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# Advance CCTV Analytics Solution with FRS Intelligent system

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# Abstract

Closed-circuit television (CCTV)-based video surveillance systems have grown popular for security and crime prevention. In high-risk locations, installing CCTV cameras can reduce crime and bad behaviour by 50%. However, present surveillance systems have several drawbacks, including the unreliability of human operators, the limited credibility of recorded information owing to technological issues or difficult recording settings, and inadequate legal mechanisms for monitoring and reaction. To overcome these restrictions, IP CCTV solutions are developing clever analytic systems. These systems automatically identify and interpret various moving objects, improving monitoring and alarm processes. The system's capacity to create detailed reports and maintain a database containing incident specifics, such as the event's type, time, location, and alert level, boosts its efficacy.



# Introduction

- Closed-circuit television (CCTV) is a security and monitoring system that doesn't broadcast. There are several books and articles on CCTV monitoring and sophisticated video analytics. Most of these systems will be maintained automatically because to the ageing population and the public's desire for independence. CCTV-based video surveillance systems have become more widespread in the past two decades to deter, detect, and identify criminal behaviour.
- Statistics show that CCTV cameras in high-risk locations may cut crime in half. This aim is achieved via improving security-related services. Unreliable human operators, a lack of formalised methods for monitoring and responding lawfully, and low content dependability owing to technical defects or challenging recording settings are all shortcomings of current surveillance systems. To effectively monitor citizen security, system operators and law enforcement must maintain a fluid information flow.
- After 20 minutes, an operator may miss 90% of the activity, according to research. Therefore, sophisticated analytic systems that can recognise and analyse a huge number of moving objects in real time are the current emphasis in IP CCTV solutions.



# Intro Contd..

***Now the Question arises that how to offer people faith in their ability to maintain a secure life and a better standard of living ?***

- In addition to CCTV analytics, this strategy uses RFID-based Facial Recognition Systems (FRS) to automatically detect people's initials such as gender, age, and name etc. For prior convictions, the FRS checks the criminal database (if access has been approved). The model must also notify a specific person in an organisation when an unauthorised individual is detected, generate reports, and keep a comprehensive database of incidents, including their nature, time, location, and alert level (low, medium, or high).



# Objectives



- To aid in avoiding offences, uncertain activities and preserve people's safety and security.
- To provide maximum accuracy in face recognition and suspicious actions in short time.
- To identify and deny the unauthorized person's entry for the specific organization.
- To increase the flexibility and efficiency of the FRS.



# Literature review

1 - Tianhao Zhang ,Waqas Aftab ,Lyudmila Mihaylova ,Christian Langran-Wheeler ,Samuel Rigby ,David Fletcher ,Steve Maddock Garry Bosworth(June 2022) proposed **Recent Advances in Video Analytics for Rail Network Surveillance for Security, Trespass and Suicide Prevention—A Survey.**

2 - Marek Kulbacki,Jakub Segen,Zenon Chaczko,Zenon Chaczko,Jerzy W. Rozenblit,Michał Kulbacki,Ryszard Klempous,Konrad Wojciechowski(April 2023) proposed **Intelligent Video Analytics for Human Action Recognition: The State of Knowledge.**

3 - Prince Waqas Khan,Yung-Cheol Byun,Namje Park(March 2020) proposed **A Data Verification System for CCTV Surveillance Cameras Using Blockchain Technology in Smart Cities.**

4 - Mirosław Siergiejczyk,Zbigniew Kasprzyk,Mariusz Rychlicki,Piotr Szmigiel(February 2022) proposed **Analysis and Assessment of Railway CCTV System Operating Reliability.**

# Aim

## Safety purpose

Surveillance systems are booming. Residential societies, companies, and governments employ these systems to monitor activity and assure safety. Past security systems relied on human operators. Automated CCTV analytics are becoming more popular due to their efficiency and reliability.

## Object Detection

object detection is the ability to identify objects in video or in images and identify them with greater accuracy.

