Summer Intern Project SP2023

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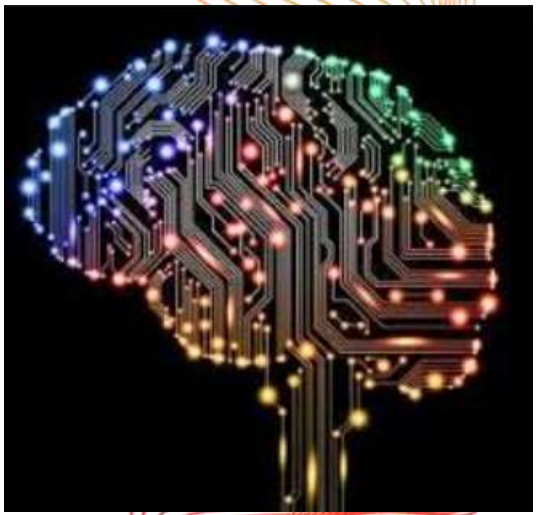
- Theme - Recognition and Clustering System
- Project name – Missing Link

Missing Link – The Search and Locate Web Application for wanted person

This project report describes the development of “Missing Link," a web application designed to harnesses the potential of technology to expedite the process of locating wanted individuals. By fostering collaboration between law enforcement agencies and the public, we can bridge the gap and create a more connected and proactive approach to apprehending fugitives.Using face recognition and machine learning algorithms, it can find out the missing or wanted person.

