Criminal Identification Web App Utilizes Facial Recognition to Identify and Track Criminals

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Abstract: *Criminal record generally contains all the information both personal and criminal with the photograph of the person. In order to recognize Criminal, identification of some sort is required, designated by eyewitnesses. In most cases the resolution or/and quality of the recorded image sections is unsatisfactory and is difficult to recognize the face. Recognition can be achieved in various different ways like DNA, eyes, finger print, etc. One of the ways is face identification. Since facial recognition technology is powered by artificial intelligence, it can provide excellent results in identifying criminals. Even considering that most people, when committing an illicit activity, try to hide their identity: hiding their faces or covering their faces with scarves, masks, etc. In such cases, AI uses deep learning methods to identify the individual. In this project, proposed a CrimeNet an automatic criminal identification system for Police Department to enhance and upgrade the criminal classification into a more effective and efficient approach using Convolutional neural network algorithms*.

Keywords: Admin login, Police login, Face recognition, Message alert, Face monitoring, User friendly

I. INTRODUCTION

Criminal is a popular term used for a person who has committed a crime or has been legally convicted of a crime. Criminal also means being connected with a crime. When certain acts or people are involved in or related to a crime, they are termed as criminal. Criminal-person means a person who is accused of committing a crime and by following a prescribed procedure, the court finds such person guilty of the charge and declares him guilty. But in the context of criminology, only the criminological definition of criminal has been accepted. Crime is defined as "an act or omission prohibited by law". The individual who violates the law is called criminal. There are different types of criminals which are classified as under.

Habitual criminal: This type of criminals violates the law because of financial crisis. They are involved in anti-moral and anti-social behaviours. Gamblers, drug addicts, and drinkers come under this category.

II. LITERATURE SURVEY

M. Alansari, O. A. Hay, S. Javed, A. Shoufan, Y. Zweiri and N. Werghi, "GhostFaceNets: Lightweight face recognition model from cheap operations", *IEEE Access***, vol. 11, pp. 35429-35446, 2023:** The development of deep learning-based biometric models that can be deployed on devices with constrained memory and computational resources has proven to be a significant challenge. Previous approaches to this problem have not prioritized the reduction of feature map redundancy, but the introduction of Ghost modules represents a major innovation in this area.

Y. Yang, W. Hu, H. Lin and H. Hu, "Robust cross-domain pseudo-labeling and contrastive learning for unsupervised domain adaptation NIR-VIS face recognition", *IEEE Trans. Image Process.***, vol. 32, pp. 5231-5244, 2023:** Near infrared-visible (NIR-VIS) heterogeneous face recognition refers to the process of matching NIR to VIS face images. Due to self-occlusion and sensing gap, NIR face images lose some visible lighting contents so that they are always incomplete compared to VIS face images. This paper models high resolution heterogeneous face synthesis as a complementary combination of two components, a texture in painting component and pose correction component.

M. Luo, H. Wu, H. Huang, W. He and R. He, "Memory-modulated transformer network for heterogeneous face recognition", IEEE Trans. Inf. Forensics Security, vol. 17, pp. 2095-2109, 2022: Heterogeneous Face Recognition (HFR) aims to match face images across different domains, such as thermal and visible spectra, expanding the applicability of Face Recognition (FR) systems to challenging scenarios. However, the domain gap and limited availability of large-scale datasets in the target domain make training robust and invariant HFR models from scratch difficult.

C. Yan et al., "Age-invariant face recognition by multi-feature fusionand decomposition with self- attention", *ACM Trans. Multimedia Comput. Commun. Appl.*, **vol. 18, no. 1, pp. 1-18, 2022:** Different from general face recognition, age-invariant face recognition (AIFR) aims at matching faces with a big age gap. Previous discriminative methods usually focus on decomposing facial feature into age-related and age-invariant components, which suffer from the loss of facial identity information. In this article, we propose a novel Multi- feature Fusion and Decomposition (MFD) framework for age-invariant face recognition, which learns more discriminative and robust features and reduces the intra-class variants.

