IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

DEEP LEARNING MODEL BASED CRIMINAL IDENTIFICATIONS SYSTEM FOR LAW ENFORCEMENT DEPARTMENT

Akash c
PG Scholar, Department of Master of Computer Applications,
Vidyaa Vikas College of Technology, Tirucengode, Tamilnadu, India
Dr. K. Pooranapriya
Professor, Department of Electronics and Communication Engineering,
Vidyaa Vikas College of Technology, Tirucengode, Tamilnadu, India
Dr. C. Gomathi
Professor, Department of Master of Computer Applications,
Vidyaa Vikas College of Technology, Tirucengode, Tamilnadu, India

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.

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.

- **Habitual criminal**
- **Legalistic criminals**
- **Moralistic criminals**
- **Psychopathic criminals**
- **Institutional criminals or white color criminal**
- **Situational or occasional criminals**
- **Professional criminals**
- **Organized criminals.**
- **Juvenile delinquents.**

II.LITERATURE SURVEY

2.1. GRAPH-BASED LOCAL FEATURE ADAPTATION FOR CROSS-DOMAIN PERSON RE-IDENTIFICATION

Author: Jun Wang

Year:2022

Doi: 10.1109/ACCESS.2022.3140311

Problems Identified

The performance of cross-domain person re-identification has been greatly improved in recent years. However, there are still two problems in existing cross-domain person re-identification methods. First, most of them conduct domain adaptation on features that contain background noise. Second, they ignore the correlation between different features, including intra-domain and inter-domain.

Paper Objective

To overcome these problems, we propose a novel Graph-based Local Feature Adaptation (GLFA) framework for cross-domain person re-identification, which promotes domain adaptation by correlating intra-domain and inter-domain semantic local features with graph convolutional network.

Methodology

The author proposes a novel GLFA framework for unsupervised domain adaptive person re-identification, which conducts adaptation on semantic local features. Compared with previous methods, the features learned by our framework are more fine-grained and domain invariant. Then construct two graphs to correlate semantic local features within each domain and across different domains, respectively. And two stacked GCNs are built to propagate local feature information through these two graphs, thereby facilitating the knowledge transfer from source to target domain. To our best knowledge, this is the first work that applies GCN to unsupervised domain adaptive person re-identification. Then design a local feature distribution alignment loss based on Maximum Mean Discrepancy (MMD) distance. It enables the corresponding local feature distributions between two domains are well aligned.

Findings

Experimental results on six cross-domain pairs prove the superiority of our method. However, the training of our model is slightly complex, which may affect the generalization of our method in other fields.

Furthermore, our work utilizes the parsing model to extract semantic local featurs, which may not be feasible in other person re-identification scenarios due to the lack of corresponding parsing models, such as Visible-Infrared Person Re-Identification (VI-ReID).

2.2. GAIT RECOGNITION AND RE-IDENTIFICATION BASED ON REGIONAL LSTM FOR 2- SECOND WALKS.

Author: Piya Lim Charoen; Nirattaya Khamsemanan

Year:2021

Doi: 10.1109/ACCESS.2021.3102936

Problems Identified

Law enforcement and different authorities need a new efficient way to track and re-identify a person of interest via different cameras. Usually, the person of interest is not known and the original video may be short and have poor quality.

Paper Objective

In this paper, the author proposes a new technique based on a new regional-LSTM learning model that can use a 2-second walk to recognize and re-identify an unknown person.

Methodology

In this work, we propose a new gait recognition and re-identification technique that is unsupervised, resists the view-point issue, and only requires a 2-second walk input. We propose a new unsupervised gait recognition technique based on a new learning model, called the regional-LSTM learning model. The regional-LSTM learning model is a representation function that maps gait features into an embedded space so that the similarity of intra-class is small and the similarity of inter-class is large. The proposed technique focuses on sequential movements of each region of the body by creating an LSTM model for each region. It then combines the outputs from all regions to create a gait-embedded vector for an entire body. By doing these different regions are assigned different weights to reflect different degrees of uniqueness in the regions. An output of the regional-LSTM learning model is an embedded vector in Euclidean space.

Findings

This demonstrates that the proposed regional LSTM model is efficient and useful in tracking and re-identifying a person of interest. This implies that the proposed regional LSTM technique is suitable for assisting authorities in tracking and re-identifying a person of interest, especially the identity of an unknown.

III.PROPOSED SYSTEM

The proposed system aims to revolutionize criminal face identification for law enforcement through the integration of advanced technologies, specifically Deep Convolutional Neural Networks (DeepCNN) and YOLOv8. The project envisions a comprehensive system that addresses the limitations of existing methods and leverages state-of-the-art techniques for enhanced performance. Here's an overview of the proposed system

BENEFITS OF THE PROPOSED SYSTEM

- **Real-time Identification:** Swift recognition of criminal faces for immediate response.

