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AI Driven Missing Person Detection

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ABSTRACT: Every day in our society, there are children, youth, young women, the mentally handicapped, the elderly with dementia, etc. Countless people go missing. Although the police department filed a lawsuit against them. Often times they are very difficult to find. According to the current system, if a person is found missing, we must report his whereabouts to the nearest police station. After the complaint, the police will start an investigation by obtaining the necessary information. This is a time-consuming process that requires a lot of effort. For this reason, we have prepared a project called "Missing Person Detection System" to make our work easier. We will create a web application that can send missing persons information and store it in the database. If the disappearance of a missing person is caught on CCTV, the system can use facial recognition algorithms to capture it. When the system recognizes a match, it creates custom alerts and locations and sends them directly to family members and interested researchers.

The "Missing Person Detection System" project introduces a transformative web-based application designed to revolutionize the search for missing individuals by integrating machine learning and facial recognition techniques. The project's primary objective is to expedite the search process by enabling users to upload images of missing persons and suspicious individuals, which are then cross-referenced against a comprehensive database. Upon finding a match, the system generates notifications to inform relevant authorities and concerned individuals about the located person's whereabouts. The project comprises distinct modules that contribute to its functionality. Users, including family members and law enforcement, can upload images of missing persons, accompanied by relevant information, through the "Image Upload" module. The "Face Recognition" module employs machine learning algorithms to extract and compare facial features, while the "Database Management" module efficiently organizes and retrieves information from the image repository.

KEYWORDS : Missing Person Detection, Facial Recognition, Machine Learning, Image Processing, Real-time Alert System, Surveillance Systems, CCTV Footage Analysis, Database Management, Artificial Intelligence, Deep Learning, Face Matching Algorithms, Person Identification System, Law Enforcement Technology, Public Safety System, Automated Monitoring, Smart Surveillance, Pattern Recognition, Humanitarian Technology, Crowdsourced Missing Person Reports.

I. INTRODUCTION

In today's technologically driven world, the challenge of locating missing persons remains a persistent societal concern. Each day, children, the elderly, mentally challenged individuals, and others disappear, often without immediate or effective ways to trace them. Conventional search and rescue operations, although vital, are frequently time-consuming and resource-intensive. Motivated by this urgent need, the "Missing Person Detection System", also known as "Bharatiya Rescue", is proposed as a transformative solution at the intersection of compassion and technology.

This web-based system leverages machine learning and facial recognition technologies to streamline the process of identifying missing individuals. By enabling the public and law enforcement to upload images and reports of missing persons, the system cross-references facial data with CCTV footage and a centralized image database. When a match is detected, it triggers automated notifications to the police, family members, and related parties, significantly reducing response time.

A key innovation in this system is its ability to process real-time video feeds from CCTV cameras and analyze them using advanced facial recognition algorithms. Additionally, the application provides features like public reporting of unidentified individuals and complaint number tracking to avoid duplication and ensure follow-up by authorities.

Designed with scalability in mind, the system anticipates future enhancements, including mobile app integration, GPS-based tracking, and real-time public notifications through newspapers and digital media. By incorporating robust data management and intelligent analytics, the system aims to offer a reliable, efficient, and humane approach to missing person detection.

This paper presents the design, architecture, and implementation of the “Missing Person Detection System,” evaluating its potential to revolutionize traditional methods and support law enforcement agencies and communities in safeguarding vulnerable individuals.

II. LITERATURE SURVEY

1. Criminals and missing children identification using face recognition and web scrapping. Year: 2020 The paper by S. Ayyappan and S. Matilda explores using face recognition and web scraping to identify criminals and locate missing children. Face recognition matches individuals' faces to databases, while web scraping gathers real-time data from social media and news sites. Combining these technologies improves the speed and accuracy of identification. This approach offers a promising solution for law enforcement and child safety.

2. A novel integration of face recognition algorithms with a soft voting scheme for efficiently tracking missing person in challenging large-gathering scenarios. This paper presents a novel approach combining face recognition algorithms with a soft voting scheme to efficiently track missing persons in large gatherings. The method enhances accuracy and reliability in challenging environments by integrating multiple recognition techniques.