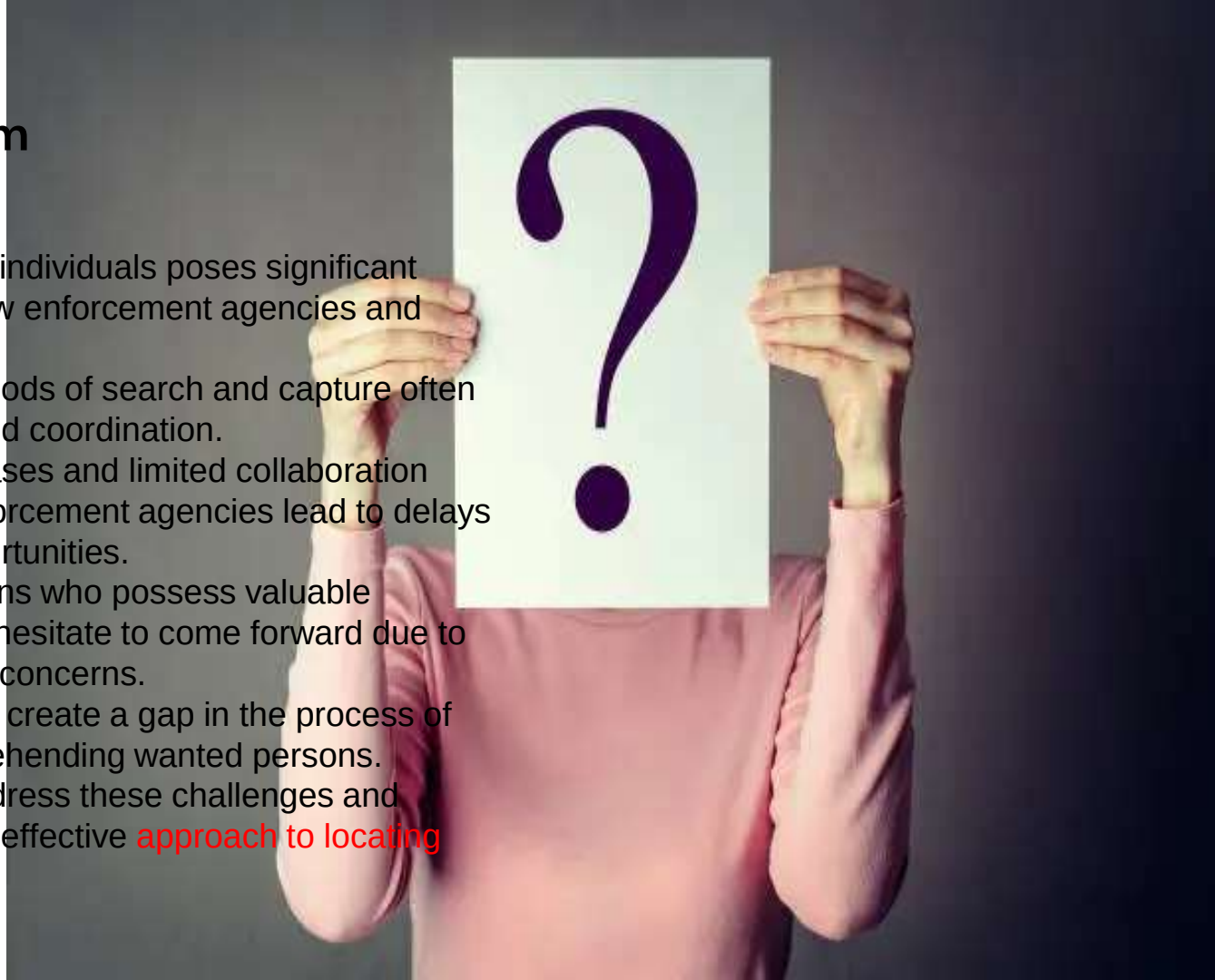


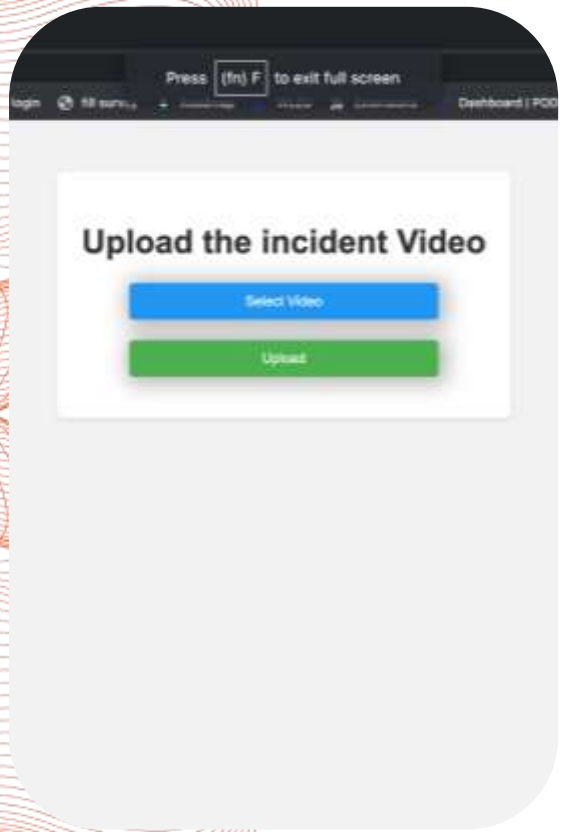
Introduction

- In today's world, the challenge of locating wanted individuals is significant for law enforcement agencies and public safety.
- The traditional methods of searching and capturing fugitives often face limitations and delays.
- That's why we have developed "Missing Link," a cutting-edge web application designed to bridge the gap and enhance the search and capture process.
- By harnessing technology and fostering collaboration, "Missing Link" aims to revolutionize the way we locate wanted persons.
- In the following slides, we will explore the key features and benefits of this powerful application.