- **High Accuracy:** Precise facial recognition through advanced deep learning models, minimizing errors.
- **Integration of YOLOv8:** Utilizes YOLOv8 for agile and accurate object detection in real-time.
- **User-Friendly Interface:** Intuitive design for easy navigation by law enforcement personnel.
- **Automated Alert System:** Immediate response facilitated by an automated alert generation and notification system.
- **Comprehensive Database:** Stores and retrieves criminal records for thorough investigations.
- **Privacy Measures:** Adheres to strict privacy and ethical standards, addressing concerns.
- **Location-Based Information:** Provides location details in alerts for targeted interventions.
- **Customizable Settings:** Allows flexibility in alert settings and prioritization.
- **Seamless Integration:** Integrates smoothly with existing communication platforms for a cohesive workflow.
- **Continuous Monitoring:** Enables ongoing assessment and updates for optimal system performance.
- **Enhanced Operational Efficiency:** Contributes to streamlined criminal identification and investigation processes, saving time for law enforcement.

IV.MODULES

1. Criminal Identification Web App

The Criminal Identification System Web App is a web-based application that is designed to identify and track criminals using facial recognition technology. The application is built using Python Flask, a popular web framework, and Tensor Flow, an open-source machine learning library. This module is designed to be user-friendly and efficient, providing law enforcement agencies with a powerful tool to track and apprehend criminals.

2. End User Dashboard

The End User Dashboard module is designed to provide a user-friendly interface for end users to perform facial recognition searches against the database of criminal records.

1. Government Regulator

- **Login: Government regulators access the system through a secure login interface, ensuring authorized entry into the system.**
- **Add and Manage Police Station:** Regulators have the authority to add new police stations, facilitating the expansion or restructuring of law enforcement entities. The module also supports the ongoing management of police station details.
- **Generate Username and Password for Each Police Station:** Automatic generation of unique login credentials for each police station streamlines access management and enhances security.
- **Add and Manage Police:** Regulators can add new police personnel to the system and update details of existing officers, ensuring an up-to-date and comprehensive database.
- **Assign Police to Police Station:** This feature allows regulators to assign police officers to specific stations based on jurisdictional needs, optimizing law enforcement resource distribution.

- **Receive Surveillance Alert:** Real-time alert mechanisms keep regulators informed about ongoing surveillance activities, potential criminal matches, or any system anomalies requiring attention.
- **System Maintenance:** Regulators have the capability to perform system maintenance tasks, ensuring the system operates smoothly and addressing any technical issues promptly.

3. CrimeNet Model: Build and Train

Criminal Face Classification using CrimeNet refers to the use of Deep Convolutional Neural Networks (DCNN) for the classification of criminal faces. DCNNs are a type of deep learning architecture that have shown significant promise in image recognition tasks. In the context of criminal face classification, CrimeNet can be trained to automatically identify and classify images of criminal faces, allowing law enforcement officers to quickly and accurately identify potential suspects.

4. Criminal Face Identification

1. Capture Video of Criminal:

Law enforcement personnel utilize recording devices to capture video footage featuring the face of a suspected criminal. This serves as critical evidence for identification and criminal investigations.

5. Criminals Crime Record Finder

The Criminals Crime Record Finder module plays a vital role in law enforcement by leveraging facial recognition technology to identify and retrieve the criminal history of individuals. Upon identifying a match with a high degree of confidence, the system confirms the criminal's identity by associating the facial features extracted from the input frame with a known individual within the CrimeNet Model.

6. Criminals Surveillance System

The CrimeNet Model is seamlessly integrated with all public CCTV cameras to enable real-time facial recognition. This integration forms the backbone of the Criminals Surveillance System, allowing for the identification of individuals captured by surveillance cameras.

7. Alert Generation and Notification System

An alert to law enforcement officers for criminal face identification can be triggered in the following situations:

- If the identified person is a wanted criminal or has a criminal record, an alert should be immediately sent to the officer in charge of the case.