3. Finding missing person using AI,ML. The paper explores the use of Machine Learning (ML) and Artificial Intelligence (AI) techniques to locate missing persons. It focuses on leveraging these technologies for efficient and accurate identification and tracking in real-world scenarios.

4. Martins and Ribeiro, in "Deep Learning Techniques for Face Recognition in Real-World Scenarios", highlight the effectiveness of convolutional neural networks (CNNs) for face recognition in challenging environments. Their study shows that CNNs handle variations in lighting, pose, and occlusion well, making them suitable for real-time identification tasks like missing person detection.

5. Zhao and Wang, in their paper "Real-Time Surveillance Systems for Missing Persons", propose a system that uses live CCTV footage combined with facial recognition to locate missing individuals. Their approach emphasizes real-time detection, database matching, and alert generation to support faster police response and public safety efforts.

III. PROBLEM STATEMENT

Current methods for locating missing persons—such as public announcements, printed posters, social media campaigns, manual searches by law enforcement, and the use of static databases—are often slow, inefficient, and lack real-time capabilities. These approaches do not incorporate modern technologies like artificial intelligence, facial recognition, or real-time health and emotion monitoring, leading to delayed responses and lower chances of successfully and safely locating missing individuals.

IV. OBJECTIVES

1. To enhance community engagement by fostering active participation from local residents in the search for missing persons, creating a network of vigilance and support
2. To facilitate quick identification of missing individuals through the collection and cross-referencing of images uploaded by community members.

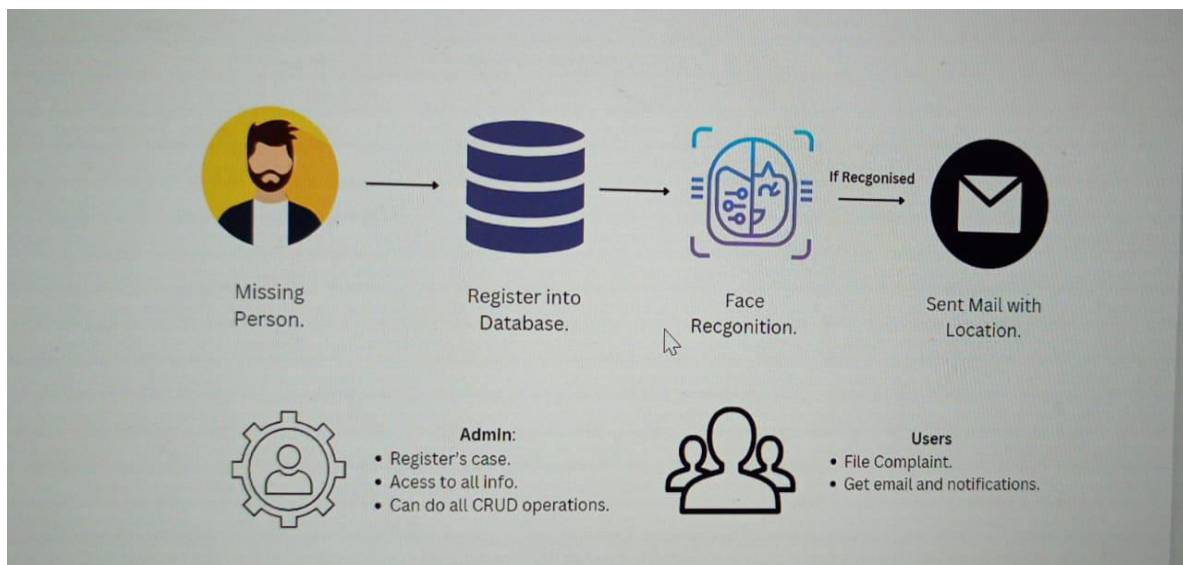
3. To promote safety and awareness by increasing public awareness about missing persons and safety concerns within communities, encouraging proactive engagement.
4. To reduce response time by significantly decreasing the duration taken to locate missing persons, thereby improving outcomes for families and communities.
5. To leverage technology for efficiency by utilizing modern technology and AI-driven algorithms to improve the speed and accuracy of locating missing persons compared to traditional methods.

