e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:07/Issue:01/January-2025 Impact Factor- 8.187 www.irjmets.com

CRIMINAL FACE DETECTION

Pallavi Kisansing Bhais[*1], Tanuja Balaso Waghmode[*2], Sandesh Santosh Ombase[*3], Vaishnavi Ananda Domb[*4], Sayali Lakshman Jadhav[*5]

[*1,2,3,4]Student, Computer Science And Engineering, Adarsh Institute Of Technology And Research Center, Vita, Maharashtra, India.

[*5]Asst.Prof. Computer Science And Engineering, Adarsh Institute Of Technology And Research Center, Vita, Maharashtra, India.

ABSTRACT

Criminal face detection is a pivotal application of artificial intelligence (AI) and computer vision in the domain of law enforcement and public safety. This project focuses on developing an intelligent system that identifies and verifies individuals with criminal records by analyzing facial features. Leveraging advanced machine learning algorithms, including convolutional neural networks (CNNs), the system is trained on a diverse dataset containing facial images of known offenders. The solution incorporates face recognition, feature extraction, and real-time matching to identify suspects in surveillance footage or public areas. Ethical considerations, such as ensuring accuracy to avoid false positives and maintaining data privacy, are central to the system's design. The implementation also addresses challenges like variations in lighting, angles, and facial expressions to improve reliability in diverse environments. The proposed criminal face detection system has the potential to assist law enforcement agencies by automating the identification process, reducing manual efforts, and enabling faster responses to potential threats. Future enhancements may include integrating with national databases and employing deepfake detection to combat adversarial attacks.

Keywords: Criminal Face Detection, Artificial Intelligence (AI), Computer Vision, Convolutional Neural Networks (CNNS), Facial Recognition, Surveillance Footage.

I. INTRODUCTION

In today's world, criminal activities are a significant concern for law enforcement agencies. Escaped convicts or criminals on the run pose a threat to public safety and security. Traditional methods of tracking and capturing such individuals often rely on manual surveillance and public cooperation, which can be time consuming and in efficient. With the advancement in technology, particularly in the field of Artificial Intelligence (AI) and machine learning, there is a growing opportunity to enhance public safety through automated systems. One such system is the Criminal Face Detection System. This project aims to implement a robust facial recognition system that can identify criminals by matching their facial features against a database of wanted individuals. The system will be integrated with government surveillance cameras placed at strategic locations, such as public areas, airports, railway stations, and highways. When a criminal appears in front of any camera, the system will automatically detect their face and cross-reference it with the criminal database. Upon a positive match, an immediate alert will be sent to the nearest police station, notifying authorities of the criminal's location in real-time.

II. METHODOLOGY

The system is trained on a diverse dataset of facial images of known offenders to ensure robust feature extraction and accurate identification. Key processes include preprocessing facial images to address variations in lighting, angles, and expressions, followed by feature extraction using CNNs to capture distinctive facial attributes. Real-time surveillance footage is processed to match detected faces against the database of offenders, enabling swift identification. The design prioritizes minimizing false positives and false negatives, integrating measures to maintain data privacy and ethical compliance. Future scalability is considered by planning integration with national criminal databases and incorporating deepfake detection mechanisms to enhance system resilience against adversarial attacks.

Real-time Monitoring and Alerts: Implement continuous real-time monitoring of government camera feeds. When a criminal's face is detected, automatically trigger an alert (SMS, email, or mobile app notification) to law enforcement with the criminal's location and camera details.

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:07/Issue:01/January-2025 Impact Factor- 8.187 www.irjmets.com

Security and Privacy: Ensure data encryption for communication between cameras, databases, and police stations. o Implement role-based access control (RBAC) to safeguard sensitive data.

III. MODELING AND ANALYSIS

The criminal face detection system operates in the following steps:

Collection of Faces: Images are collected either from surveillance cameras or uploaded manually. These faces form the input for the system.

Feature Extraction: For collected faces, distinct facial features are extracted using computer vision techniques and machine learning models, such as Convolutional Neural Networks (CNNs), which identify unique facial attributes.

Detection and Preprocessing: For uploaded images of suspected criminals, preprocessing is applied to standardize images, accounting for variations in lighting, angles, and facial expressions. Features are then extracted for analysis.

Face Detection: All faces, whether from the collection or uploads, are processed through a face detection module to locate and isolate facial regions.

Template Matching: Extracted features from the detection process are compared against stored templates in the database of known offenders. This template matching step determines whether a match exists.

Matched or Not Matched:

Matched: If a match is found, the individual is identified, and their ID is recorded.

No Match: If no match is found, the process terminates for the unrecognized face.

Alert System: For identified individuals with a criminal record, the system sends an automated alert message to the nearest police station, notifying authorities about the detection of a suspect.