V. EXPERIMENT AND RESULTS

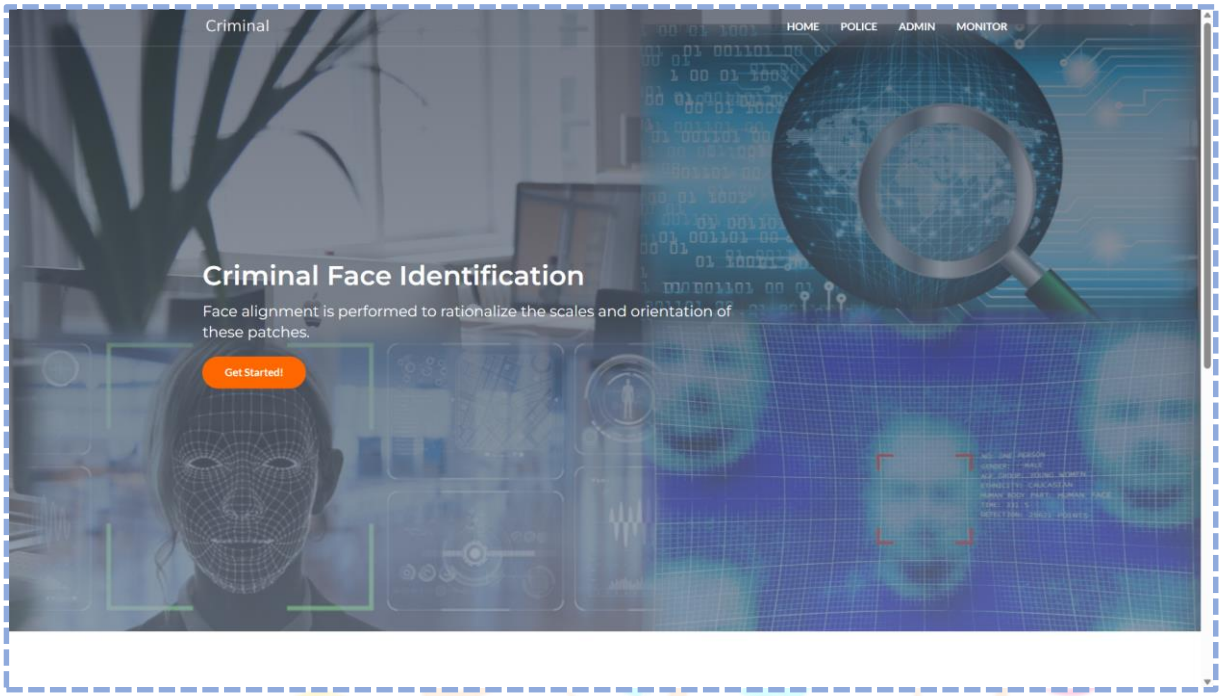

FIGURE NO.1 HOME PAGE

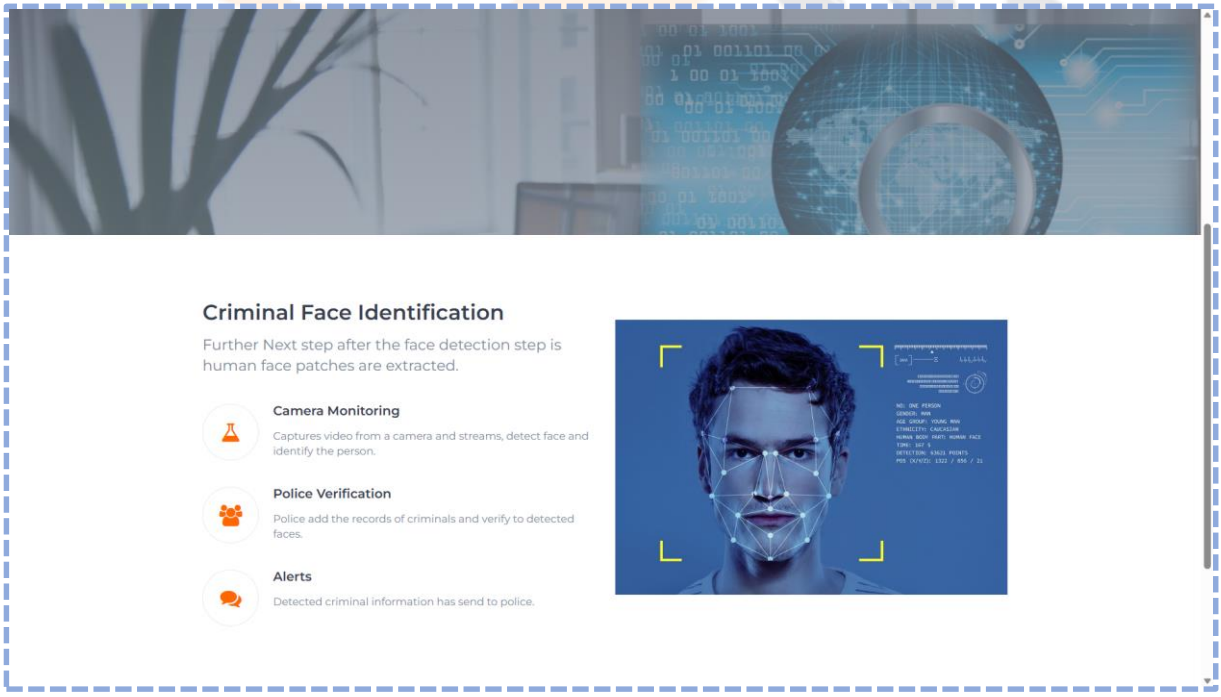

FIGURE NO.2 CRIMINAL FACE INDENTIFICATION

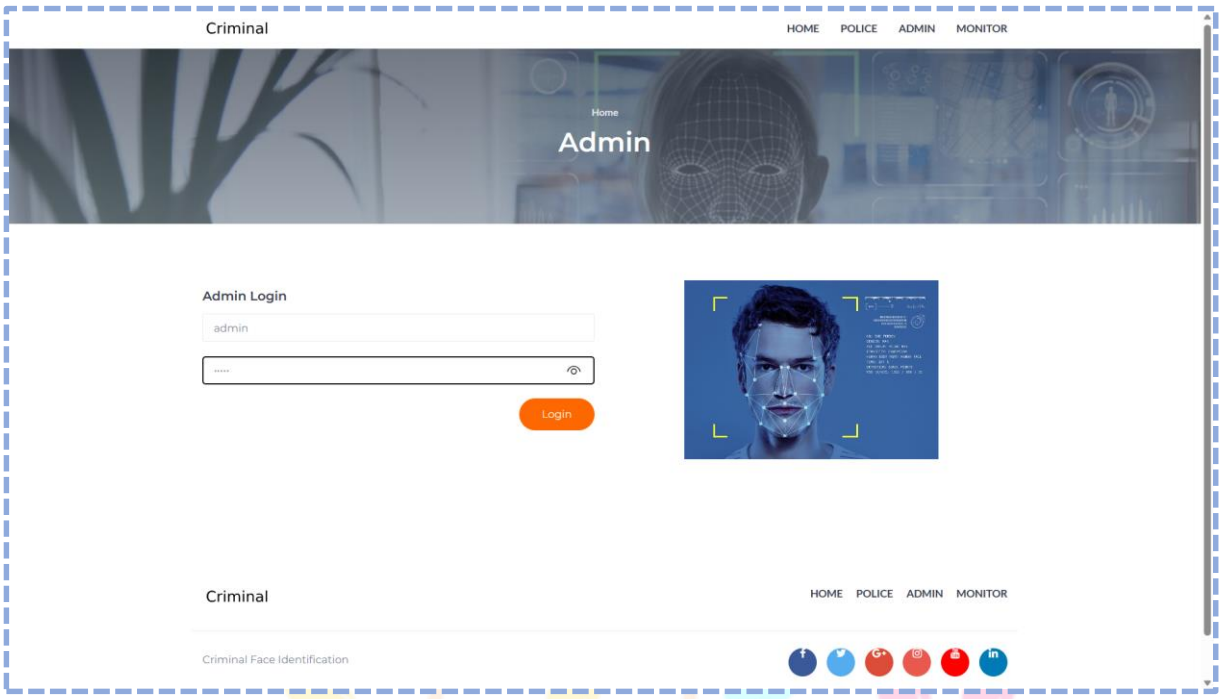

FIGURE NO.3 ADMIN LOGIN