V. PROPOSED SOLUTION

The scope of the project encompasses the development of a comprehensive web-based application that empowers users, including family members and law enforcement agencies, to actively participate in the search for missing persons. The project extends its reach beyond mere image uploads by incorporating advanced facial recognition algorithms, machine learning libraries, and database management systems. The envisaged scope includes not only the current functionalities but also embraces future enhancements such as real-time video analysis and mobile application integration. This expansive scope positions the "Missing Person Detection System" as a versatile tool adaptable to the evolving landscape of technology and societal needs.

VI. SYSTEM DESIGN

SYSTEM ARCHITECTURE



Architecture Diagram

The system's backbone is Python, chosen for its versatility and extensive support in various domains. Django, a high-level Python web framework, forms the well-structured foundation for the backend development. The integration of machine learning capabilities is achieved through the seamless collaboration of Django with OpenCV and the Face-Recognition library.

Django:

Django, a high-level Python web framework, served as the backbone of the project by providing a robust and efficient backend structure. Utilizing its Model-View-Controller (MVC) architecture and Object-Relational Mapping (ORM), it enabled seamless integration and management of databases through Python classes. This simplified database interactions, ensured data consistency, and accelerated development. Django's built-in authentication system and security features facilitated user authentication and access control, which was essential for protecting sensitive data such as facial recognition functionalities powered by OpenCV. Additionally, Django supported real-time image

processing and face recognition integration, while its email handling capabilities—via the EmailMessage class—enabled the sending of notifications and alerts, thereby enhancing overall user experience.

OpenCV:

The integration of OpenCV (Open-Source Computer Vision) was indispensable to the project, significantly enhancing its functionality through a wide range of image and video analysis tools. OpenCV played a central role in facial recognition, image processing, and other computer vision tasks. By leveraging its pre-trained deep learning models, I was able to detect and recognize faces in both images and video streams with high accuracy. This capability was seamlessly integrated into the Django backend, enabling secure and efficient identification of individuals. OpenCV also supported real-time image processing, allowing for dynamic image adjustments and preprocessing to optimize facial recognition performance. Beyond face detection, its comprehensive toolkit—ranging from image filtering and edge detection to contour analysis and feature extraction—enabled the implementation of advanced vision techniques. Its flexibility, robustness, and compatibility with Django made OpenCV an essential component of the system architecture.

Face-recognition library:

The integration of the face_recognition Python library significantly enhanced my project by providing accurate and efficient face detection and recognition capabilities. Utilizing pre-trained deep learning models, the library detects faces in images and video streams, providing bounding box coordinates and identifying key facial landmarks such as eyes, nose, and mouth. It computes facial encodings—numerical vectors that uniquely represent facial features—which are used to match and recognize individuals across various media. This enabled real-time and batch facial recognition, crucial for secure authentication and authorization within the system. The library's seamless compatibility with Django allowed for smooth integration with the backend database, facilitating efficient storage and retrieval of user-related data. Its performance, accuracy, and support for custom model training made it highly adaptable for projects requiring recognition of unique facial traits, and its ability to handle large datasets made it ideal for scalable, real-world applications involving diverse users and access control systems.

