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Detect Missing Person Using Face Recognition Technique with AI

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Abstract- The large number of missing persons pose a great problem to law enforcers as well as to their families. Conventional tracing and identification protocols are usually tiresome and cumbersome. The following paper discusses the use of face recognition technology in the form of artificial intelligence (AI) when it comes to finding and tracking missing persons. With the help of deep learning algorithms and large databases of images, this system can automatically compare facial patterns in security footage, social media updates, and police records to identify individuals. The system imagined consolidates the usage of convolutional neural networks (CNNs) and machine learning algorithms towards augmenting accuracy levels while minimizing false positives. Additional capabilities include support for real-time processing to advance identification speed so that response time for priority applications is minimized. Scalability along with cross-platform compatibility is ensured through the establishment of cloud-based and edge-computing architectures. This computer-vision-based process is faster and more efficient compared to the usual procedure, further raising the potential for the return of lost individuals to their loved ones. It further encompasses humanitarian usage of facial recognition, concerns, and possibilities in AI future uses.

Keywords- Large, Missing, Persons, Identification, Recognition, Learning, Algorithms, System, Facial, Individuals.

I. INTRODUCTION

The missing persons problem has been a rising global issue, impacting families, police departments, and communities. Conventional search and identification processes, including posting flyers, manual validation, and public notices, tend to be slow and ineffective, lowering the potential for finding missing persons in a timely fashion. With developments in machine learning and artificial intelligence (AI), face recognition technology has been found to be an effective means of helping to detect and trace missing persons.

Face recognition technology fueled by deep learning-based algorithms facilitates rapid and precise identification by matching facial patterns with large image repositories, such as law enforcement databases, surveillance images, and social media websites. The use of convolutional neural networks (CNNs) and other artificial intelligence models increases the recognition accuracy while reducing false positives. Real-time processing functionality also facilitates rapid identification, enhancing the potential for reuniting people with their families. The system utilizes AI-powered face recognition to close the gap in missing person cases by providing an automated, scalable, and effective solution.

Utilizing cloud computing and edge-based processing guarantees cross-platform accessibility, making it a useful tool for law enforcement agencies and humanitarian organizations. While AI-powered facial recognition offers promising solutions, it also poses ethical and privacy issues that need to be addressed with utmost care. This paper delves into the use of AI-based face recognition technology in missing person detection, its benefits compared to conventional processes, and the possible challenges of using it. The research is intended to emphasize how this technology can transform search operations and enhance response times, leading to a greater possibility of finding and rescuing missing persons.

II. RELATED WORK

This study builds upon the research done by other attempts at facial recognition for criminal identification and missing child identification using web scraping methods. The previous attempts at research have tried to utilize facial recognition through Convolutional Neural Networks (CNN) and deep models but without integrating them with web-based data mining in order to provide real-time identification. The previous research has used primarily structured databases, but this study brings the methodology to unstructured web materials.

The research is prompted by existing research on AI face recognition technology employed in policing. Existing research has focused on CNN architecture, transfer learning, and GAN to increase identification rates. This research is different because it employs a more user-focused system that can be incorporated into mobile applications and police databases to perform real-time missing persons identification.

Cross-age face matching has been challenging due to dynamic facial change during aging. Deep neural network-based methods such as VGGFace and FaceNet and age-invariant feature extraction methods have been used in traditional methods. The work complements existing proposed methods using Deep Residual Networks (ResNet) to improve the level of accuracy for different age groups, still a major issue in traditional face recognition systems.

Previous studies have introduced face recognition based on SVMs, PCA, and CNNs. The present work extends these by taking lost individuals under realistic environments, including IoT-based surveillance systems and facial embeddings for high accuracy.

There has already been research on Artificial Neural Networks (ANNs) for face recognition, much of which has aimed at improving accuracy with deep learning architectures. This research extends from that by improving feature extraction techniques and neural network architecture in trying to improve identification rates, especially in the event of large databases.