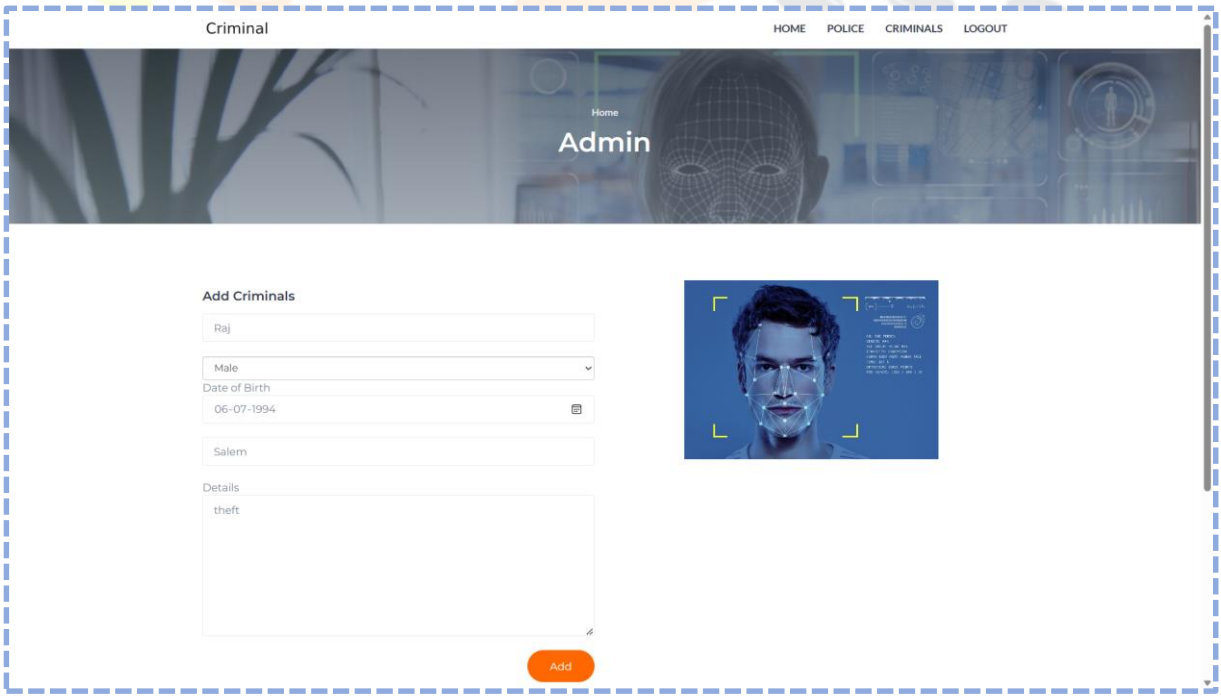

FIGURE NO.4 DATA FEED

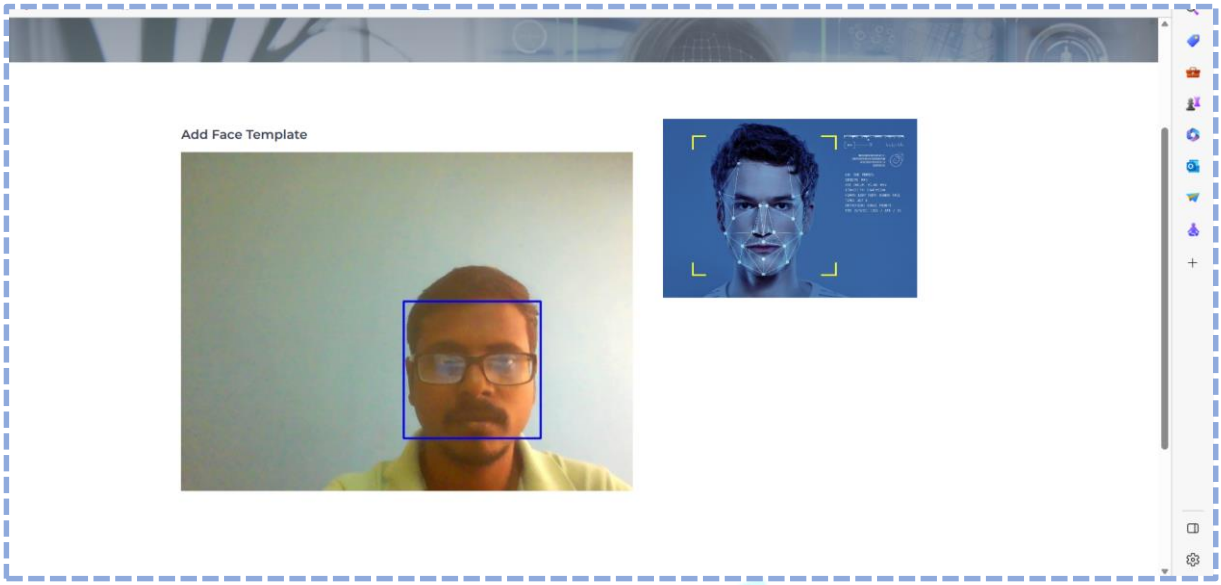

FIGURE NO.5 DATA FEED FACE TEMPLATE

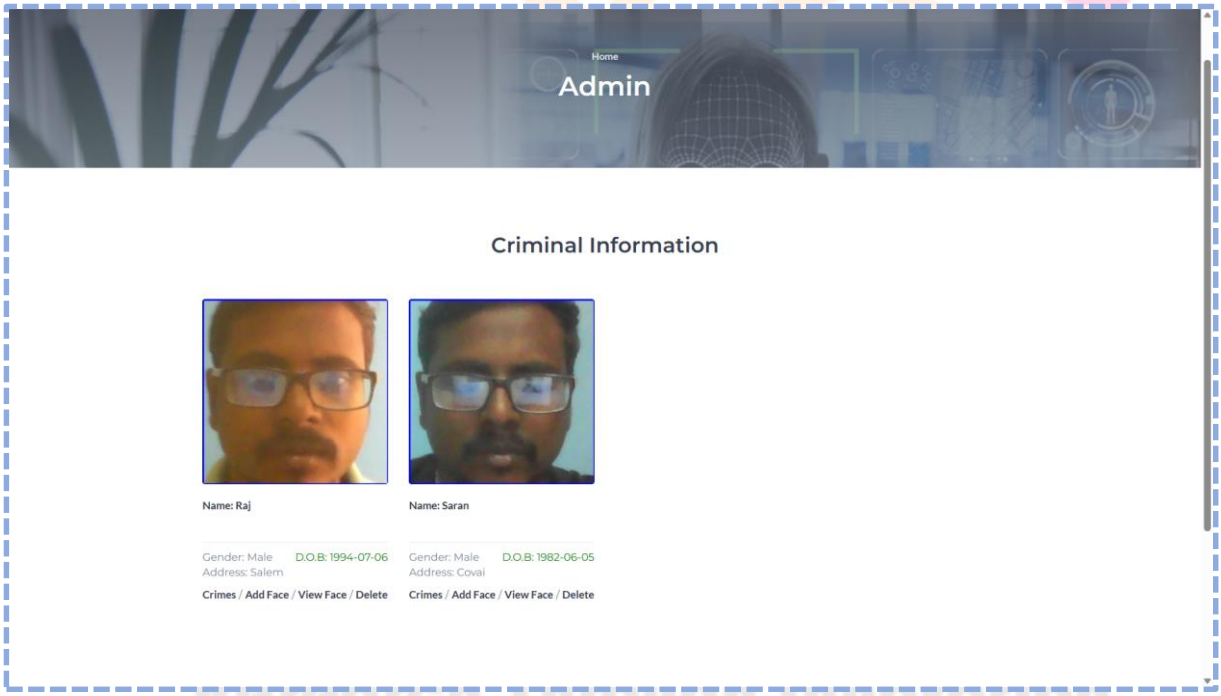

FIGURE NO.6 CRIMINAL INFORMATION

FIGURE NO.7 CRIMINAL INFORMATION

