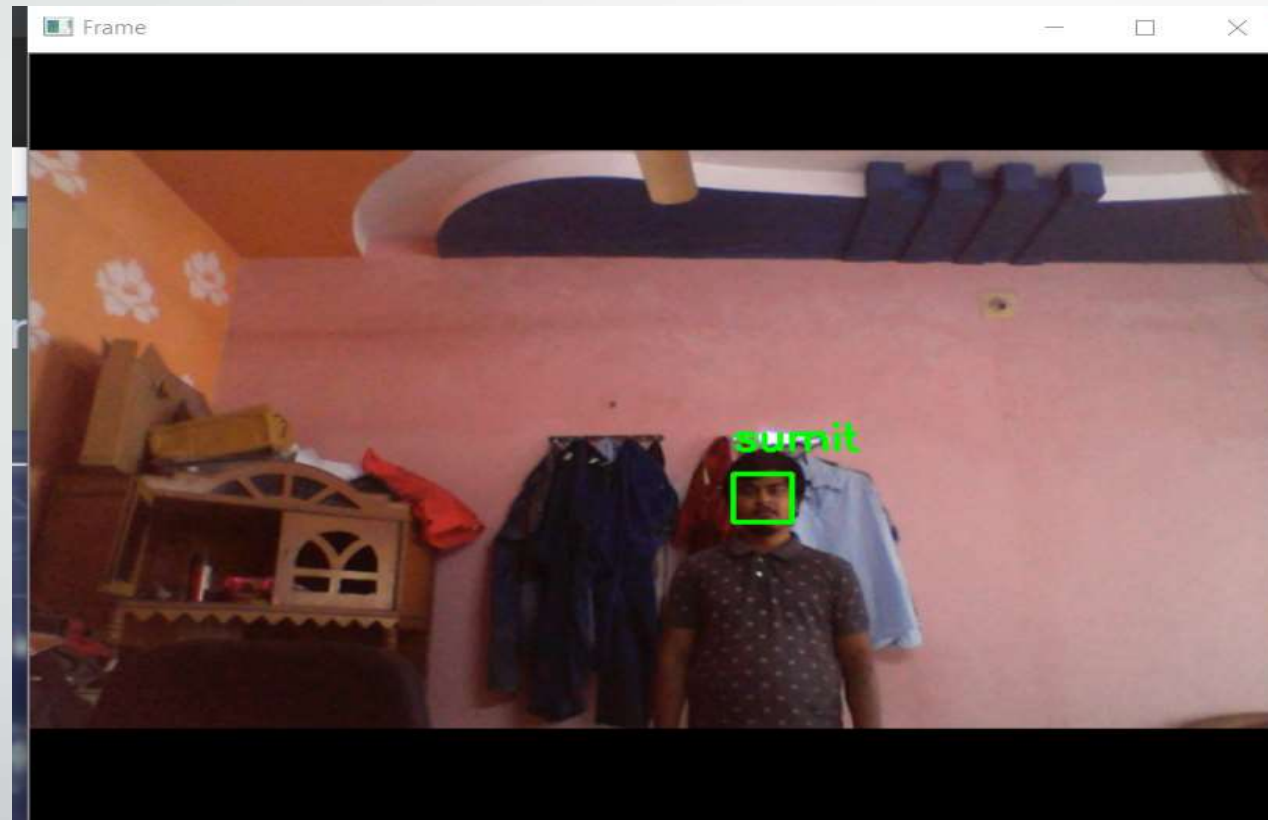
Recognition Screen Obstructed Face



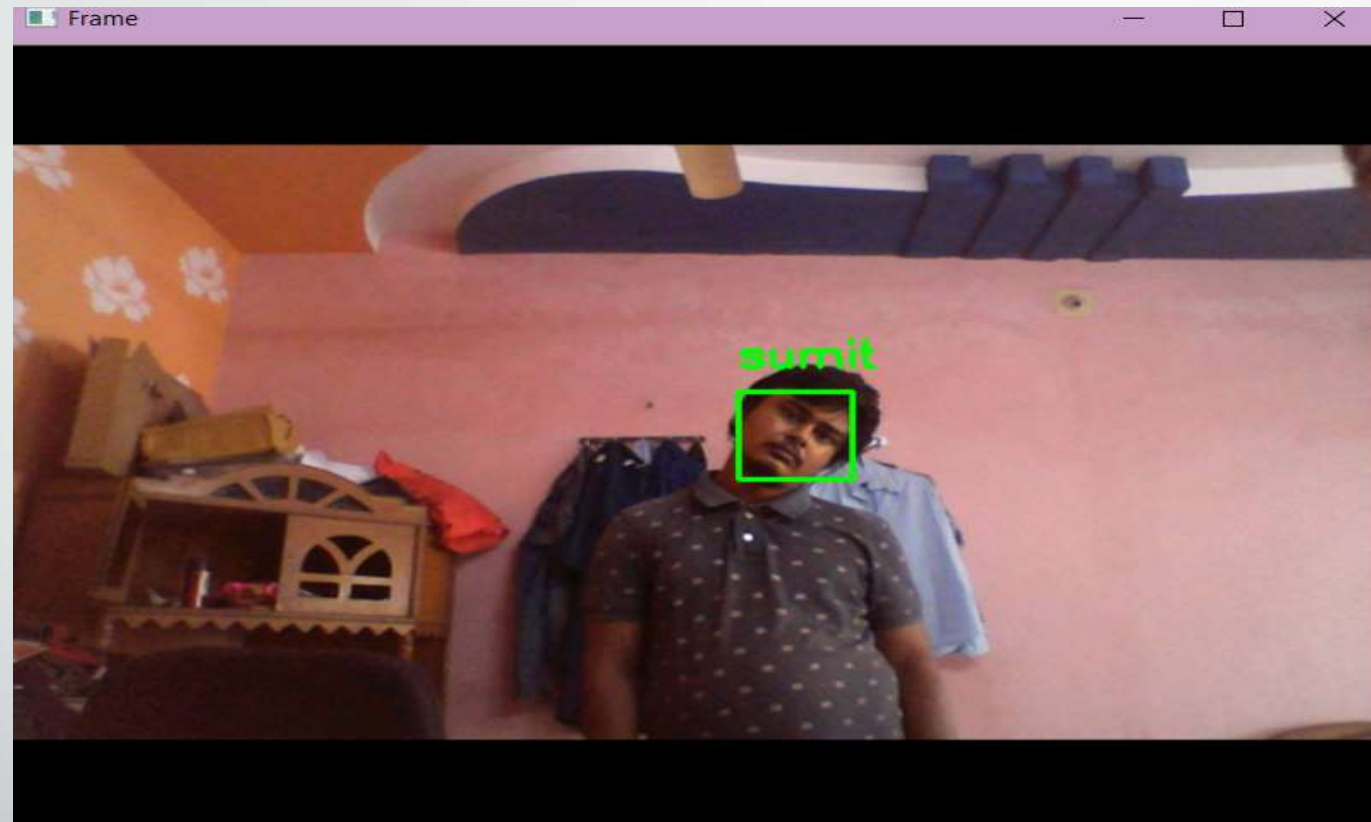
Recognition Screen Standing Position



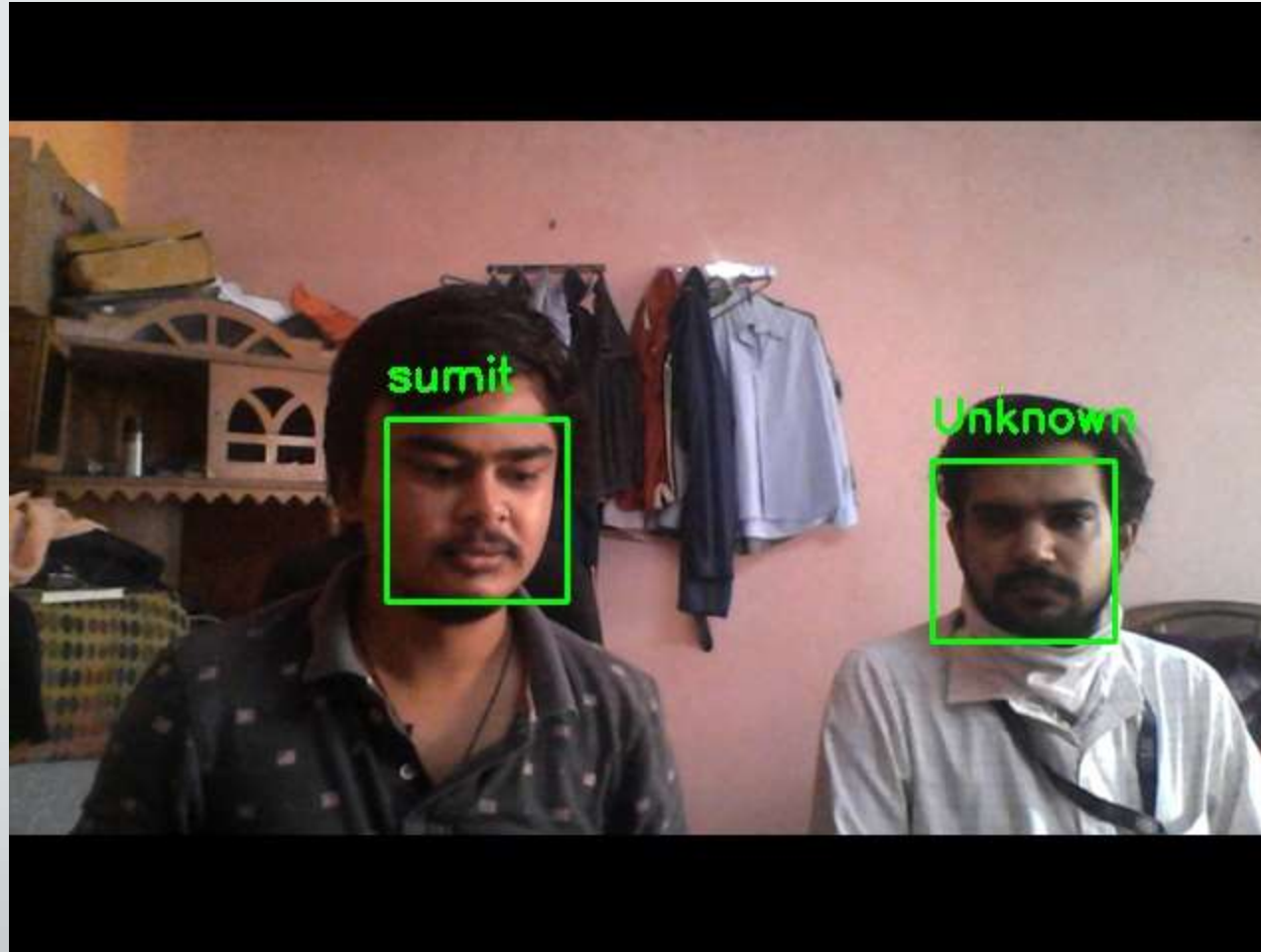
Recognition Screen Distant Position



Recognition Screen Angled Position



Recognition Screen Multiple Faces



Daily Record Screen

Automated Face Monitoring

Automated Face Monitoring

Select Date:- 18-05-20

Enter name:-

show Record

All Log Files

- 18-05-20.json
- 17-05-20.json
- 15-05-20.json
- 09-05-20.json
- 05-05-20.json
- 03-05-20.json
- 01-05-20.json

