Vision Rescue: AI-Powered Missing Persons Detection System

Project

Synopsis Report

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1. ABSTRACT

The Vision Rescue project is an AI-powered system that uses crowdsourced data, real-time alerts, and facial recognition to improve the search and identification of missing people. In order to effectively identify missing people, this system uses deep learning models to evaluate and compare facial photos from social media, CCTV footage, user – reported databases.When a match is discovered, the project incorporates real-time notification systems to guarantee that volunteers, families, and pertinent authorities are notified right away. Crowdsourced participation allows the public to contribute to missing person searches, which further expands the system's reach and efficacy. The following are this system's primarygoals: facial recognition powered by AI to match photos of missing people.Notifications in real time for prompt action Data handling that is ethical and secure to safeguard personal dataWeb and mobile applications that are easy to use for reporting and access.Vision Rescue offers a thorough, effective, and safe method of finding down missing people and reconnecting them with their families by fusing AI, cloud computing, and crowdsourcing.

KEYWORDS: Improved accuracy, Facial recognition, Machine Learning, Artificial Intelligence

2. INTRODUCTION

Millions of people disappear globally every year, leaving law enforcement agencies heavily burdened and causing emotional misery to families. Finding missing people is frequently a difficult and urgent task, and the likelihood of a successful recovery can be greatly reduced by responding slowly. Due to their slow response times and lack of an integrated data-sharing system, traditional search methods—such as human searches, media broadcasts, and police investigations—are time-consuming, dispersed, and frequently ineffective. These traditional methods are resource-intensive and scale-constrained due to their heavy reliance on human participation, which makes the search process even more difficult.

There is currently a chance to transform missing persons tracking with automated, data-driven solutions thanks to developments in artificial intelligence (AI), deep learning, and cloud computing. In applications like biometric identity, security systems, and surveillance, AI-powered facial recognition technology has already shown impressive performance, demonstrating its capacity to reliably identify people across large datasets. By allowing for real-time identification and cross-referencing of missing person reports with publicly accessible photos, CCTV footage, and crowdsourcing data, these technologies have the potential to greatly improve search operations.

The Vision Rescue: AI-Powered Missing Persons Detection System seeks to close the gap between AI-driven identification systems and conventional search methods. Vision Rescue offers an automated, scalable, and incredibly effective method of finding missing people by utilizing machine learning, real-time data processing, and facial recognition. In addition to lowering reliance on manual labour, this system improves cooperation between the public, families, and law enforcement. Vision Rescue aims to enhance search effectiveness, boost recovery rates, and provide a more proactive response to the worldwide missing persons crisis by combining AI-powered search mechanisms, crowdsourcing data, and real-time notifications.

3. MOTIVATION

1. **An increase in missing person cases.** The increasing number of missing person cases poses a significant societal challenge, particularly affecting children, the elderly, and victims of human trafficking, who are at heightened risk. Delayed search efforts significantly reduce the likelihood of locating missing individuals alive, underscoring the urgent need for more efficient and proactive identification systems.

2. **Limitations of Conventional Methods**: Traditional manual search methods are often time-consuming, inefficient, and lack scalability. These approaches are further hindered by the absence of integrated databases, making it difficult to cross-reference missing person reports across multiple sources. Additionally, public participation in search operations remains limited, reducing the overall effectiveness of search efforts.

3. **AI and Crowdsourcing as a Solution**: The integration of artificial intelligence (AI) and crowdsourcing presents a transformative solution to these challenges. AI-powered facial recognition enables instant identification, significantly improving search accuracy and efficiency. Crowdsourced data collection fosters community involvement, expanding the search network and increasing the chances of successful recovery. Furthermore, real-time alerts facilitate immediate response efforts, reducing delays and enhancing overall recovery rates. Vision Rescue: AI-Powered Missing Persons Detection System seeks to address these challenges by leveraging AI-driven identification and public participation to create a faster, more efficient, and highly scalable missing persons tracking system.

4. LITERATURE REVIEW :

An artificial intelligence (AI)-powered missing persons identification system has been developed in large part because to extensive research and technology developments in facial recognition, crowdsourced searches, and data protection.

1. Facial Recognition Using Artificial Intelligence High accuracy in identifying people has been shown by sophisticated face recognition technologies like Face Net, Deep Face, and OpenCV. The extensive use of AI-powered biometric verification systems in surveillance and security demonstrates their usefulness. Additionally, a subclass of deep learning models called Convolutional Neural Networks (CNNs) have greatly improved image-matching accuracy, making them indispensable instruments for automatic identification in massive datasets.