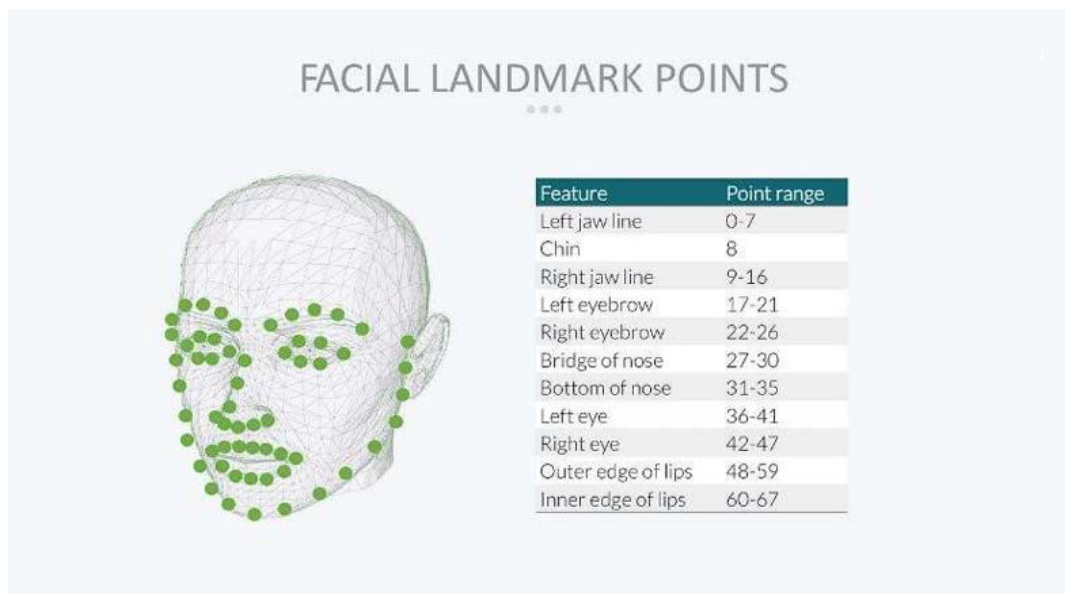


Figure 5.2 Facial Landmark point

FLOWCHART

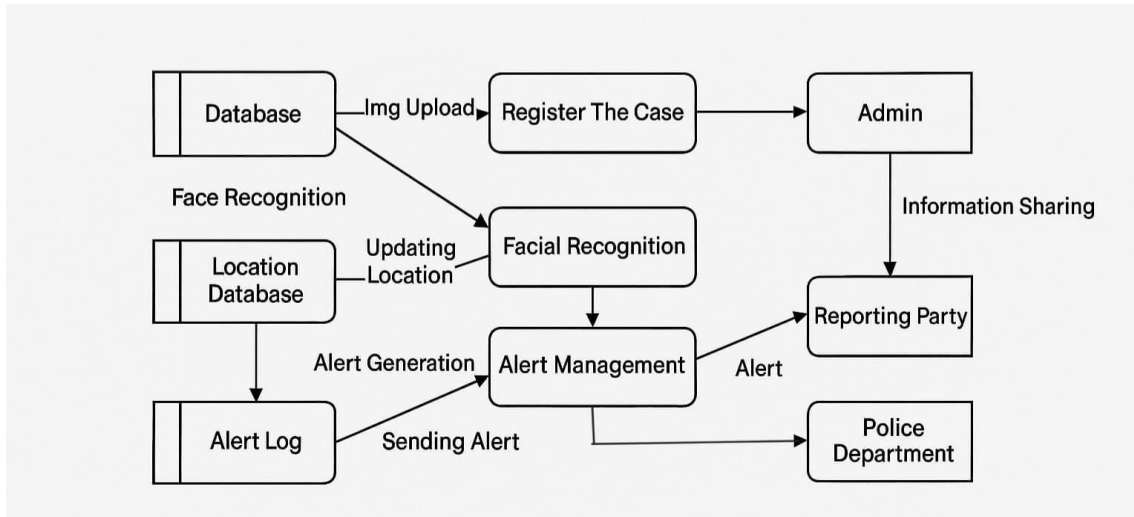


Fig: Data Flow Diagram

A Data Flow Diagram (DFD) is a graphical representation that depicts the flow of data within a system. It illustrates how data is input, processed, and output in a system, highlighting the interactions between different components. DFDs use various symbols to represent processes, data stores, data flows, and external entities, providing a visual and intuitive way to understand the flow of information within a system. The Data Flow Diagram provides a visual representation of the flow of data within the "Missing Person Detection System," illustrating the processes, data sources, and interactions between different components.

The DFD for this system can be outlined as follows:

External Entities:

User (Uploader): Represents individuals such as family members or law enforcement personnel who upload images of missing persons. **System:** Represents the "Missing Person Detection System."

Processes:

· Image Upload Process:

Inputs: Images of missing persons along with relevant information.

Outputs: Uploaded images stored in the database

· Face Recognition Process:

Inputs: Uploaded images, stored images from the database.