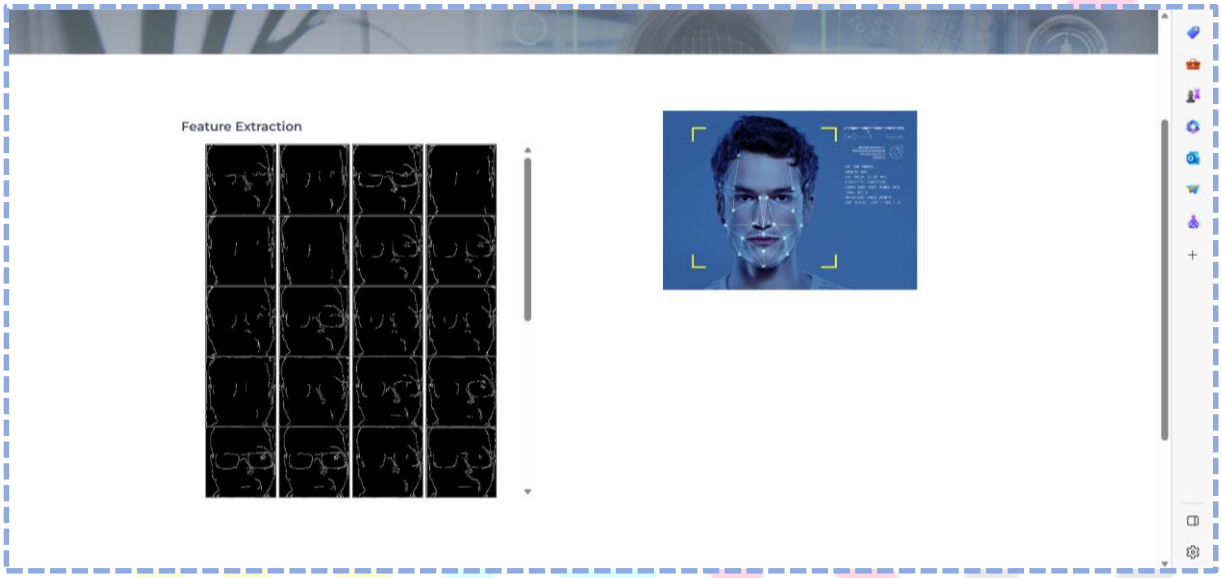

FIGURE NO.8 FEATURE EXTRACTION

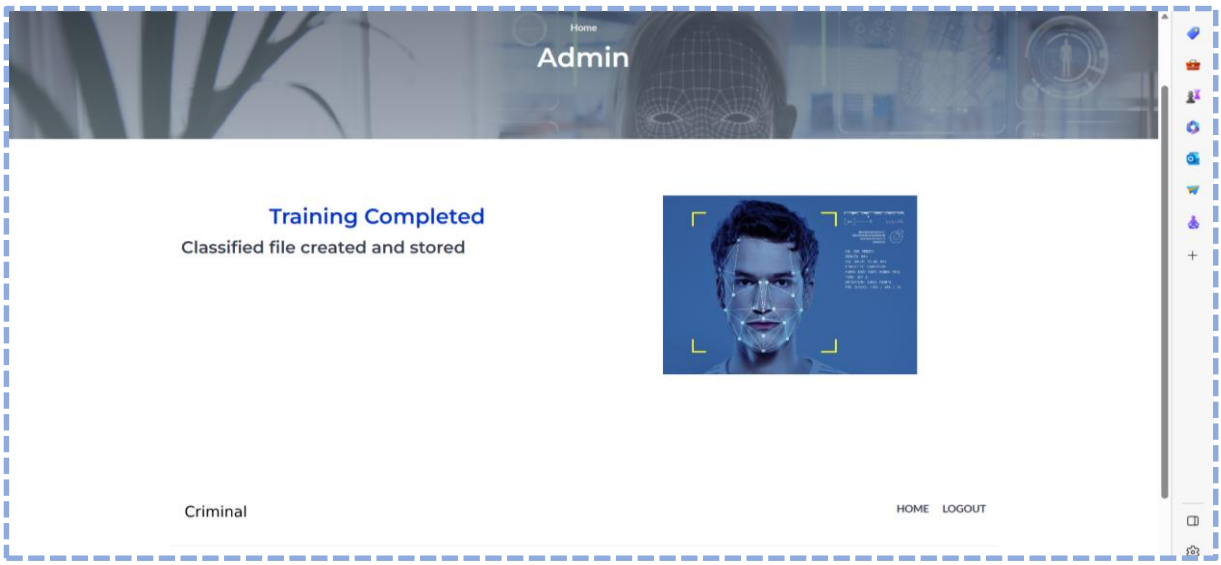

FIGURE NO.9 TRAINING COMPLETED

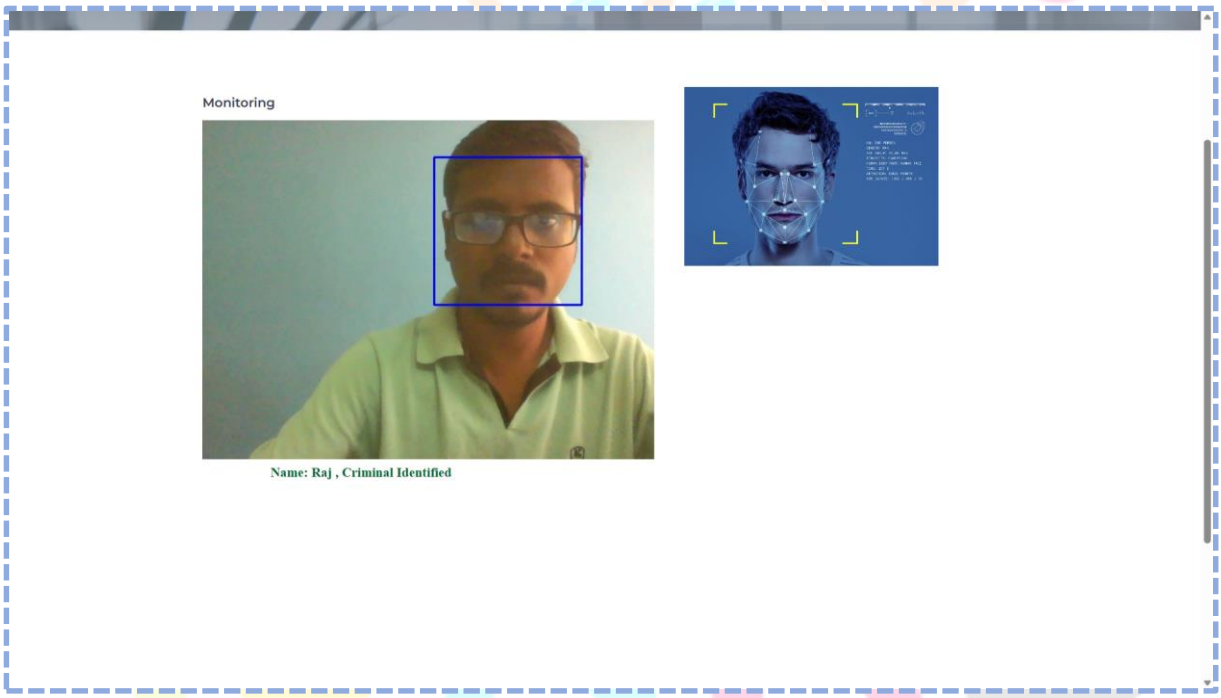

FIGURE NO.10 INDENTIFICATION OF CRIMINAL

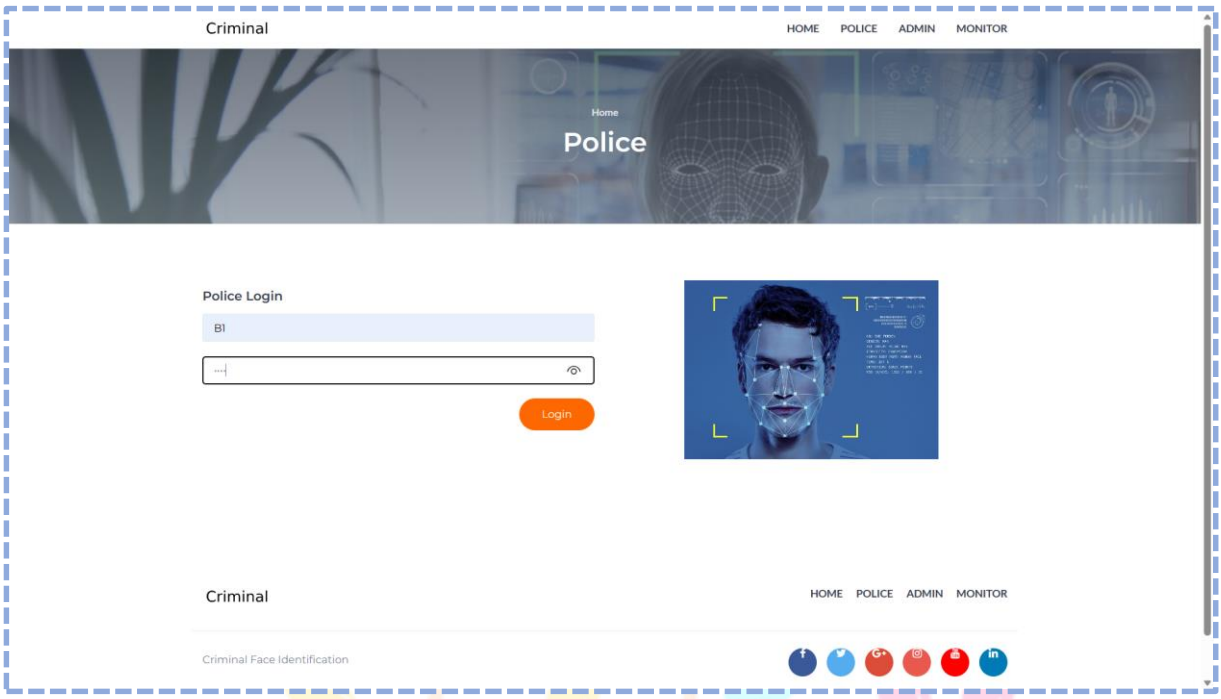