2. Crowdsourced Searches for Missing Persons: Platforms that use crowdsourcing data to improve search efforts, like NamUs and Find My Child, have highlighted the importance of public participation in finding missing people. In a number of fields, such as crisis management and disaster assistance, where quick data collection and analysis might be crucial, AI-driven crowdsourcing has shown great promise. Missing person searches can reach beyond conventional databases by utilizing AI-powered crowdsourcing strategies, which raises the likelihood of a successful identification.

3. Ethical and Privacy Aspects: AI-driven identification systems must ensure adherence to data protection laws (such as the GDPR). Maintaining accuracy, equity, and inclusivity in facial recognition systems requires addressing biases. Furthermore, the usage of strong encryption techniques protects private information by avoiding misuse and illegal access. In order to promote confidence, security, and the general efficacy of AI-powered missing person detection systems, ethical AI deployment and responsible data governance are essential.

5. GAP ANALYSIS

The search for missing people still faces many practical obstacles, even with the advances in facial recognition technology. Since the majority of AI-powered search engines rely exclusively on law enforcement records, which limits the extent of identification attempts, one of the main constraints is the insufficient integration of public databases. Furthermore, a lot of current systems don't have real-time alert features, which means that when possible matches are discovered, authorities and families can't be informed right away. Furthermore, as AI-based monitoring systems carry the danger of unethical use and illegal data access, security and privacy issues continue to be crucial.

By putting in place an AI-driven real-time scanning system that instantly notifies pertinent stakeholders, Vision Rescue: AI-Powered Missing Persons Detection System seeks to close these gaps. The technology increases the possibility of finding missing people by broadening the search network beyond official records by integrating crowdsourced data. Additionally, Vision Rescue uses robust encryption methods and privacy-focused machine learning models to guarantee the preservation of sensitive personal data, placing a high priority on data security and ethical AI research. Vision Rescue provides a more thorough, safe, and effective method of missing person finding because to these advancements.

6. PROBLEM STATEMENT

Traditional missing person tracking methods often suffer from inefficiencies and delays, leading to unsuccessful recoveries and prolonged response times. These conventional approaches rely heavily on manual investigations, outdated databases, and limited public participation, which can significantly hinder the speed and accuracy of locating missing individuals.

To address these challenges, **Vision Rescue** aims to develop an **AI-powered missing person tracking system** that leverages advanced technologies to enhance search efforts. This system will integrate **crowd sourced data**, allowing the public to actively contribute valuable information in real time. Additionally, it will utilize **real-time notifications** to alert relevant authorities and communities instantly when a missing person is reported, ensuring a swift response.

A key component of **Vision Rescue** is its incorporation of **facial recognition technology**, powered by deep learning and artificial intelligence. By using sophisticated algorithms, the system can analyze and compare facial features with existing databases and live images, significantly improving identification accuracy. This automated approach will reduce reliance on traditional, slower verification methods, expediting the search and increasing the likelihood of successful recoveries.

Beyond improving efficiency, **Vision Rescue** also prioritizes ethical considerations such as **data privacy, security, and bias mitigation**. Adhering to **GDPR** and other data protection regulations, the platform will ensure that sensitive information is handled responsibly. Measures such as **encryption, access control, and unbiased AI training** will be implemented to safeguard user data and maintain fairness in the identification process.

By combining **crowdsourced efforts, real-time alerts, and AI-driven facial recognition**, **Vision Rescue** seeks to revolutionize the way missing persons are located, ultimately **enhancing response times, increasing accuracy, and improving overall success rates in recoveries**.

7. OBJECTIVES

Conventional approaches to tracking missing persons are frequently ineffective, disjointed, and slow, which results in slower reaction times and lower success rates in finding missing people. Large volumes of data cannot be processed and analysed in real time by these traditional methods, which mostly rely on manual procedures. Critical time is thus missed, which can have a major effect on the likelihood of a full recovery.

The Vision Rescue: AI-Powered Missing Persons Detection System seeks to address these issues by creating a cutting-edge, AI-powered solution that combines real-time alerts, crowdsourcing data, and facial recognition. The missing person photographs will be analysed and compared to publicly accessible sources, including social media, user-submitted reports, and CCTV footage, using machine learning algorithms, computer vision techniques, and big data analytics. The solution will greatly increase search efficiency and improve identification accuracy by integrating automatic alerts and real-timeprocessing.

