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AI-Supported Detection of Missing Persons

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Abstract - This study investigates the efficient and precise use of artificial intelligence to find missing people. The system can create massive datasets spot trends and promptly notify authorities by utilizing technologies like facemask recognition machine learning and data analysis. The study demonstrates how AI improves conventional search techniques speeds up response times and raises the possibility of locating people who are missing. To further optimize search operations future enhancements might include predictive modelling and real-time monitoring.

KEYWORDS: Artificial Intelligence Predictive Modelling Real-Time Monitoring Machine Learning Data Analysis Facial Recognition Missing People and Search Optimization.

INTRODUCTION

As cities expand and digital activity rises locating missing people has become a significant challenge. Rescue operations may be delayed by the time and labour-intensive nature of traditional search techniques. Large datasets videos and images can now be analysed much more quickly and accurately thanks to recent advances in artificial intelligence. Artificial intelligence (AI) tools like facial recognition machine learning and pattern recognition assist in identifying people in public databases social media and CCTV footage. These tools help authorities by lowering the possibility of human error and providing faster insights. This study focuses on how AI-based systems can enhance search efforts support decision-making and offer a trustworthy framework for more effectively finding missing people.

I. LITERATURE SURVEY

[1] AI-Assisted Missing Person Finder Using FaceNet – Dr. K. Venkatachalam et al., 2024

This study explains how the FaceNet algorithm can be used to accurately identify missing individuals by converting facial images into numerical embeddings. These embeddings make it easier to compare new images with stored profiles, even when there are slight changes in appearance such as lighting, hairstyle, or age. The findings show that using FaceNet can significantly cut down the time needed for manual verification and improve the overall accuracy of missing-person detection.

[2] Searching Missing People Through AI-Based Video Surveillance – S. Sowmiya et al., 2024

The authors present an AI-driven method that automatically monitors CCTV footage to detect missing persons. Their system scans live video feeds, identifies faces, and matches them with a missing-person database, reducing the need for human operators. This automated approach enables real-time alerts and quicker responses from authorities, demonstrating how AI can enhance search operations within surveillance environments.

[3] AI for Missing Person Detection – Prajwal Patil et al., 2024

This paper focuses on the usage of deep learning to identify missing individuals from multiple image sources. The model processes large datasets, analyses facial features, and provides accurate matches even in challenging conditions. The study highlights that AI greatly speeds up the search process and reduces errors when compared to conventional manual search techniques, creation it a valuable tool for police and rescue teams.

II. PROPOSED SYSTEM

This system taps into AI—think facial recognition and machine learning—to hunt for missing people. Once you enter a case, it takes the person's photo and scans through CCTV footage, images, and public databases, lining up possible matches and showing how confident it is in each one. Everything lands in a straightforward dashboard, so authorities can quickly review results and get alerts when something pops up. It cuts down on all the manual searching, making it faster and more accurate to find missing people.

• By automatically scanning massive volumes of photos and CCTV footage in real time the system expedites the search process.

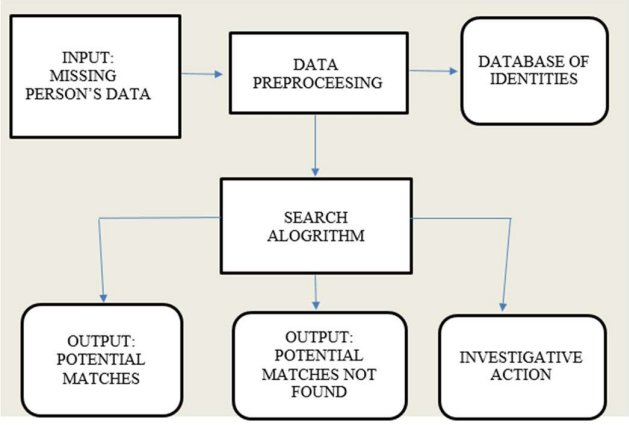
• AI-based facial recognition increases accuracy and decreases human error even in congested or complicated settings.

• By delivering prompt data-driven results it reduces the manual labor of police and rescue teams. • Authorities can react more quickly when a potential match is found thanks to automated email alerts.

• For more trustworthy identification the system can incorporate data from various sources including public records social media photos and CCTV.

• AI models and preprocessing enhance recognition even in the presence of noise low light or different viewpoints.

• Tracking leads managing records and keeping an eye on cases are all made simple and organized by the dashboard.



This flowchart outlines the working process of an AI-based missing person identification system. It begins with collecting images and related information, which is stored in a database. The data is then cleaned and prepared during preprocessing before being used to train or update the AI model. When a new image is checked, the system compares it with stored records. If a match is found, the result is verified; if not, it is marked as "not found," and the database may be updated. The result is then displayed, completing the process.

Algorithm used: The AI-based missing person search system uses a combination of rule-driven filtering and pattern-matching techniques to identify potential matches. Instead of depending on highly complex models alone, it applies predefined rules such as facial landmarks, clothing cues, movement patterns, and location-based logic gathered from CCTV and uploaded images. This method offers clear, dependable, and easy-to-interpret results, helping investigators narrow down possibilities quickly and track individuals more efficiently.

[1] Algorithm for detecting faces:

By scanning the frame and locating areas that resemble facial patterns the face detection algorithm finds human faces in pictures or videos. To identify the precise location of a face it examines characteristics such as shape skin tone and edge structure. This stage enables the system to concentrate solely on the face before advancing to more in-depth analysis.