FIGURE NO.11 POLICE LOGIN

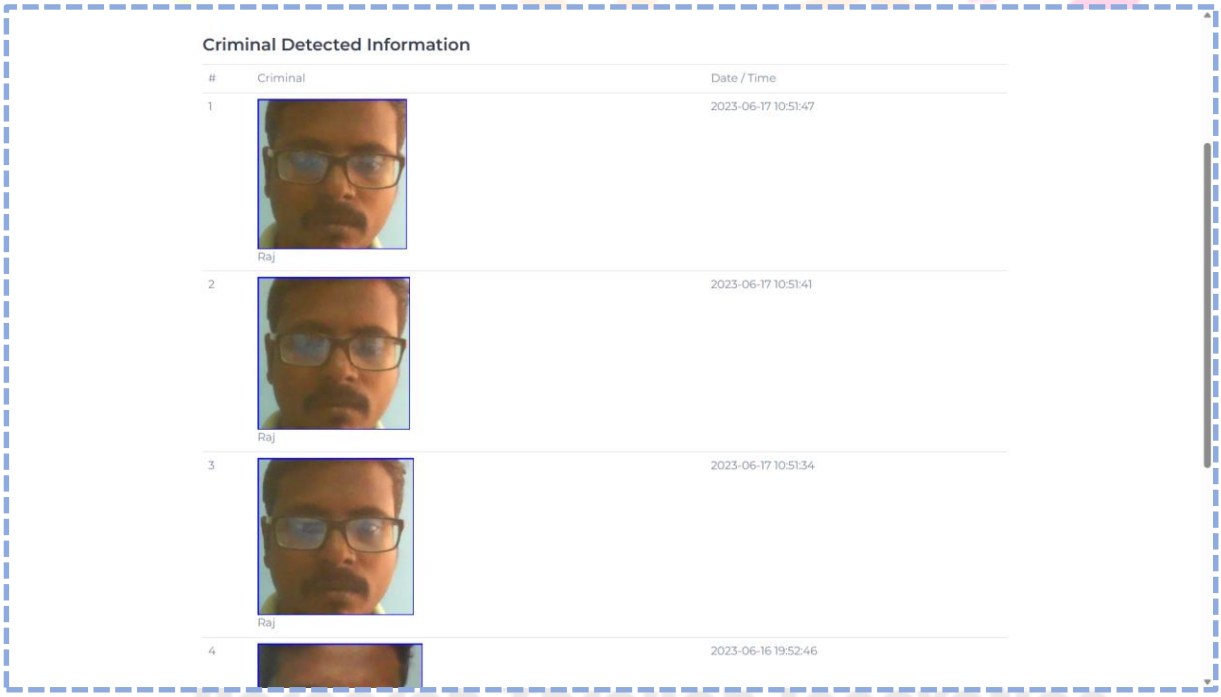

FIGURE NO.12 DETECTION OF CRIMINAL

REFERENCE

1. Y. Yang, W. Hu and H. Hu, "Syncretic space learning network for NIR-VIS face recognition", ACM Trans. Multimedia Comput. Commun. Appl., vol. 20, no. 1, pp. 1-25, Jan. 2024.
2. Z. Zhu et al., "WebFace260M: A benchmark for million-scale deep face recognition", IEEE Trans. Pattern Anal. Mach. Intell., vol. 45, no. 2, pp. 2627-2644, Feb. 2023.
3. 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.
4. 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.
5. S. Yu, H. Han, S. Shan and X. Chen, "CMOS-GAN: Semi-supervised generative adversarial model for cross-modality face image synthesis", *IEEE Trans. Image Process.*, vol. 32, pp. 144-158, 2023.