Outputs: Matches or potential matches, triggering an alert.

· Database Management Process:

Inputs: Information from the Image Upload and Face Recognition processes.

Outputs: Updated database with new images and associated information.

· Alert Generation Process:

Inputs: Matches or potential matches from the Face Recognition process.

Outputs: Alerts sent to relevant authorities and concerned individuals.

Data Stores:

- **Image Database:** Stores images and relevant information uploaded by users. Accessed and updated by the Image Upload and Database Management processes.

- **Face Features Database:** Stores facial features and encodings for comparison during the Face Recognition process. Accessed and updated by the Face

Recognition process.

- **Alert Log:** Stores information about generated alerts. Accessed and updated by the Alert Generation process.

Data Flows:

- **Image Upload Data Flow:** Carries images and information from the User to the Image Upload Process.
- **Face Recognition Data Flow:** Carries images from the Image Database and uploaded images to the Face Recognition Process. Carries matches or potential matches from the Face Recognition Process to the Alert Generation Process.
- **Flow:** Carries matches or potential matches from the Face Recognition Process to the Alert Generation Process. Sends alerts to relevant authorities and concerned individuals. Updates the Alert Log

VII. RESULTS

HOME PAGE

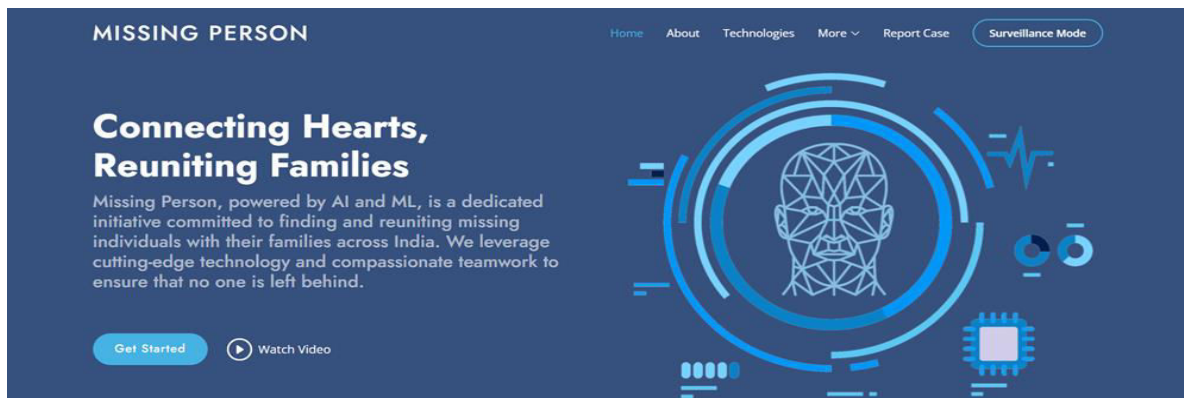


Fig a: Home Page

This snapshot showcases the homepage of the "Missing Person" web application, emphasizing its AI and ML-driven mission to locate and reunite missing individuals with their families. The interface includes navigation options like "Home," "Technologies," "Report Case," and "Surveillance Mode" for seamless user interaction.

