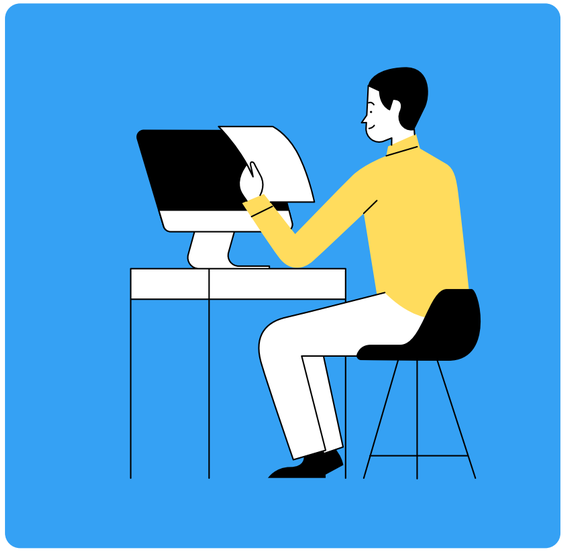
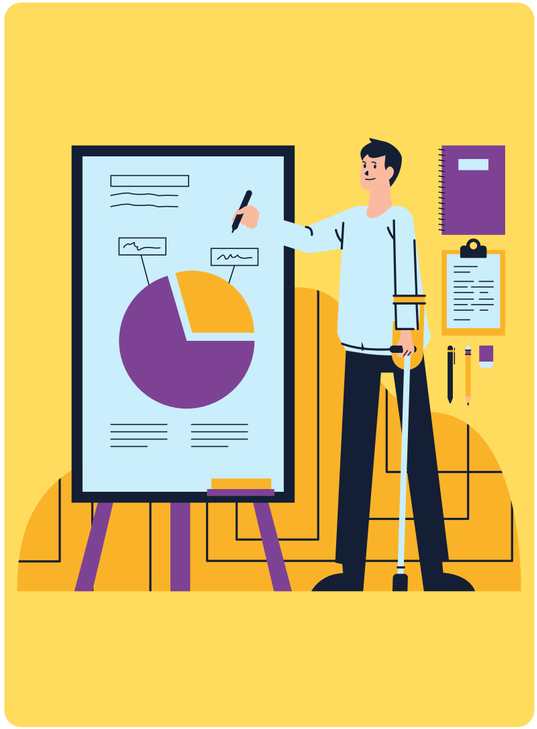
Real Time Face Detection and Recognition



By

1. Navnath Auti (05)
2. Sahil Nazare (46)
3. Binitdev Pandey (48)
4. Adnan Shaikh (68)

UNDER THE GUIDANCE OF
PROF. HEMALATA GOSAVI



OCTOBER 12, 2022

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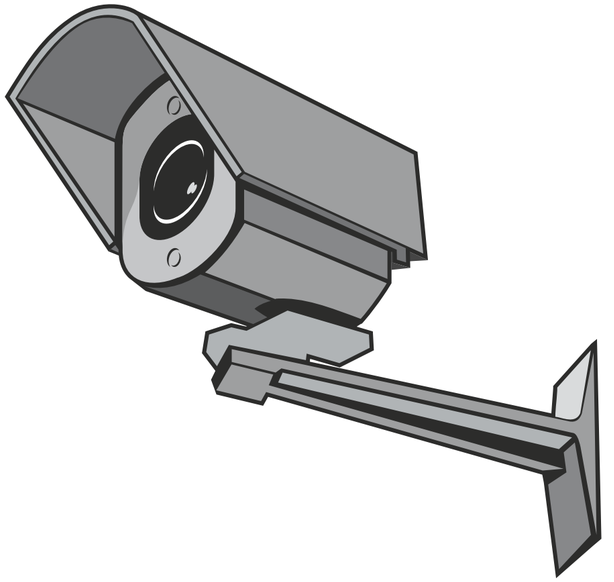
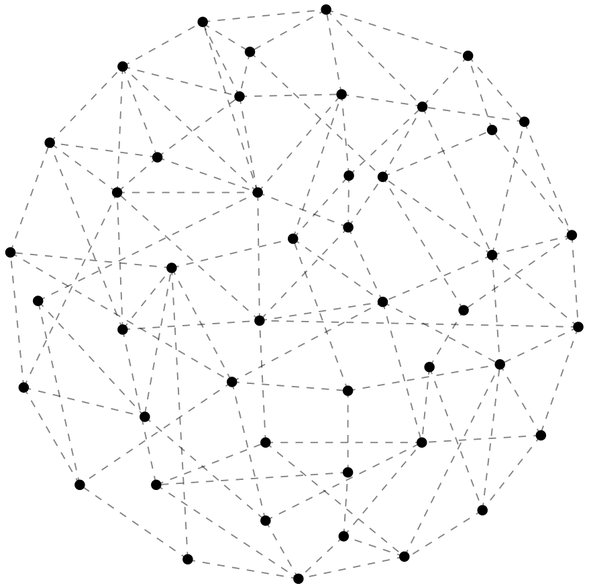
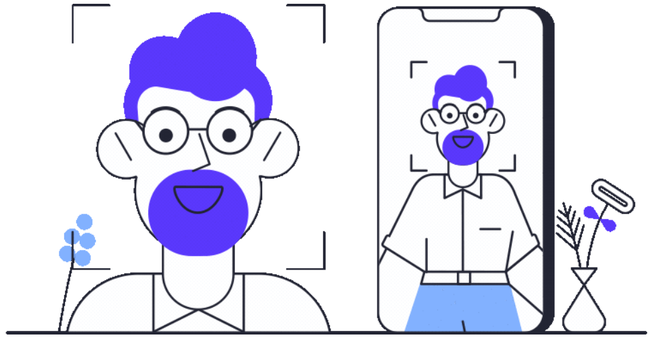
Introduction