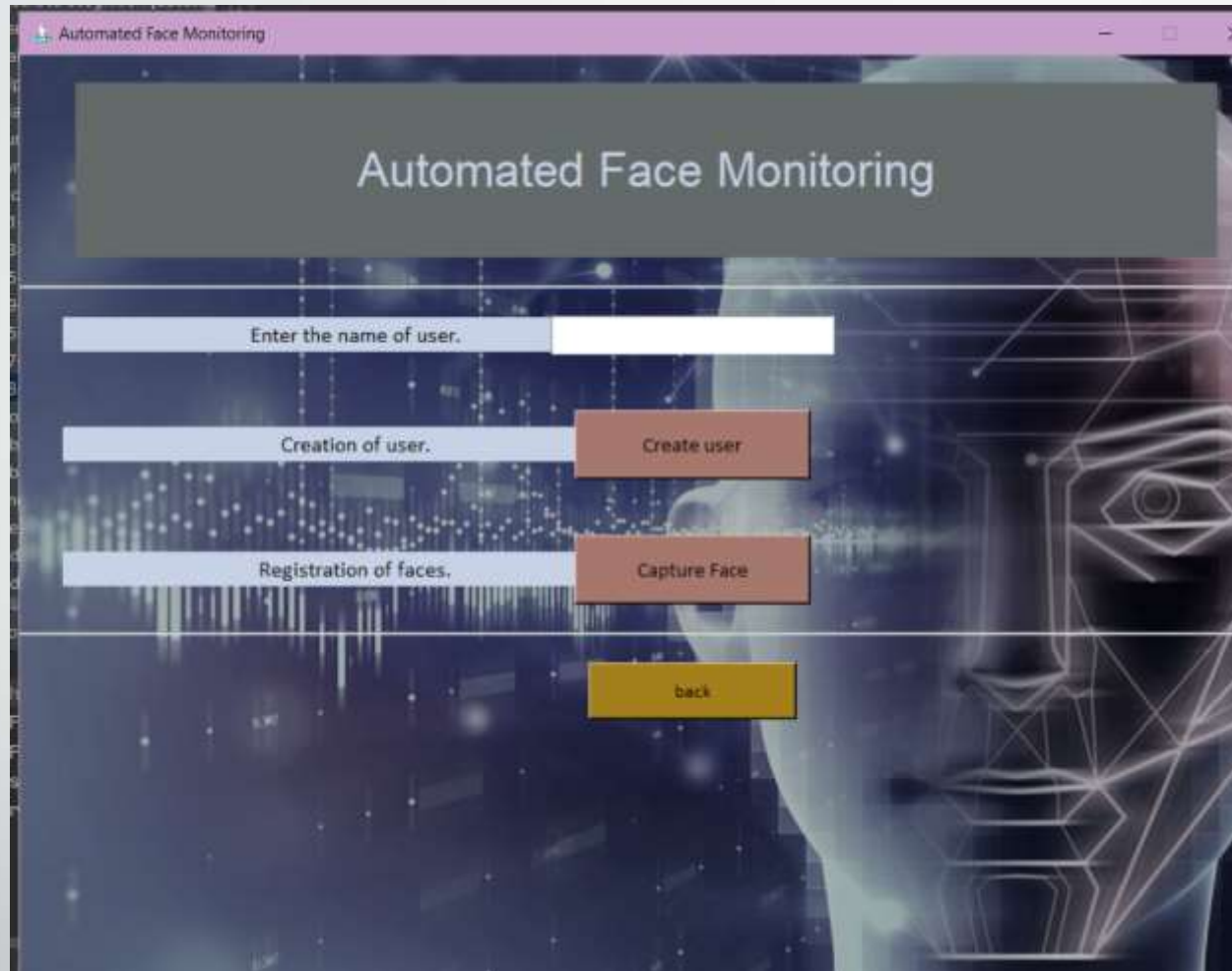
All Users

- sumit
- jija
- alpesh
- aakash

back

[illegible]

Faces Registration Screen



The screenshot displays a software window titled "Automated Face Monitoring". The interface features a dark background with a stylized, wireframe face on the right side. The main content area is divided into sections by horizontal lines. At the top, a grey box contains the title "Automated Face Monitoring". Below this, there is a text input field labeled "Enter the name of user." followed by a white input box. Underneath the input field, there are two rows of buttons. The first row has a label "Creation of user." and a red button labeled "Create user". The second row has a label "Registration of faces." and a red button labeled "Capture Face". At the bottom, there is a yellow button labeled "back".