III. PROPOSED APPROACH

Figure 1: Architecture for proposed Approach

Fig.1 illustrates the Architecture for the proposed Users can register a missing person case and get alert notifications if there is a match. Admin has more duties, like registering cases, watching over surveillance systems, and conducting CRUD (Create, Read, Update, Delete) operations on the database to update data.

Missing Person Case Registration

The whole process starts with a user or administrator following the steps which are necessary in order to initiate a missing person's case. This basic but fundamental step is undertaken by posting a good image of the missing individual, and all related information which pertains to him or her. Once all such crucial information is collected and categorized, the same is uploaded on a master database, which would then process the information and analyze the information in a critical way to help trace the missing person.

Database Storage

The particular case that has been formally recorded and brought to the public eye, regarding the facial photo of the subject missing, is stored safely and securely in an extremely specialized database through the use of the latest encryption techniques available for the guarantee of its confidentiality and integrity. Such above-mentioned database represents a significant future reference system of immense value with regard to identification of missing persons, serving useful aid and assistance in these very sensitive and delicate cases.

Face Recognition Processing

Facial recognition software forms the basis of the intricate procedure of identifying a newly obtained photo or video record. The procedure carefully calculates several facial features of the missing person, and the features are then carefully matched with available information contained in an extensive database. Through the incorporation of high-quality deep AI technology and complex deep learning algorithms, an extremely high level of precise identification is enabled in an attempt to find a missing person.

Alert Notification via Email

The system uses a face recognition system to automatically alert authorities, registered users, or family members of a match, providing them with critical information on the missing person. The information is used by law enforcement and social welfare departments to initiate resources and coordinate intervention. The system's real-time alerts and AI-powered face recognition enhance the chances of successfully tracing and reuniting missing persons with their family members.

IV. WORKFLOW

Missing Person Report

A Missing Person Report is a document that is completed by relatives, police, or interested individuals when a person goes missing. The report can contain vital details such as the complete name of the missing person, age, physical appearance, last known address, and identifying features or conditions. Photographs and biometric data, such as facial photographs, can be entered into computer systems to facilitate searches. After the report has been made, the government officials come into play by conducting investigations such as searches of the area of interest, surveillance checks, and serving notifications. Some of the sophisticated systems employ AI-powered facial recognition and cloud storage of data to cross-match records of missing persons against rescued persons in real-time. Civilian support is also significant, with civilians and volunteers capable of helping out by reporting a glimpse or giving information. The role of a missing person report is to provide for a rapid and concerted response in searching and reunifying missing persons with their families safely.

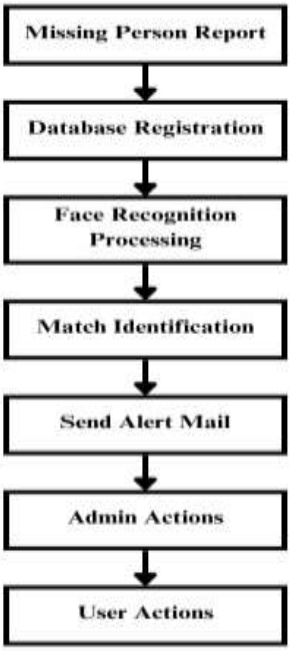

Figure 2: Architecture diagram for Workflow

Database Registration

Database Registration is quite an important process of handling missing persons cases since it organizes all information pertaining to the case and makes it easily searchable. When one vanishes, information such as personal information, photos, last seen location, and any distinguishing features are inputted in a common database. It is utilized as an e-warehouse where law enforcement authorities, NGOs, and concerned individuals can collect and

cross-check information without much hassle. With the advancement of technology, cloud storage services such as Google Firebase offer real-time information, where the information is updated at the same time and made accessible everywhere. In addition, the process is also enhanced by facial recognition technology and AI, where new reports are compared with records in storage, hence enhancing the possibilities of identifying and tracing missing persons. A database in order not only facilitates investigations but also enhances data security, where information is stored safely while easily accessible to officials in authority.