Vision Rescue will offer a missing person detection method that is quicker, more dependable, more scalable by utilizing artificial intelligence and cloud computing. In addition to assisting communities and families in their search, this program hopes to be a useful resource for law enforcement, assisting them in accelerating investigations and enhancing recovery results.

8. TOOLS/ TECHNOLOGIES USED

For this project, we have used various latest technologies which will be evaluated in this chapter with every detail of why it is used.

• **Frontend (UI/Website):**

   1. **React.js** for building an interactive, dynamic web interface.
   2. **Node.js** for handling backend logic and API requests.

• **Facial Recognition & AI Processing:**

   1. **Python with OpenCV** for image processing and face detection.
   2. **dlib** for advanced facial landmark detection and feature extraction.
   3. **Deep learning libraries (e.g., TensorFlow/Keras, FaceNet)** for high-accuracy recognition.
   4. **NumPy** for numerical operations, array manipulations, and handling image matrices.

• **Database & Backend:**

   1. **SQL-based database** (PostgreSQL/MySQL/SQLite) for structured data storage and efficient querying.

9. METHODOLOGY

Step1: Search Initiation

- An Image of the missing person is uploaded on the app/website.

- Details for the missing person are added.

Step 2: Real-Time Image Processing and Matching Through Facial Recognition:

- Uploaded images are processed using Python with OpenCV

- Processed Images are matched using Facial Recognition through the cctv feeds.

Step3: Result Of Face Recognition:

- Case 1(No match): If a match isn't found The program continues searching further till a match is found, if it isn't it reports the user accordingly/

- Case 2(Match Found): If a match is found Real-Time alerts and notifications are sent to users, Following the notification Other users can also report sightings of the missing person and report it to the authorities or in the app itself.

Step4: Details of the missing person is stored in a protected data base and sent for further investigation and tracking.

Methodology Flowchart
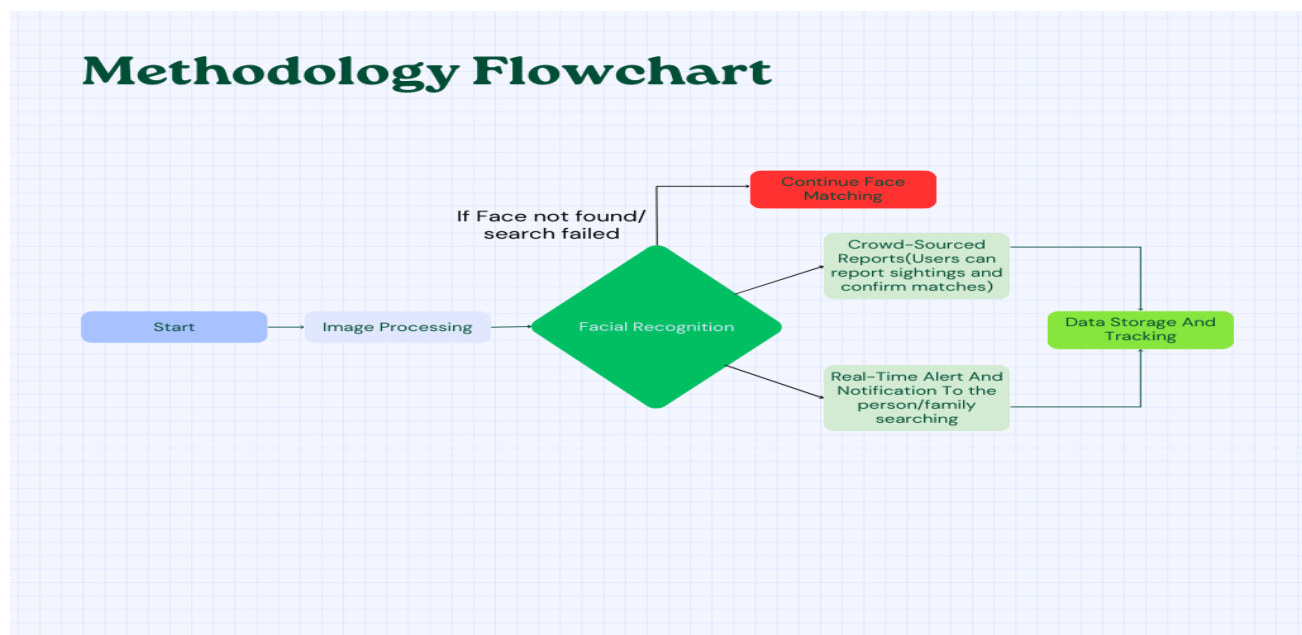
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