D. Liu, X. Gao, C. Peng, N. Wang and J. Li, "Heterogeneous face interpretable disentangled representation for joint face recognition and synthesis", *IEEE Trans. Neural Netw. Learn. Syst.*, **vol. 33, no. 10, pp. 5611-5625, Oct. 2022:** Synchronization is a ubiquitous phenomenon in nature that enables the orderly presentation of information. In the human brain, for instance, functional modules such as the visual, motor, and language cortices form through neuronal synchronization
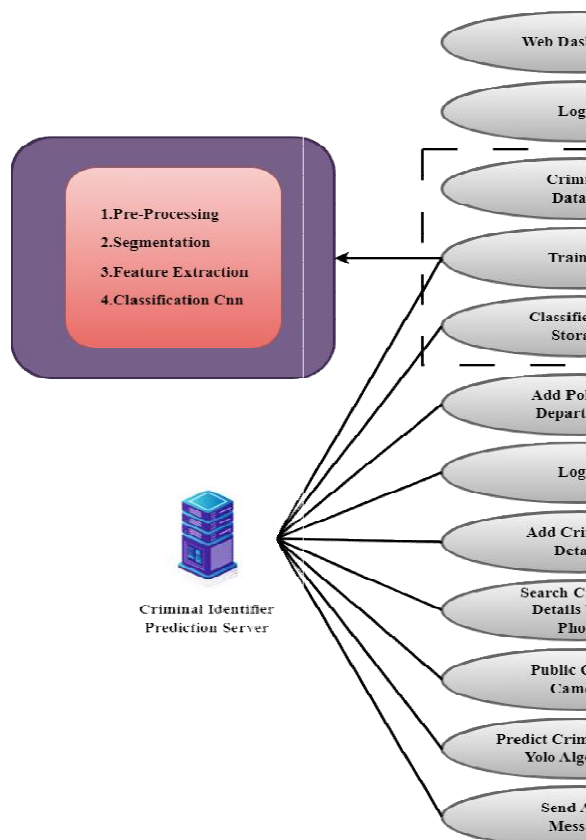
III. METHODOLOGY SECTION

Fig.1 Use Case Diagram

This criminal identification web app utilizes facial recognition to identify and track criminals.

- End User Dashboard allows authorized users like government regulators and police to manage the system and access features like adding police stations/personnel, uploading criminal faces, and receiving alerts.

- CrimeNet Model, a deep convolutional neural network, is trained on image datasets to identify criminal faces.
- Criminal Face Identification involves capturing video of a suspect, converting it into frames, applying pre-processing and facial detection algorithms, and comparing extracted features with CrimeNet for identification.
- Criminals Crime Record Finder retrieves the criminal history of identified individuals from a Criminal Database.
- Criminals Surveillance System integrates CrimeNet with CCTV cameras for real-time monitoring, identification of suspects, and generation of alerts for suspicious activities.
- Alert Generation and Notification System sends alerts to law enforcement personnel based on various scenarios like identified criminals or missing persons.