- MOTIVAVTION
- AIM
- BRIEF STEPS





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Literature Review

Paper Name	Author Name	Year	Publication	Remark
A Real-Time Framework for Human Face Detection and Recognition in CCTV Images [2]	Rehmat Ullah , Hassan Hayat, Afsah Abid Siddiqui, Jebran Khan, Farman Ullah	**2022**	Hindawi	• A CCTV based face recognition system which recognize single face from Image using PCA, CNN and KNN • It requires average of 30 images for each face before classifying accurately
Face Recognition based Surveillance System Using FaceNet and MTCNN on Jetson TX2 [1]	Edwin Jose, Greeshma M, Mithun Haridas T. P	**2019**	IEEE	• Face detection and recognition of human faces using embedded graphic card Jetson TX2 in IP camera • Models used by the authors are MTCNN and FaceNet

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Literature Review

Paper Name	Author Name	Year	Publication	Remark
Joint Face Detection and Alignment Using Multitask Cascaded Convolutional Networks [4]	Kaipeng Zhang, Zhanpeng Zhang, Zhifeng Li, Senior Member, IEEE, and Yu Qiao, Senior Member, IEEE	**2016**	IEEE	• Deep learning algorithm for face detection on different alignment of face • Multitask-Cascaded Convolutional Networks is enhanced version of Cascade Classifier
FaceNet: A unified embedding for face recognition and clustering [5]	F. Schroff, D. Kalenichenko and J. Philbin	**2015**	IEEE	• Learns an embedding into an Euclidean space for face verification • Based on two deep network architectures to make this model.

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Literature Review

Paper Name	Author Name	Year	Publication	Remark
Robust Real-Time Face Detection [3]	Paul Viola, Michael J. Jones	**2003**	Kluwer Academic Publishers	• Cascade Classifier • Haar like features • Integral image • Best suited for real time face detection

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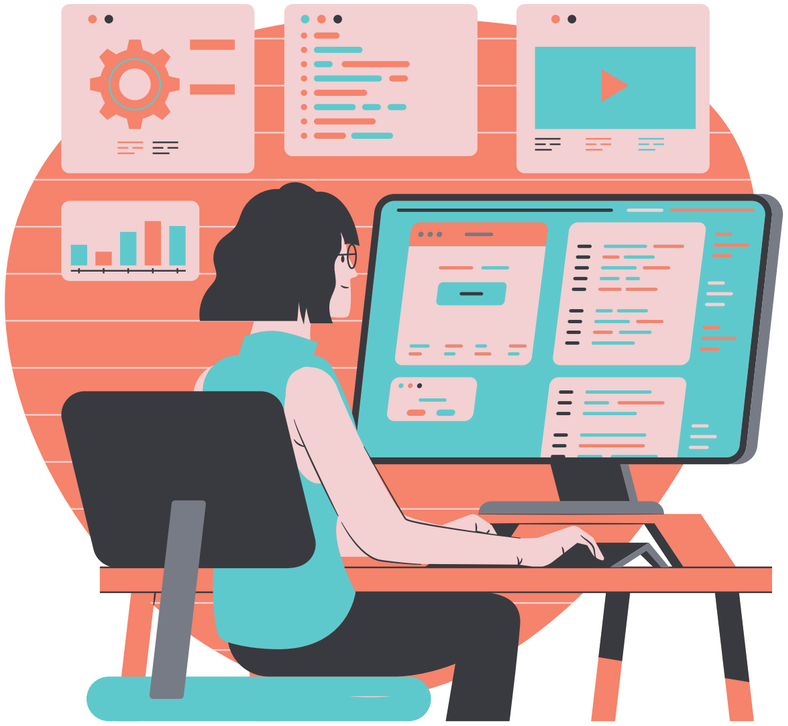
Algorithms