The Problem

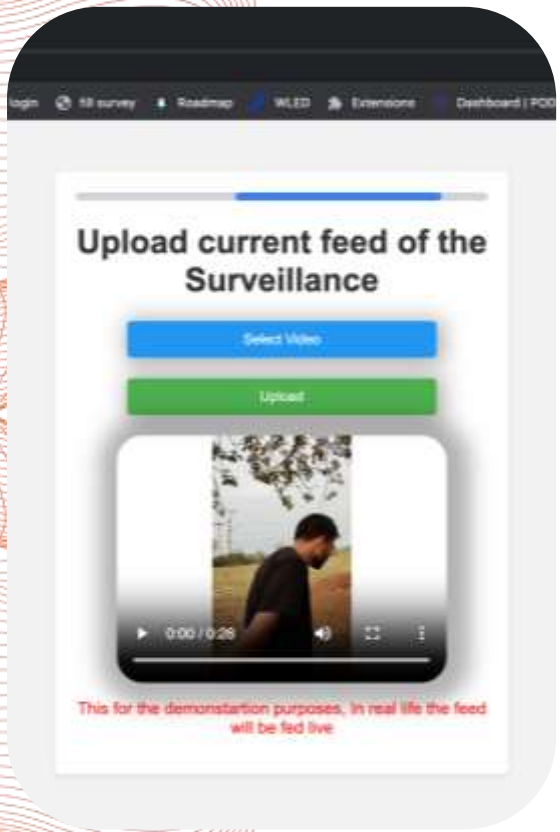
- Locating wanted individuals poses significant challenges for law enforcement agencies and public safety.
- The current methods of search and capture often lack efficiency and coordination.
- Disparate databases and limited collaboration between law enforcement agencies lead to delays and missed opportunities.
- Concerned citizens who possess valuable information may hesitate to come forward due to safety or privacy concerns.
- These limitations create a gap in the process of finding and apprehending wanted persons.
- It is crucial to address these challenges and establish a more effective approach to locating fugitives.





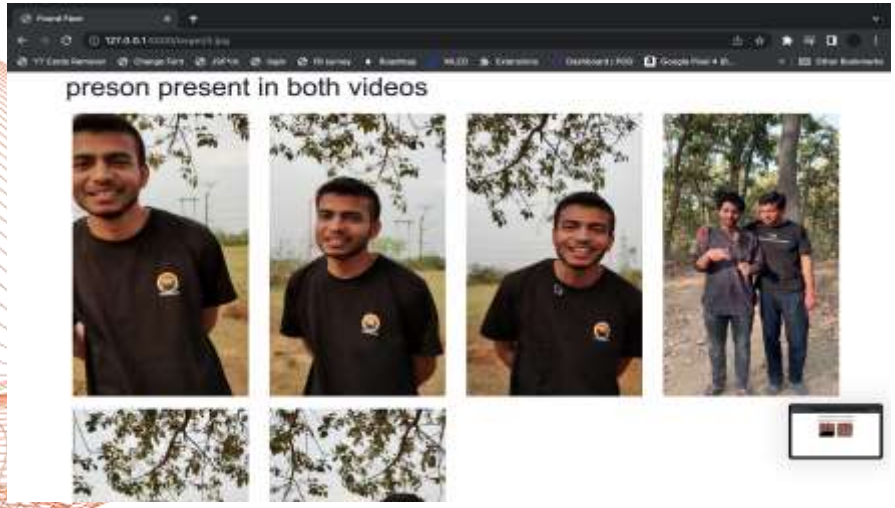
Solution: “Missing Link”

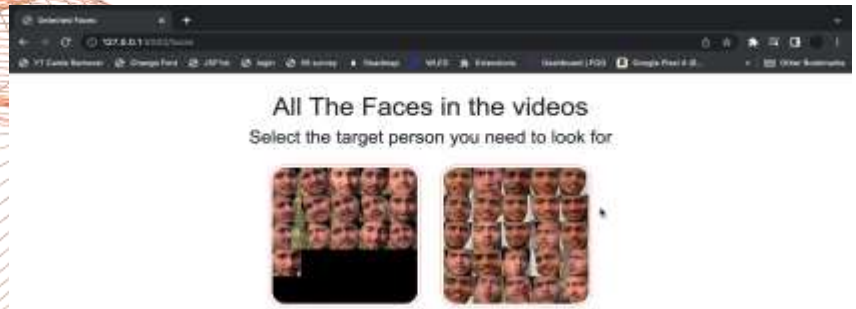
- "Missing Link" is the solution that bridges the gap and revolutionizes the search and capture process for wanted individuals.
- Our web application serves as a centralized platform, connecting law enforcement agencies and concerned citizens.
- By harnessing cutting-edge technology and fostering collaboration, "Missing Link" enhances the efficiency and effectiveness of locating fugitives.
- Let's explore the key features and benefits of "Missing Link" that make it a game-changer in the field of law enforcement.