## Receiving alarm when an unauthorized person is detected

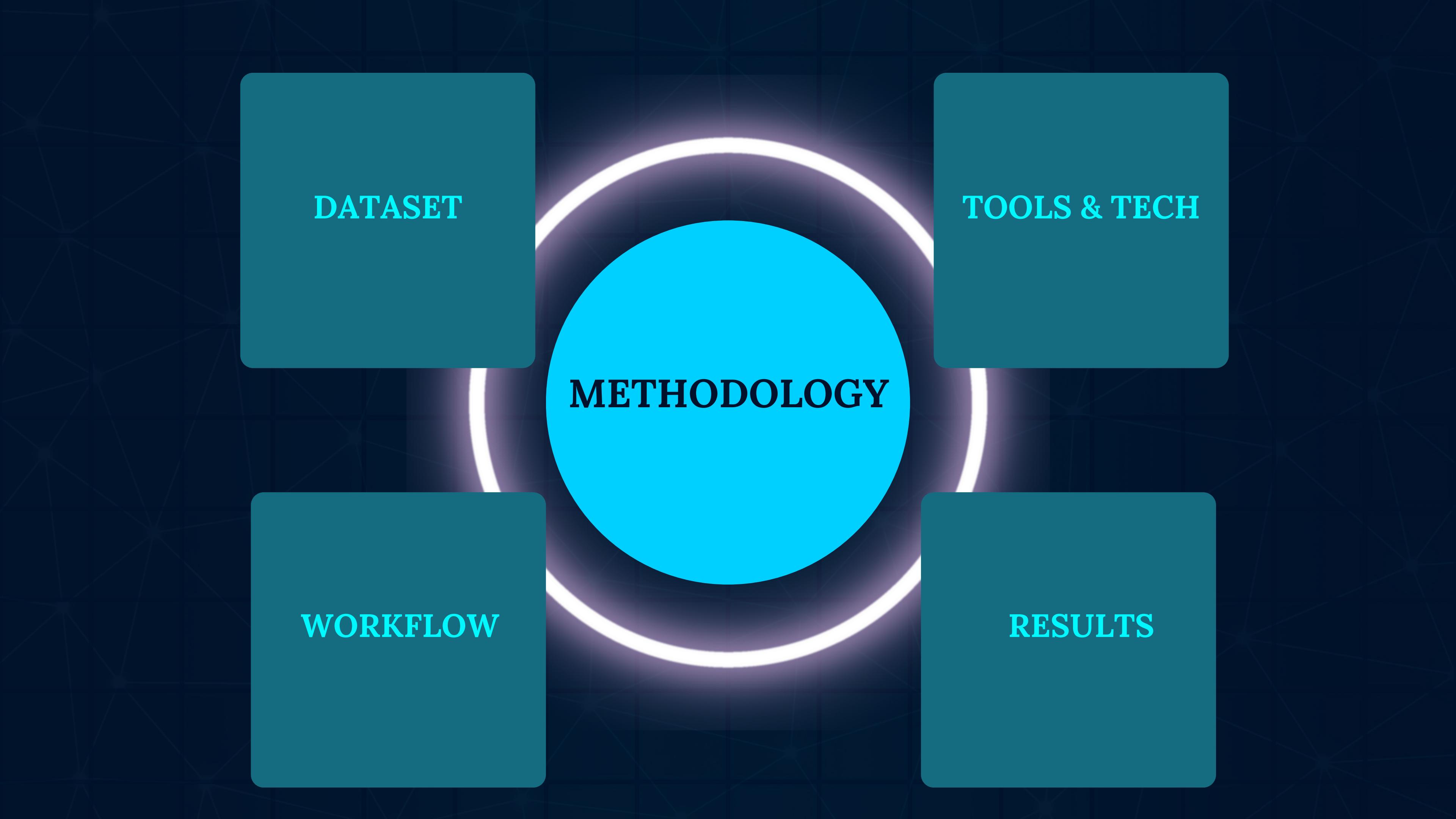
If the camera fails to detect the person, then it will send an alert to the organisation through a phone call & email.

## Cost-effective

Human surveillance operators might make mistakes. They're dangerous and expensive. Thus, cutting-edge CCTV and surveillance solutions are replacing older surveillance systems to handle their issues and reduce manpower expenses.

## Identify in a crowd

Advanced CCTV analytics systems utilise facial recognition to detect and monitor crowds. It can locate missing persons, criminals, and staff attendance.