- Cascade Classifier
- MTCNN
- FaceNet

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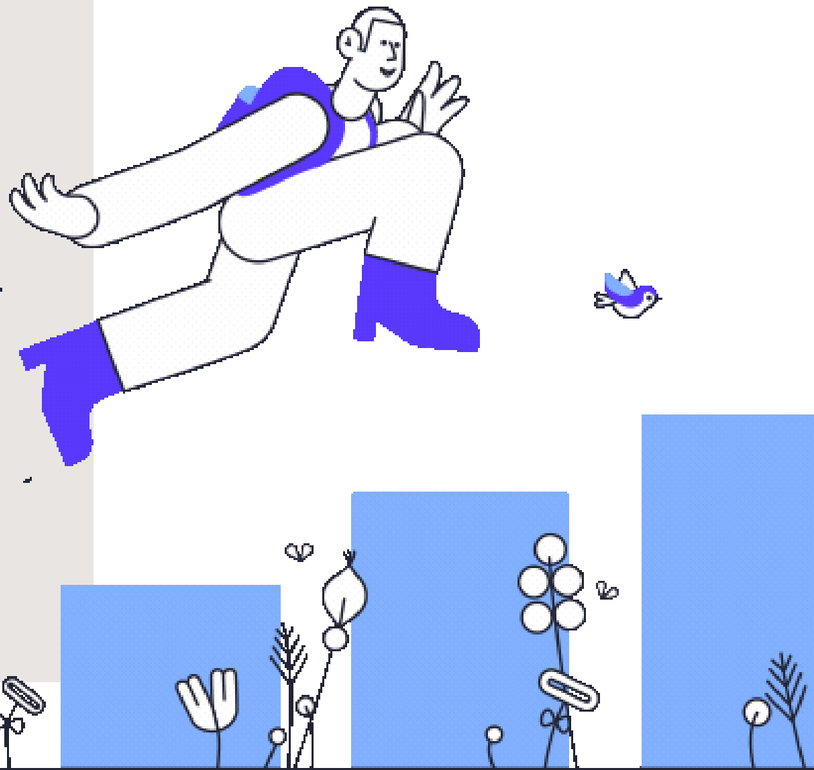
Design Details

- Extraction of frames from Ip camera video using OpenCV
- Extraction of faces from frames using Haar Cascade Classifier
- Recognition of extracted faces from frames using Facenet
- If face matched with any faces in face repository, then storing it in Index DB with corresponding frame time and location of camera using Desktop Application



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Flow Diagram

Real time
Video Stream

OpenCV Video Capture

Video Frames

HAAR Cascade Classifier

Face Repo

Extracted Faces

Matched faces stored with time and location

Match faces
Frame

Facenet Model

MTCNN

Extracted Faces

Check Triplet loss

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System Specifications

Hardware

- RAM: Minimum 4GB
- CPU: Intel Core i3 or higher
- Hard Drive: 40GB free space
- IP Camera
- Graphic Card (Optional)

Software

- TensorFlow
- NumPy
- OpenCV
- Python IDE
- Kivy (Python open source Framework)

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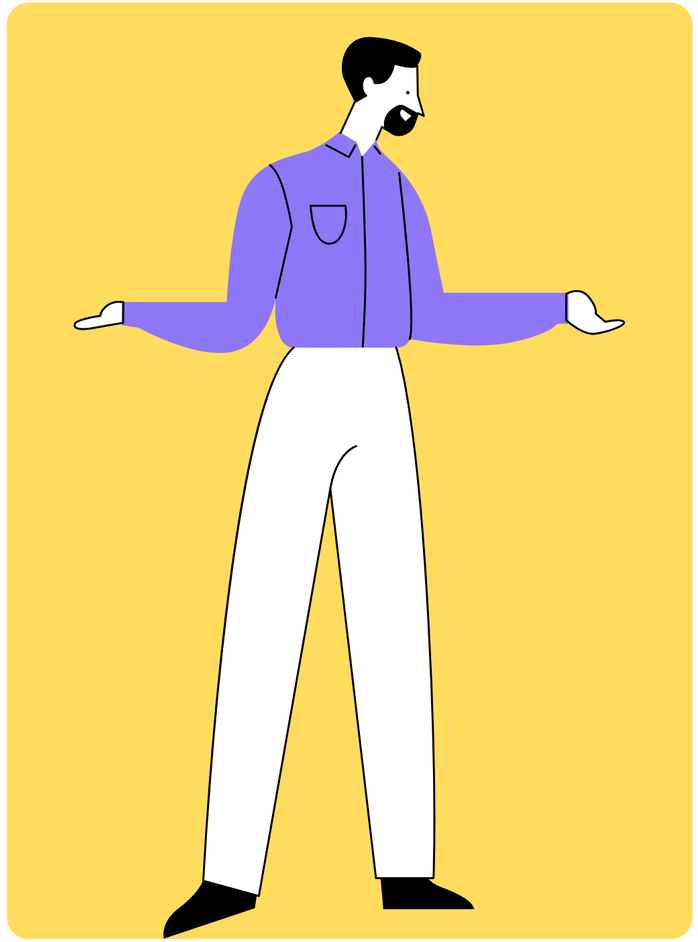
Summary