User-Friendly Interface

- "Missing Link" boasts a user-friendly interface, designed to be accessible to both law enforcement personnel and the general public.
- The intuitive design and navigation make it easy for anyone with basic computer skills to use the application effectively.
- Users can quickly search for wanted individuals based on criteria such as name, physical description, criminal history, and geographical location.
- The user-friendly interface ensures a seamless experience for all users, enhancing their ability to contribute to the search for wanted persons.

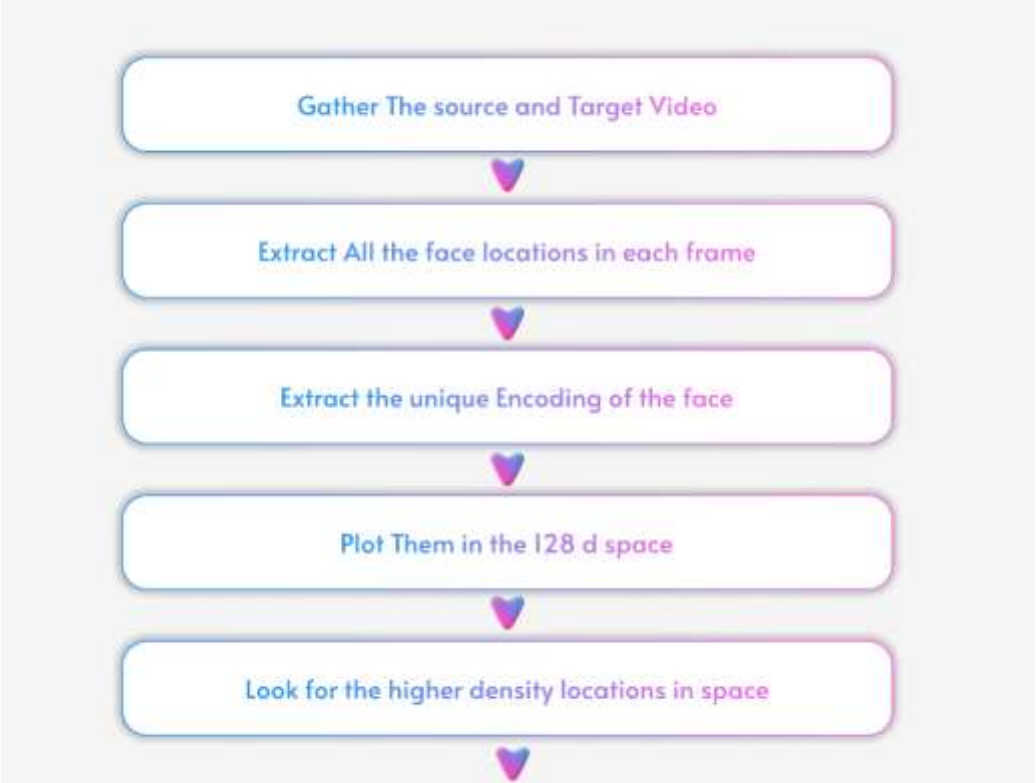




Methodology

- Involved several stages, including data collection(gather videos), preprocessing, feature extraction and clustering.
- A large dataset of face detection videos was collected and used for clustering.
- OpenCV library and Histogram of Oriented Gradients(HOG) was used for preprocessing and feature extraction, and Density-Based Spatial Clustering of Applications with Noise (DBSCAN) was used for clustering.