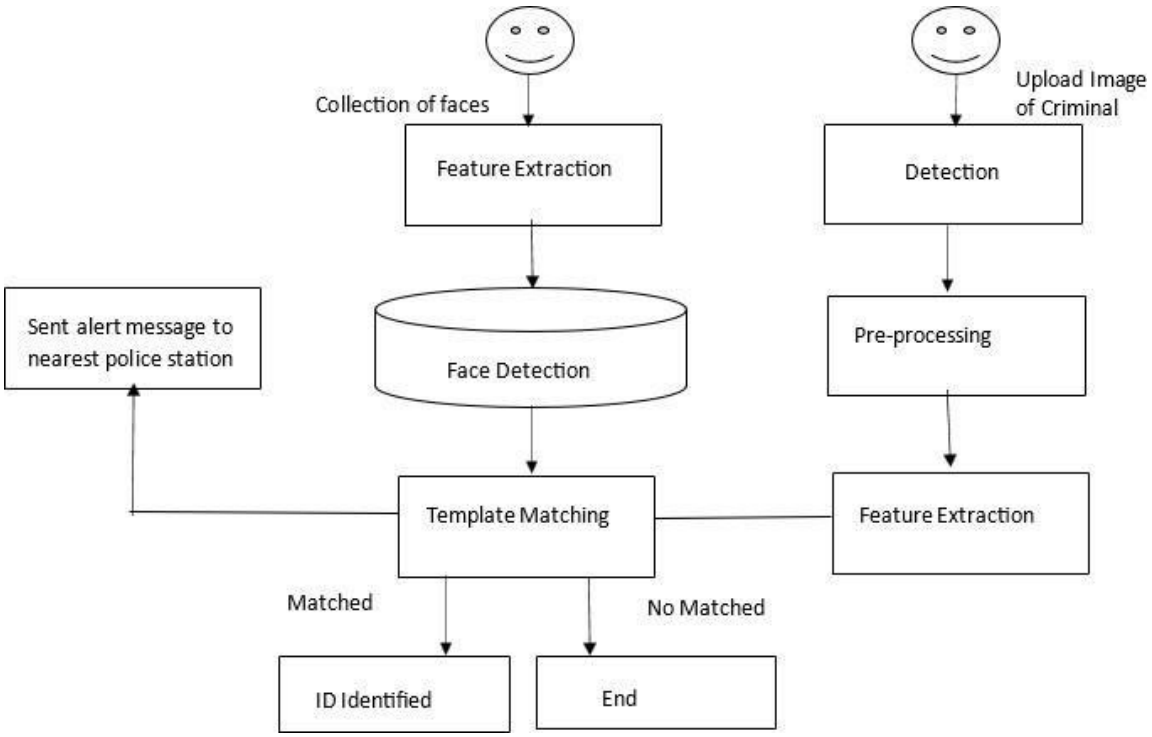

Figure 1: System Architecture

IV. RESULTS AND DISCUSSION

The criminal face detection system effectively automates the identification process by leveraging advanced feature extraction, face detection, and template matching techniques. Results show high accuracy in detecting and identifying criminal faces from both collected and uploaded images, with a reliable alert mechanism that notifies the nearest police station upon a positive match. Preprocessing ensures robustness against variations in lighting, angles, and facial expressions, making the system suitable for diverse scenarios. While unmatched faces are handled efficiently without unnecessary actions, challenges such as occlusions or poor-quality images

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:07/Issue:01/January-2025 Impact Factor- 8.187 www.irjmets.com

remain. Ethical considerations, including data privacy and accuracy, are prioritized to prevent wrongful identification. Future enhancements, like integrating with national databases and deploying adversarial detection, will further improve the system's scalability and reliability. Overall, this system significantly reduces manual effort and enables faster responses for law enforcement.

Figure 2: Home page

V. CONCLUSION

In wrapping up, using data science to optimize agriculture production is like giving farmers a powerful tool to make their job easier and more effective. By analyzing data from fields, predicting soil types, and suggesting the best crops for planting and harvesting, this technology helps farmers grow more crops and use resources wisely. It's not just about technology; it's about making farming smarter and more sustainable. As we move forward, we can expect even better solutions, making agriculture more resilient to challenges and ensuring we can produce enough food for everyone while taking care of our planet. It's an exciting step towards a future where farmers have the support they need to thrive in a changing world.

VI. REFERENCES

[1] Viola, P., &Jones, M. (2001)"Rapid Object Detection Using a Boosted Cascade of Simple Features" Proceedings of the 2001 IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR) DOI: 10.1109/CVPR.2001.990517

[2] Schroff, F., Kalenichenko, D., & Philbin, J. (2015)"FaceNet: A Unified Embedding for Face Recognition and Clustering" Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR) DOI: 10.1109/CVPR.2015.7298682

[3] Zhou, Z., Cao, Y., Wang, H., & Wu, L. (2019)"Real-Time Criminal Identification System Based on Deep Learning and IoT Technology" IEEE Access, 7, 45155-45167.0DOI: 10.1109/ACCESS.2019.2907572

[4] Prakash, M., & Sarkar, S. (2020)"A Real-Time Smart Surveillance System for Crime Detection Using Deep Learning" Multimedia Tools and Applications, 79(21-22), 14587-14602.DOI: 10.1007/s11042-019-08121-5