**DATASET**

**WORKFLOW**

**TOOLS & TECH**

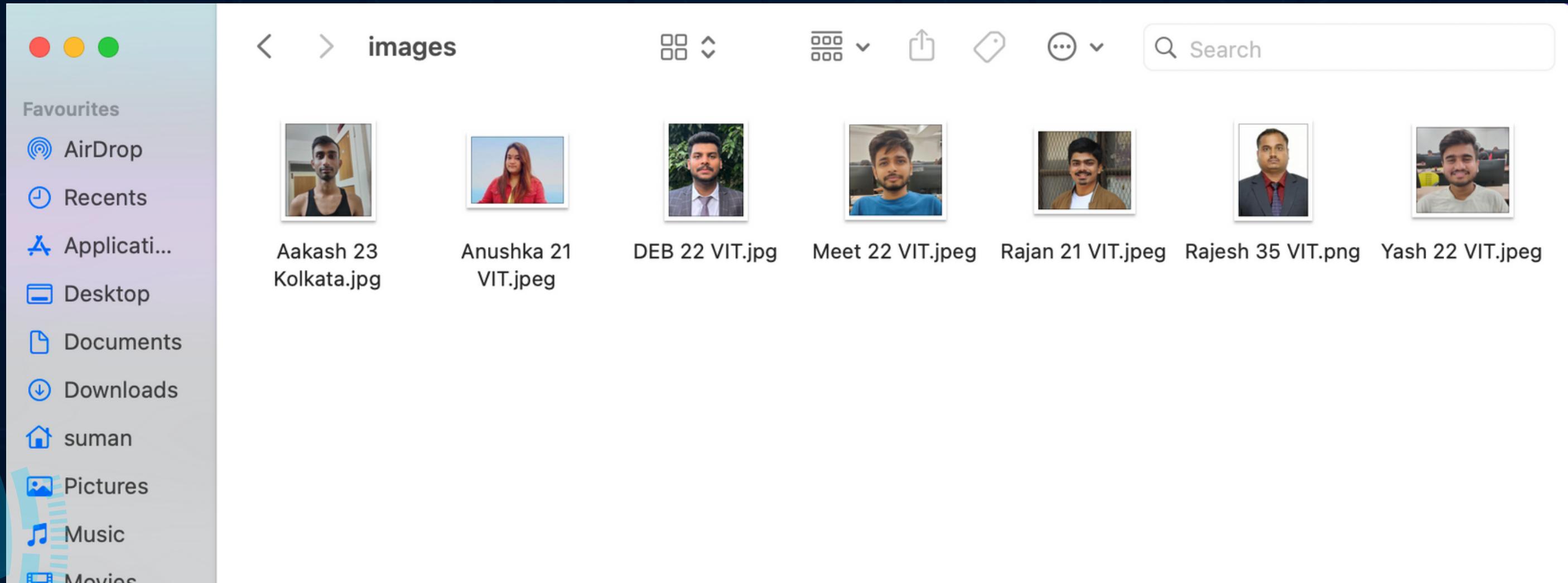
**METHODOLOGY**

**RESULTS**

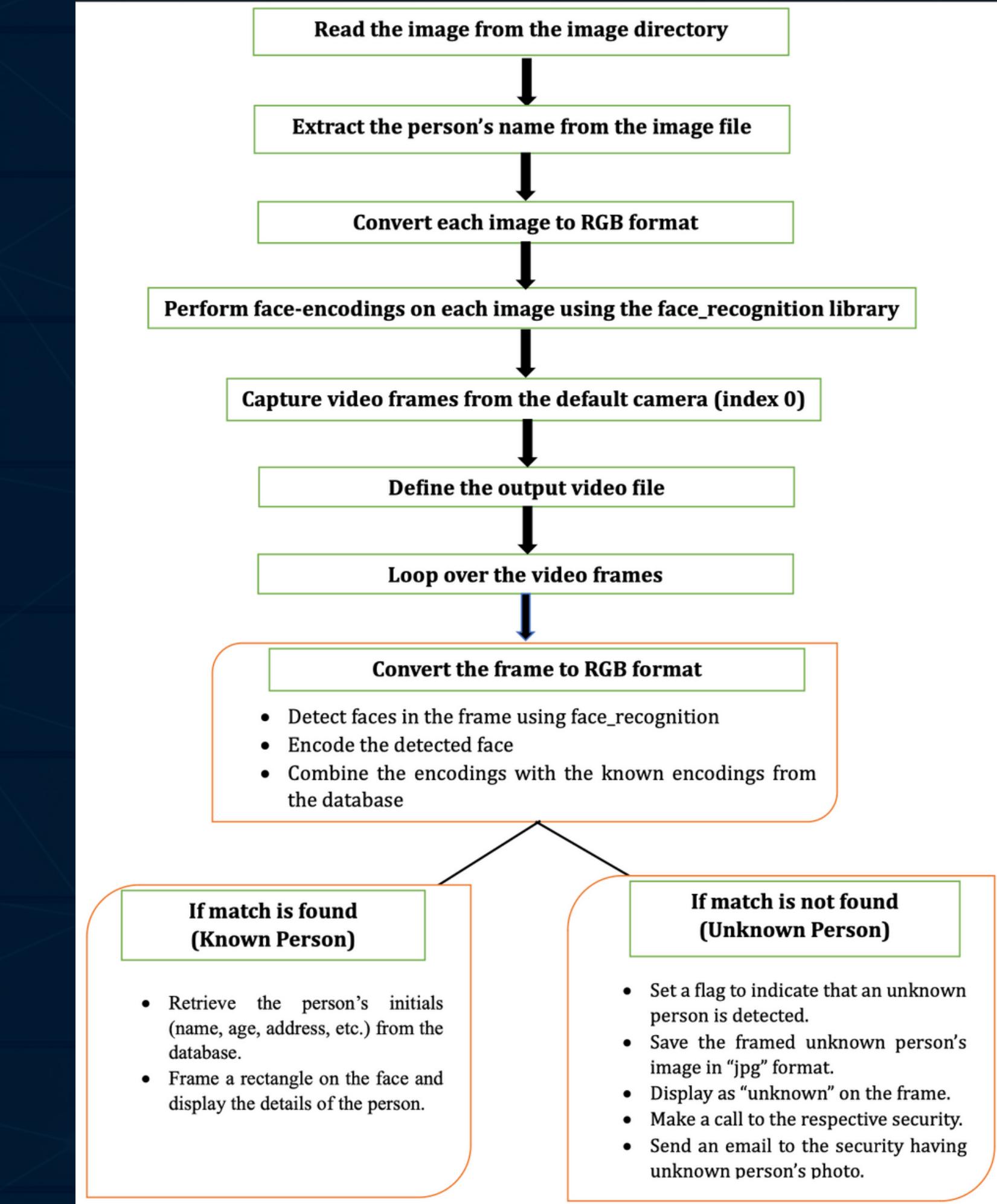
# Dataset

- The dataset is a collection of images stored in the "images" directory. Each image represents a person, and the image file names are used as identifiers for each person.

Now We have a small data & it will give the 100% accuracy



# Workflow





# Tools & Techniques

-  **OpenCV (Open Source Computer Vision Library)**
-  **NumPy**
-  **Face\_recognition Library**
-  **Image Loading and Processing**
-  **Face Encoding**
-  **Video Capture**
-  **Face Detection**
-  **Face Recognition**
-  **Drawing and Displaying Results**
-  **User Interaction**



# Results

```
80         cv2.putText(frame, age, (x2 + 6, y1 + 100), cv2.FONT_HERSHEY_COMPLEX, 1, (0, 0, 255), 2)
81         cv2.putText(frame, address, (x2 + 6, y1 + 150), cv2.FONT_HERSHEY_COMPLEX, 1, (0, 0, 255), 2)
82
83
84     else:
85         name = 'UNKNOWN'
86         if(callFlag==False):
87             callFlag = True
88             cv2.imwrite("unknown.jpg", frame)
89             test_2.makeCall()
90             mailer.send_email()
91             print(name)
92
93             y1, x2, y2, x1 = faceLoc
94             y1, x2, y2, x1 = y1 - 50, x2 + 50, y2 + 50, x1 - 50
95             cv2.rectangle(frame, (x1, y1), (x2, y2), (0, 255, 0), 2)
96             cv2.rectangle(frame, (x1, y2 - 35), (x2, y2), (0, 255, 0), cv2.FILLED)
97             cv2.putText(frame, name, (x1 + 6, y2 - 6), cv2.FONT_HERSHEY_COMPLEX, 1, (0, 0, 255), 2)
98
99             cv2.imshow("Live Video Stream", frame)
100            key = cv2.waitKey(1) & 0xFF
start_record() > while (True) > for encodeFace, faceLoc in zip(... > else > if (callFlag==False)
Run: test_1 x
Bookmarks
Structure
/Users/suman/PycharmProjects/FRS/venv/bin/python /Users/suman/PycharmProjects/FRS/test_1.py