How Missing Link works

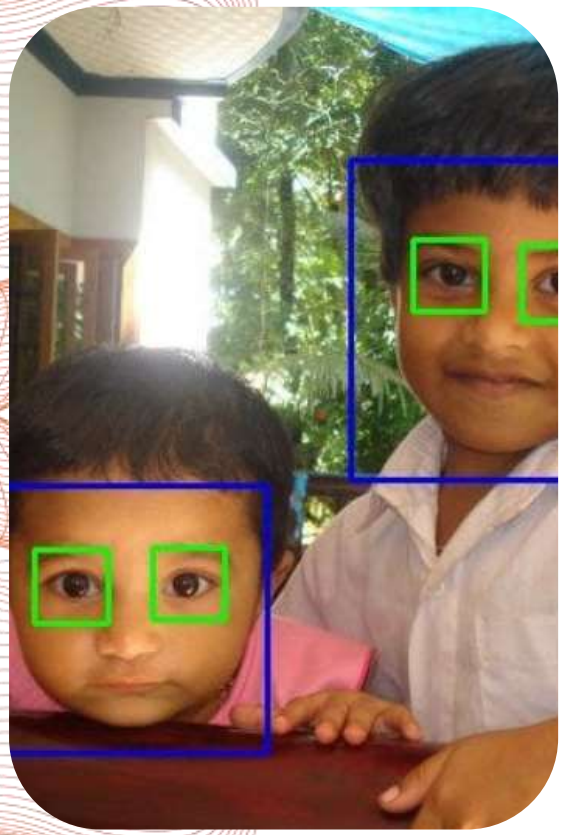


Higher density clusters are assigned label

Low density locations are random noise and ignored

Faces belonging to each label are gathered

It is checked that to what videos the faces belong to



Face Detection and Clustering

- Haar-Cascade for detecting face in a video frame.
- OpenCV library(HOG) used for preprocessing and feature extraction.
- Density-Based Spatial Clustering of Applications with Noise(DBSCAN) used for clustering.