This project will demonstrate a system for face recognition from surveillance video and it will be robust to changes in illumination, scale, facial expression and reasonably robust to occlusions and changes in pose.



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References

[1] Edwin Jose, Greeshma M, Mithun Haridas T. P, “Face Recognition based Surveillance System Using FaceNet and MTCNN on Jetson TX2” 2019 5th International Conference on Advanced Computing & Communication Systems (ICACCS).

[2] Rehmat Ullah , Hassan Hayat, Afsah Abid Siddiqui, Jebran Khan, Farman Ullah, “A Real-Time Framework for Human Face Detection and Recognition in CCTV Images” 2022 Hindawi Mathematical Problems in Engineering.

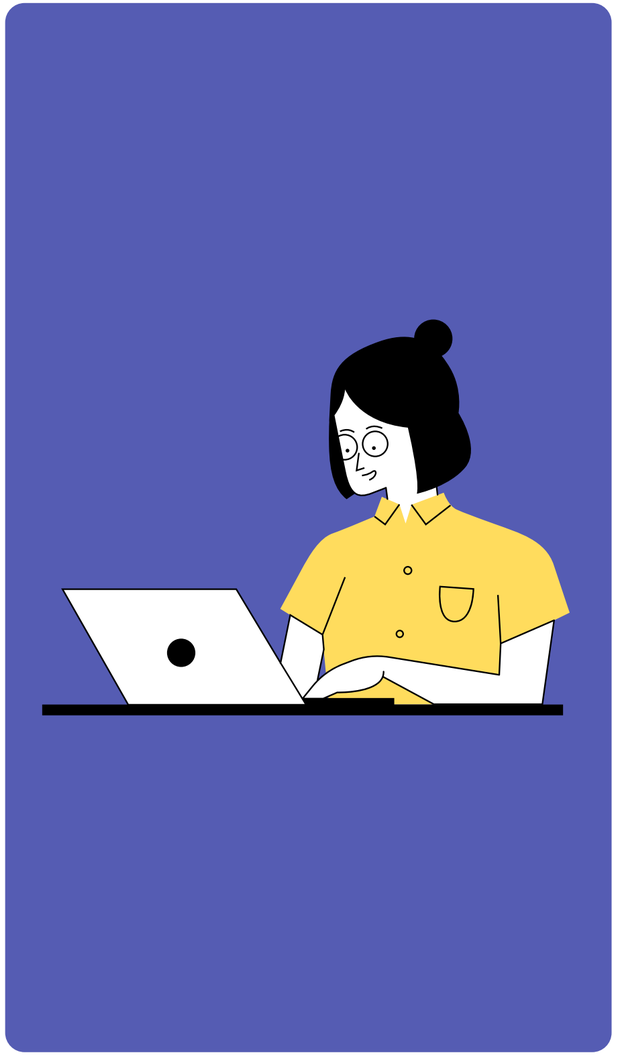
[3] Paul Viola, Michael J. Jones, “Robust Real-Time Face Detection” July 11, 2003 International Journal of Computer Vision.

[4] Kaipeng Zhang, Zhanpeng Zhang, Zhifeng Li, Senior Member, IEEE, and Yu Qiao, Senior Member, IEEE, “Joint Face Detection and Alignment Using Multitask Cascaded Convolutional Networks” October 10, 2016 IEEE SIGNAL PROCESSING LETTERS, VOL. 23

[5] F. Schroff, D. Kalenichenko and J. Philbin, "FaceNet: A unified embedding for face recognition and clustering," 2015 IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Boston, MA, 2015, pp. 815-823. 2

[6] Y. Sun, X. Wang, and X. Tang. Deeply learned face representations are sparse, selective, and robust. CoRR, abs/1412.1265, 2014. 1, 2, 5, 8

[7] Y. Taigman, M. Yang, M. Ranzato, and L. Wolf. Deepface: Closing the gap to human-level performance in face verification. In IEEE Conf. on CVPR, 2014. 1, 2, 5, 8



Thank you!