['Yash 22 VIT.jpeg', 'Meet 22 VIT.jpeg', 'Rajan 21 VIT.jpeg', 'Aakash 23 Kolkata.jpg', 'Anushka 21 VIT.jpeg', 'DEB 22 VIT.jpg', 'Rajesh 35 VIT.png']
['Yash 22 VIT', 'Meet 22 VIT', 'Rajan 21 VIT', 'Aakash 23 Kolkata', 'Anushka 21 VIT', 'DEB 22 VIT', 'Rajesh 35 VIT']
All Encodings Completed!!!!
```



# Limitation

If an unauthorised person is in unlawful possession of a weapon and the cameras are equipped with powerful CCTV analytics technology, they will identify the person but miss the weapon since it is out of view.



# Conclusion

By implementing this model, training it with almost 57 Lakhs data, and storing the data in a database, we are able to achieve the desired level of output with maximum accuracy. This means that whenever a person appears in front of a camera, this model helps to identify that person's name, age, and address, as well as any other available data. If it fails to identify the person, the system will immediately send an alert through call & Email.





## FUTURE SCOPE

- Technologies like Automatic Number-plate Recognition (ANPR) can assist solve privacy and ethical issues by automatically detecting things like license plate numbers, vehicle makes and models, and the frequency with which a certain vehicle travels the same path.
- In contrast, RFID (Radio-Frequency Identification) is a system that use radio waves to uniquely identify and keep tabs on things or people. When a person's face is obscured, RFID can be used to improve security measures by allowing for identification of the individual.
- Another major hurdle that we want to jump with the aid of this model is detecting hidden objects as well as the unwanted objects that the person carrying with him/her.



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# OUR TEAM



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# Thank You!



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