IV. EXPERIMENTAL RESULTS

This system is a high-tech tool that helps police catch criminals. It uses advanced computer programs (like facial recognition) to quickly identify suspects from cameras or videos. Law enforcement can easily add information about criminals and cases, and get instant alerts when a match is found. The system also connects to a database of past crimes, giving officers valuable background information on suspects. By using real-time monitoring and advanced detection features, this system helps police prevent crimes and respond to them more effectively. It's like a powerful weapon in the fight for public safety.
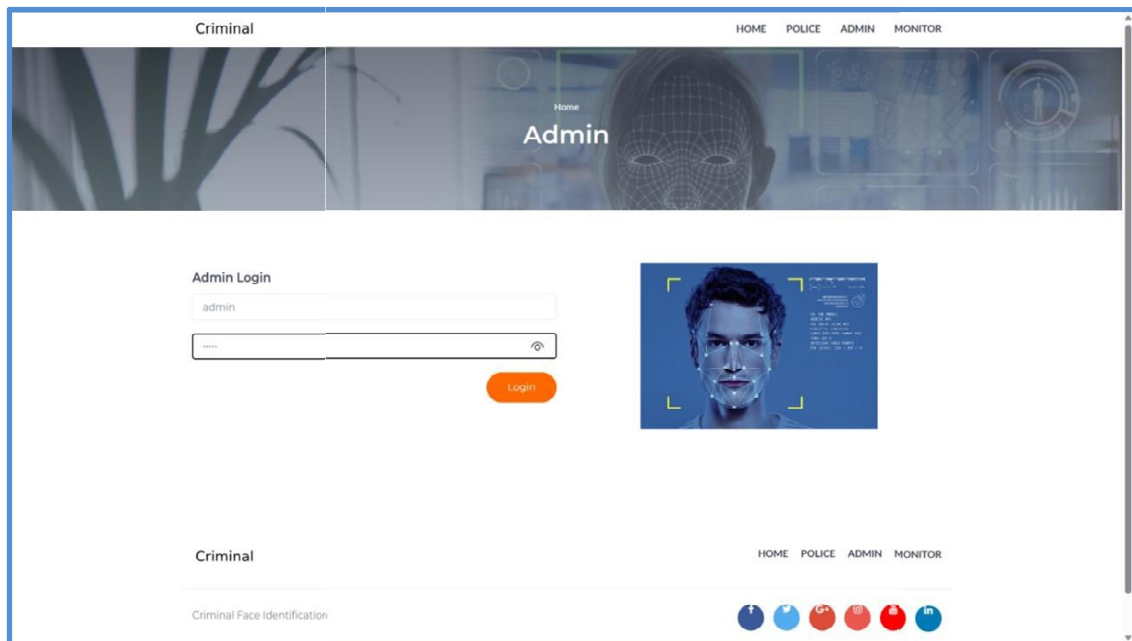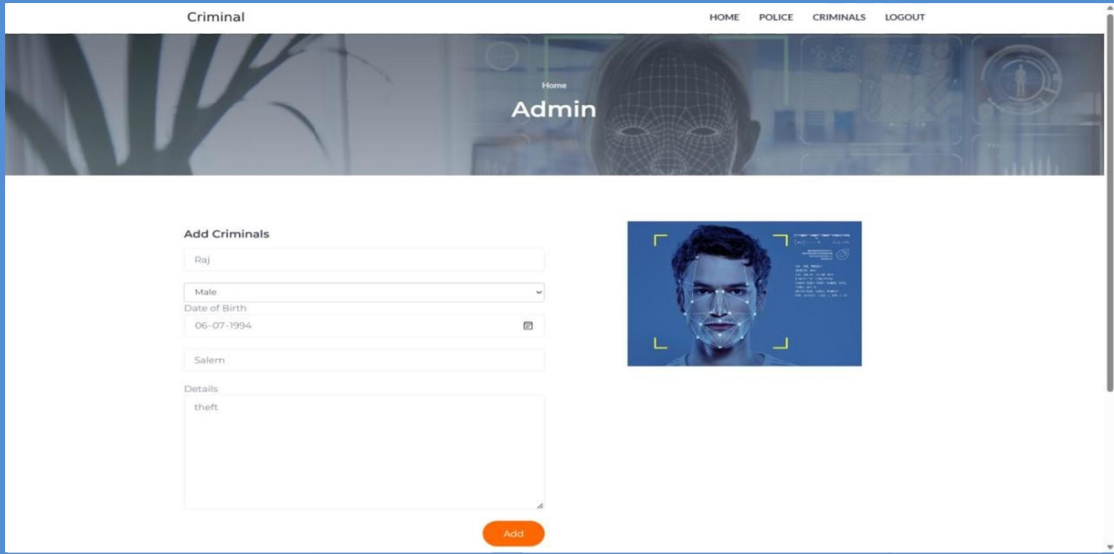