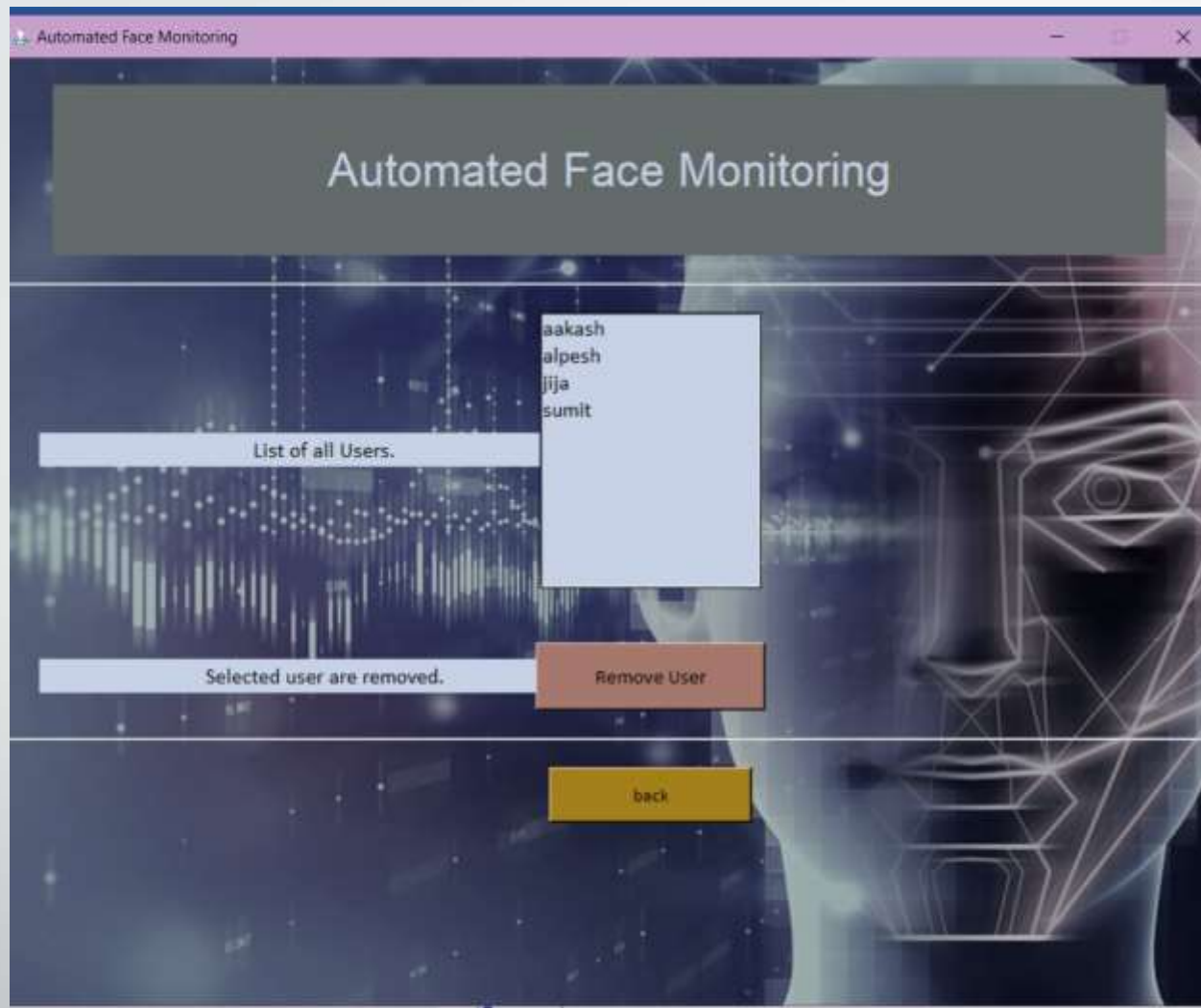
Automated Face Monitoring

Enter the name of user.

Creation of user.

Registration of faces.

Users Details



Advantages

- No high storage device is needed for storing report.
- No need to watch whole video to check the presence of person in video.

Conclusions

The main aim of this project was to put what we learnt in our Information Technology theory into practice. The automated face recognition system designed by our team allowed us to fully exercise the various techniques used for the development and implementation of computer programs. We were able to learn a new programming language, Python and also understood the working different face recognition models, exercise performed in today's world. We also learnt the importance of teamwork and how to divide our work in order to efficiently develop our software.



Thank You