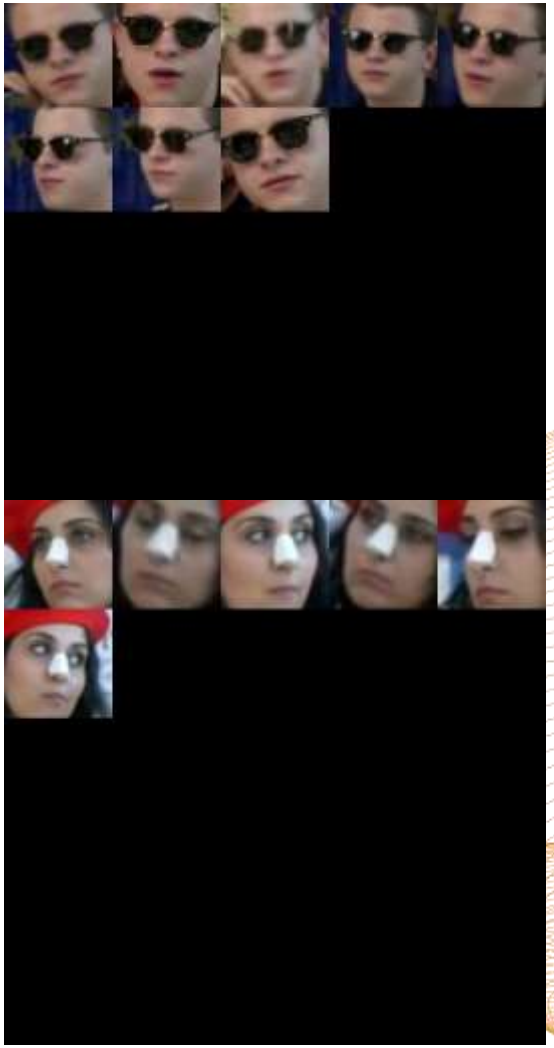
Use Cases

- Stream of CCTV footage from a public place(Surveillance video)
- Target Video



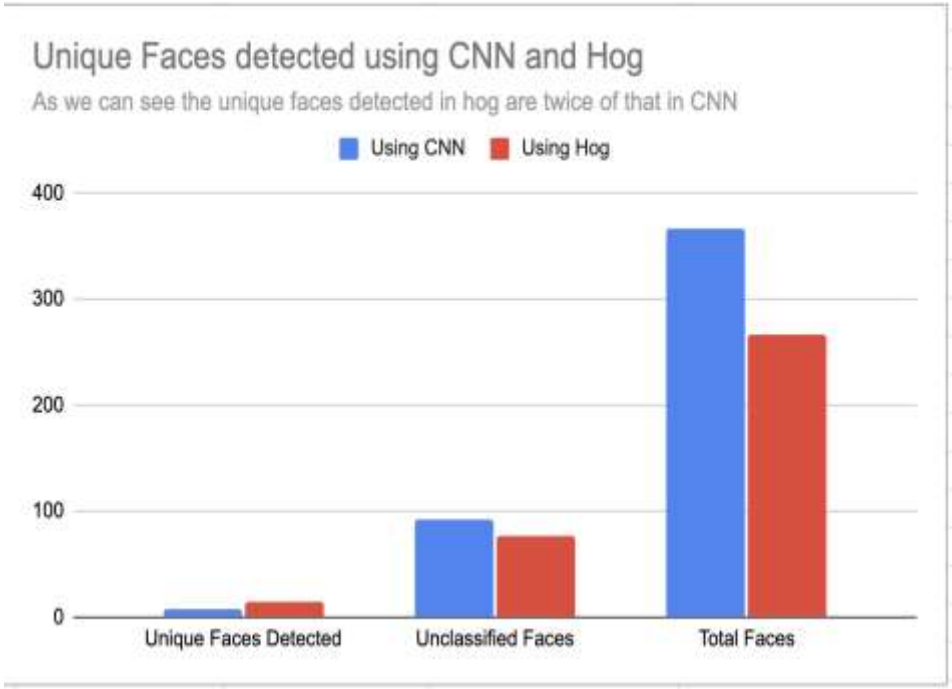


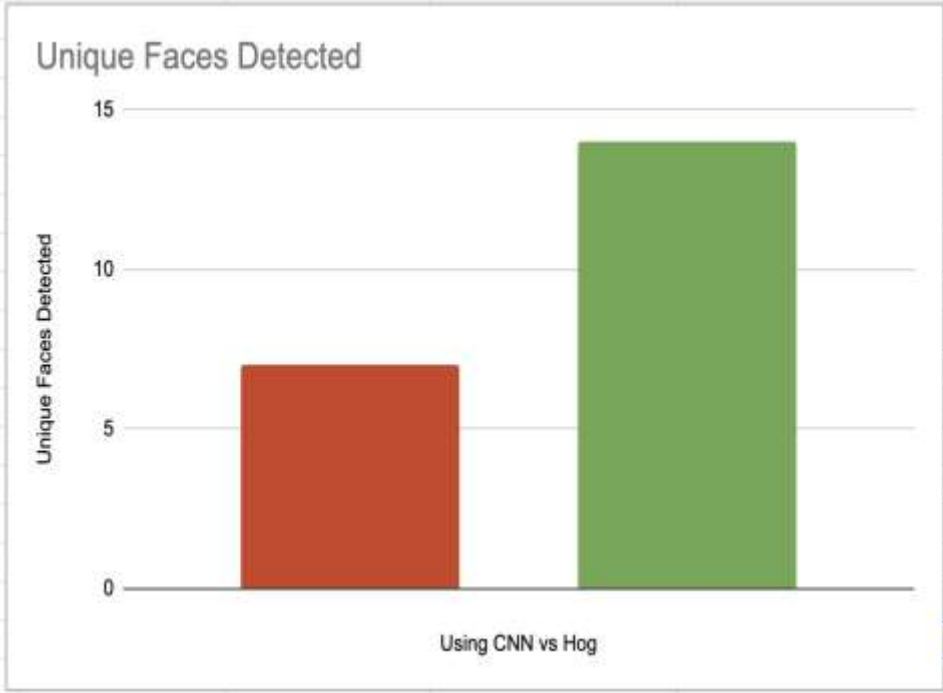




CNN vs HOG

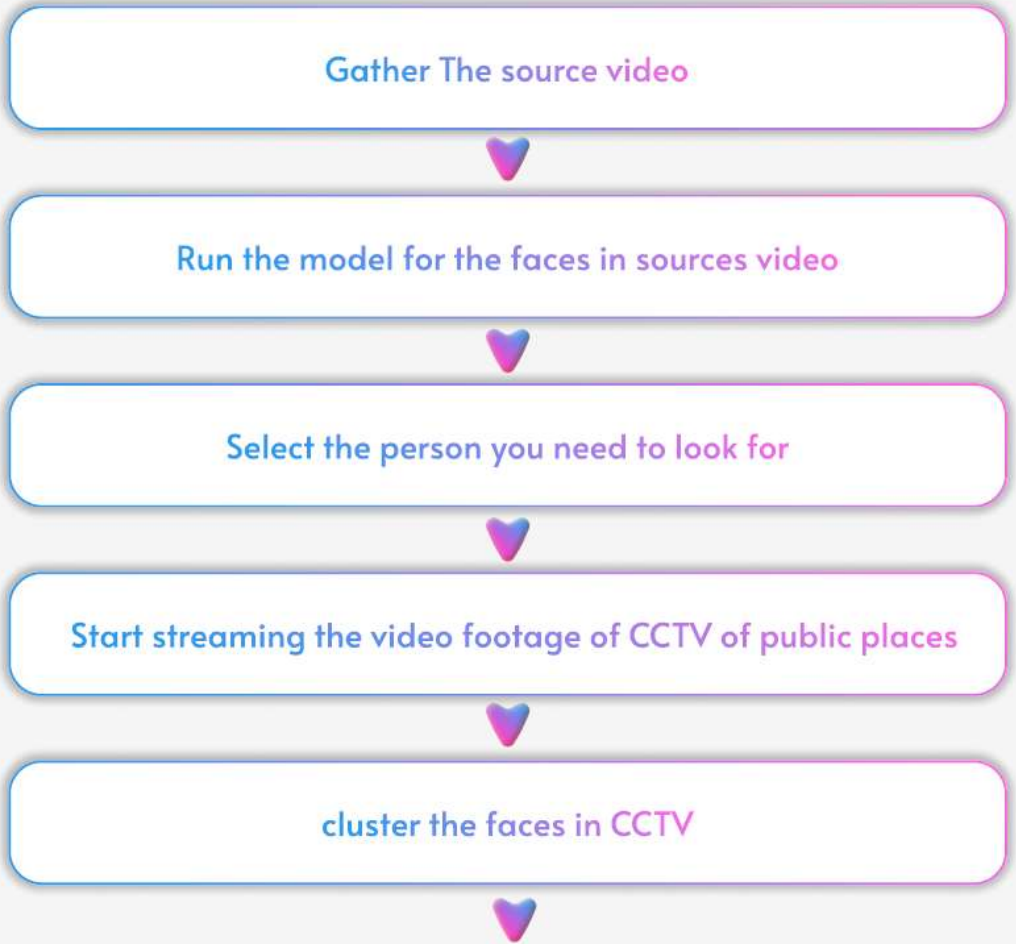
	A	B	C	D	E
1	Face Detection and Encoding generation				
2	Sample Length:	30 sec. + 163 sec.		283 Images	
3	Algorithm:	CNN	HOG	CNN	HOG
4	Time taken:	26.92 sec	102 sec	21.9 sec	37.9 sec
5	Accuracy:	74%	71%	83%	87%
6	Unique Faces Detected	7	14	14	14
7	Unclassified Faces	93	77	52	35
8	Total Faces	367	266	313	289
9	Clustering Time Using DBSCAN	0.0100 sec.	0.004 sec.	0.0450 sec.	0.004 sec.
10					


Unique Faces detected using CNN and Hog
As we can see the unique faces detected in hog are twice of that in CNN
Using CNN
Using Hog
400
300
200
100
0
Unique Faces Detected
Unclassified Faces
Total Faces


Unique Faces Detected
15
10
5
0
Unique Faces Detected
Using CNN vs Hog

Next Steps and Call to Action

- Comprehensive Database Management System.
- Anonymous Tips and Reporting
- Collaboration and Notifications
- Integration with Law Enforcement Systems.


Gather The source video
Run the model for the faces in sources video
Select the person you need to look for
Start streaming the video footage of CCTV of public places
cluster the faces in CCTV

See if the wanted face belongs to any cluster

If the person is found then alert the officials

Dispatch the search team for the location of CCTV

Repeat

Conclusion

"Missing Link" is a powerful and innovative tool that harnesses the potential of technology to expedite the process of locating wanted individuals. By fostering collaboration between law enforcement agencies and the public, we can bridge the gap and create a more connected and proactive approach to apprehending fugitives. Together, we can make a significant impact on public safety and contribute to a more secure society. Join us in our mission to connect the dots and bring wanted individuals to justice through "Missing Link" – the Search and Locate Web Application.


Thank you for your time and attention
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