Fig.2 Admin Login Page
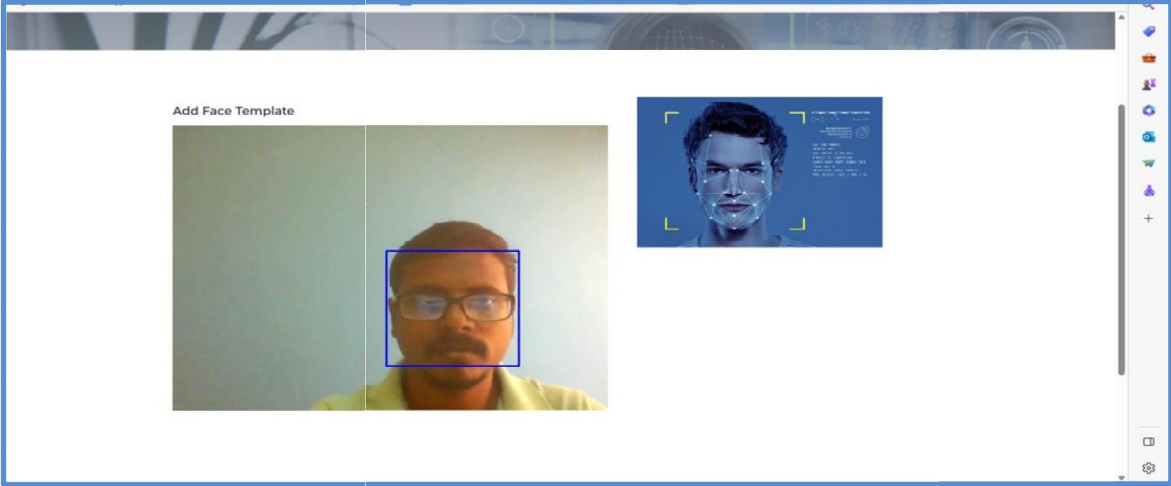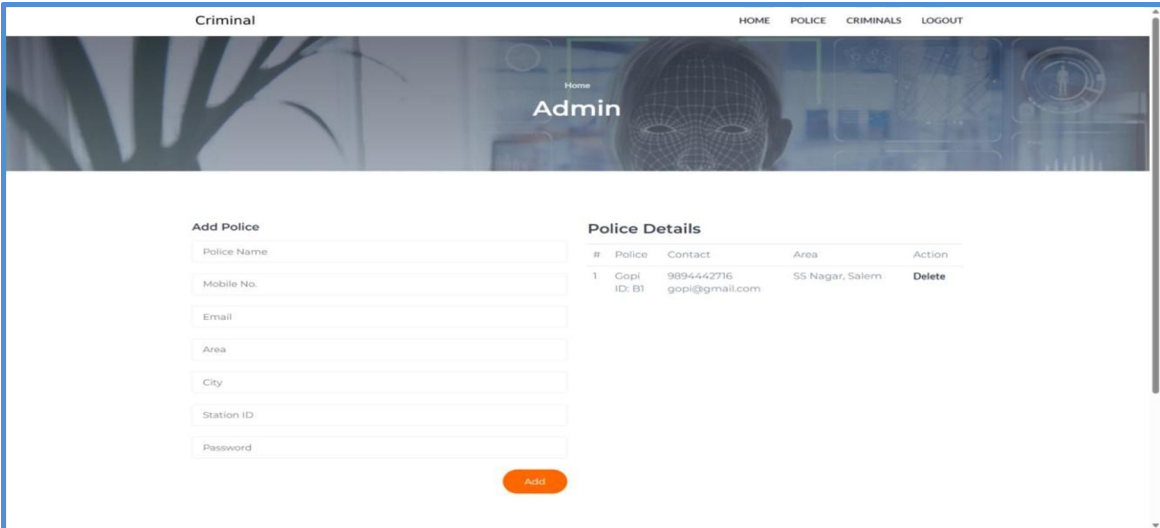
Fig.3 Uploading Criminal Details