[2] The algorithm for extracting facial features:

This algorithm gathers crucial information from a face once it has been identified including the eyes nose mouth jawline and spacing between features. A distinct numerical pattern or feature vector is created from these measurements. The system can compare faces more accurately thanks to this pattern.

[3] Face Identification and Matching Algorithm:

To find potential matches the extracted facial features are compared with profiles that have been stored. The algorithm calculates the degree of similarity between each saved face in the database and the current face. The system identifies it as a strong match and notifies the authorities if the similarity score is high. This method facilitates the prompt identification and location of missing individuals.

Testing:

A crucial component of creating the AI-based missing person detection system is software testing which guarantees that each feature functions properly and satisfies the necessary requirements. Verifying accuracy performance user experience and the dependability of real-time alerts are the main goals of the testing process. Since the system relies on CCTV feeds uploaded photos and automated identification algorithms extensive testing is carried out to ensure that every module functions reliably and reacts appropriately in practical scenarios. This ensures that during search operations families police teams and investigators can rely on the system.

1. Unit Testing

Every system module was tested separately including image upload face detection location input alert generation and match scoring. To make sure the algorithms handled errors correctly and produced stable outputs unit testing covered valid inputs inaccurate data low-quality images and edge cases. This made it easier to confirm that every part functioned flawlessly on its own.

2. Integration Testing

All the main modules—Face Detection Feature Extraction Matching Engine CCTV Integration and Search Map Visualization—were tested to make sure they all functioned

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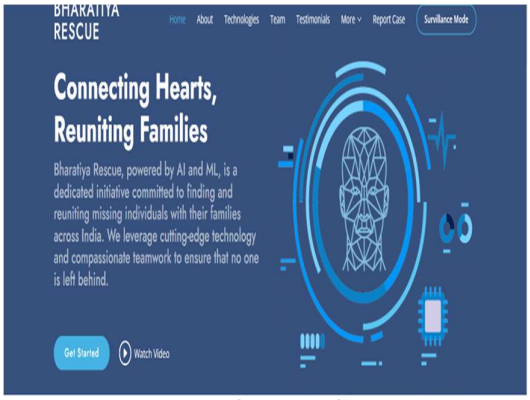
properly. It examined the systems ability to correctly interpret and connect clues as well as the data flow between modules. The tests verified that the data is processed and presented in the dashboard without any delays or inconsistencies when a face is detected..

3. Acceptance Testing

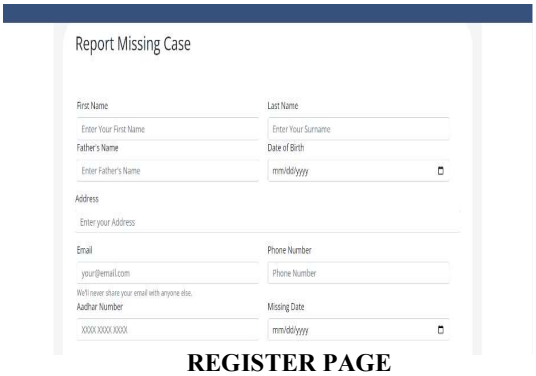
To assess the applications responsiveness alert clarity and ease of use users—including police officers and rescue volunteers—were asked to test it. They evaluated the speed at which matches appeared the clarity of the results displayed and the ease of use of the navigation. The system is user-friendly even for non-technical users according to feedback. All things considered the platform operated dependably at every level providing steady precise and prompt identification assistance.

III. EXPERIMENTAL RESULTS

The image shows an AI-based missing person tracking dashboard, where investigators can access tools such as face search, suspect movement analysis, and location-history mapping. The dashboard also gives quick updates on recent matches, alerts from CCTV networks, and active cases, helping teams respond faster and more accurate.



HOME PAGE



REGISTER PAGE

The displayed interface shows the Missing Person Input section of the AI system, where the user uploads key details such as the person's photo, last known location, clothing description, and any unique identifiers. Once this information is entered, the system creates a clear case summary that highlights essential attributes and recent activity clues. This processed profile becomes the foundation for generating an AI-driven search plan tailored to the individual's situation, helping teams track and respond more effectively.

IV. CONCLUSION

AI-based missing person detection systems provide a powerful tool for improving public safety by integrating machine learning, computer vision, and modern software technologies into a unified solution capable of processing large volumes of real-time dataThese systems analyze photos and videos from CCTV social media and other sources using facial recognition object tracking and predictive analytics. This enables fast identification even in challenging situations like dim lighting partial obstructions or appearance changes. While JavaScript and its frameworks produce interactive dashboards real-time notifications and movement pattern visualizations that make the system user-friendly for both authorities and the general public Python is widely used to develop AI models and manage data workflows. Effective coding debugging and deployment are made possible by tools like Visual Studio which guarantee the systems scalability dependability and maintainability. These systems which combine cloud services geospatial intelligence and automated notifications not only increase the speed and precision of finding missing people but also promote cooperation between law enforcement rescue groups and the community. All things considered the combination of these technologies produces a dependable effective and socially significant framework that greatly lowers the time uncertainty and risk associated with search operations ultimately making the process of locating missing people quicker more intelligent and more successful.

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