CASE REGISTRATION PAGE

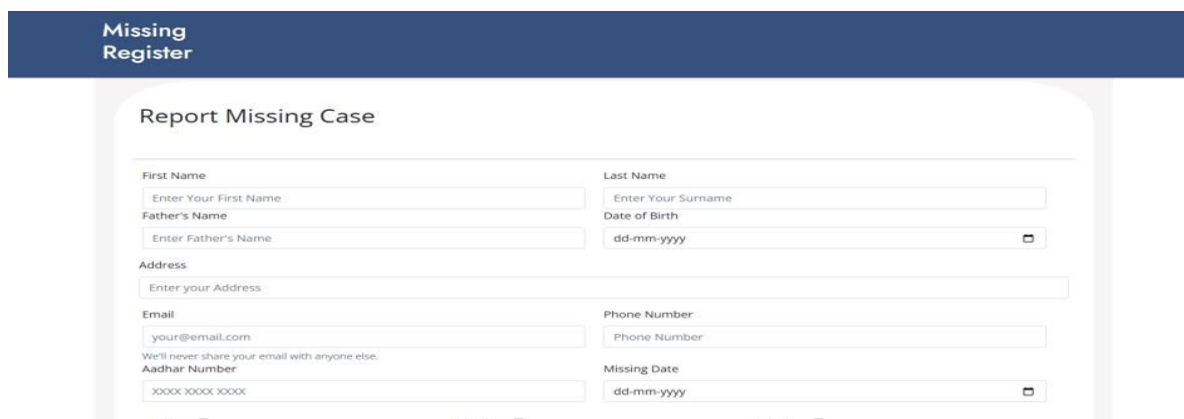


Fig b: Case Registration Page

This snapshot displays the "Case Registration" page of the "Missing Person" application, where users can submit detailed information about a missing individual, including personal details and contact information. A success message confirms the registration of the case.

REGISTERED CASE PAGE

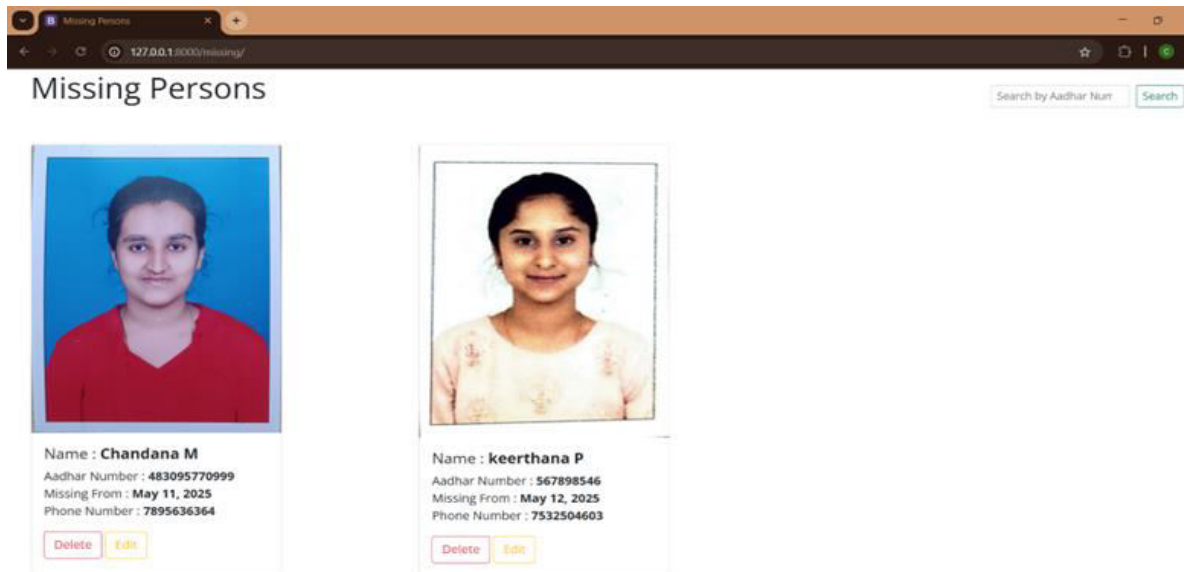


Fig c: Missing Person Repository

This snapshot displays the "Registered Case" page, where users can view detailed information about a previously registered missing person case. It includes personal details, contact information, and any relevant updates. A status message confirms the case registration.

Identification of case registered person using Surveillance Camera



Fig d: Found Person

This snapshot displays the "Case Identification" page, where users can view and match real-time surveillance images with registered missing person cases. It includes personal details and a status message confirming the identification.

VIII, CONCLUSION

The "Missing Person Detection System" is a powerful blend of technology and social responsibility, designed to assist in the timely identification and recovery of missing individuals. By combining machine learning, facial recognition, and web development, the system provides an efficient, user-friendly platform for both authorities and the public. Its core features—real-time video analysis, image uploads, and alert notifications—aim to replace outdated search methods with a faster, more accurate process. With the potential for future advancements like mobile app integration, this project not only addresses a critical social issue but also sets a foundation for scalable and impactful tech-driven solutions in public safety.

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