Fig.4 Adding Criminal Face
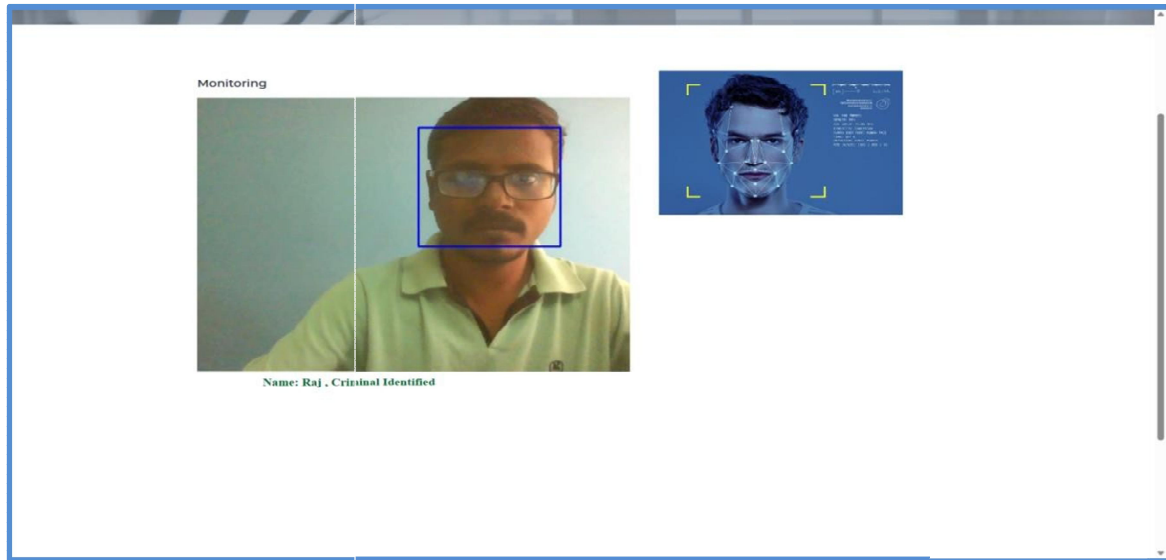

Fig.5 Uploading Police Details

Fig.6 Monitoring Criminals

V. CONCLUSION

This project presents a technologically advanced solution for law enforcement agencies in the identification and tracking of criminals. Leveraging cutting-edge technologies such as Deep Convolutional Neural Networks (DCNN), Yolo V8, and advanced facial recognition techniques, the system offers a robust framework for real-time monitoring and crime record retrieval.The web-based Criminal Identification System, built using Python Flask and TensorFlow, serves as a user-friendly interface for law enforcement personnel. The integration of the CrimeNet Model, trained through meticulous processes such as dataset collection, preprocessing, face detection, feature extraction, and CNN-based classification, enables swift and accurate identification of potential suspects.The Criminals Crime Record Finder module seamlessly integrates with the Criminal Database, providing law enforcement with historical data on identified individuals. This database includes information on past offenses, arrests, and other relevant details crucial for understanding a suspect's criminal background.The Criminals Surveillance System enhances proactive policing by integrating with public CCTV cameras. Real-time monitoring, theft and murder detection, missing criminal's identification, and GIS integration contribute to a holistic approach to crime prevention and response.The Alert Generation and Notification System acts as a crucial component, ensuring that law enforcement officers are promptly informed in critical situations. Whether dealing with wanted criminals, missing persons, ongoing investigations, known associates, or watch list individuals, the system generates alerts containing vital information for informed decision-making. This integrated system empowers law enforcement agencies with efficient tools for crime prevention, investigation, and apprehension. The fusion of artificial intelligence, machine learning, and real-time surveillance capabilities positions the Criminal Identification and Surveillance System as a force multiplier in the relentless pursuit of public safety and security.

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