Face Recognition Processing

Face Recognition Processing is the most vital technical element of the missing person identification system which makes use of AI-based facial recognition for the matching of missing persons with the records. When the photo of the missing person is uploaded, the system uses deep learning models like TensorFlow for matching facial characteristics like distinctive patterns, face landmark distances, and other biometric features. The resulting image is then referred to a huge database of images stored and retrievable for identification of likely matches. All this is done automatically and increases accuracy and minimizes man's role in the process, with real-time identification being possible.Cloud-based services such as Google Firebase are easy to maintain, scalable, and remotely accessible. AI can be used with this, and this enhances the efficiency of search, response time, and reunites missing individuals with their families.

Docker Installation

Docker Installation is the installation of Docker, a widely used containerization software used to enable applications to execute within a segregated environment. Installation begins with downloading the Docker installation package from the official Docker website in a version suitable for the operating system (Windows, macOS, or Linux). Installation wizard assumes control after download to guide users through installation, such as terms acceptance and defining system settings needed for installation. Docker is installed on Linux with package managers such as apt for Ubuntu (sudo apt install docker-ce) or yum for CentOS. Docker services execute at installation, and users need to ensure it has installed correctly by using docker version and trying out a container like hello-world. Other configuration as including users into the Docker group, ensuring Docker starts at boot, and including Docker Compose adds capacity. Developers then have an efficient means of creating, deploying, and orchestrating containerized apps in a secure and scalable manner using Docker well-installed.

Match Identification

Match Identification is a crucial process of the missing person identification system, in which the AI facial recognition technology examines and identifies the missing person uploaded image against existing records within the database. Deep learning models are employed by the system to scan facial features and match them with existing profiles. In case of a match, the system alerts authorities, relatives, or report users, which is done automatically with the purpose of increasing accuracy, reducing man work, and hastening the identification process, thereby improving the chance for lost persons to be reunited with their families.

Send Alert Mail

Send Alert Mail is also a vital component of the missing person identification system, sending a prompt notification to authorities and relatives as soon as there is a match. After the system that applies AI-powered facial recognition technology in identifying a missing person by matching faces on the database, it will also generate and send an email alert automatically. This message contains key information that includes the name of the individual, identification details, and last location seen of the matched individual and other details that can be helpful in cross-verifying identities. The registered family members, concerned authorities, police officers, or the first informant of the case receive the alert. This reminder email process fully automates, thereby increasing the productivity of the search process significantly, and thus no lost time in forwarding vital updates. By avoiding

follow-up call time waste, response times are also maximized and reunion success rates maximized. In addition, the alert emails may also be personalized with emergency contact numbers, follow-up action for further validation, as well as resource links to further support locally. The incorporation of this feature within the missing person trace system makes the communication process effective, which is a scalable and good method of addressing such sensitive matters.

Send Alert Mail

Send Alert Mail is also a vital component of the system for missing persons because it sends a prompt alert to concerned individuals if a match has been made. The instant that the missing person is properly identified by the AI facial recognition system through cross-matching with photographs in the database, the system automatically sends an email alert. This is to registered family members, police stations, and other concerned authorities and comprises critical information such as the name of the individual, last seen location, and subsequent course of action required steps. Auto-email alert facility is extremely critical in reducing the response time and allows authorities and families to respond immediately. It eliminates follow-ups manually, where necessary updates are provided to the concerned persons in time. The email can be accompanied by other resources such as emergency contacts, verification links, and the follow-up process with the next step. With this feature in the system, the system is most efficient, enhances coordination among authorities and citizens, and maximizes the potential to reunite missing people with families successfully.

Admin Actions

Admin Activities is the activity and authority provided to administrators in the platform for monitoring missing persons. Admins' function is to operate the platform by conducting database activities, monitoring the activity of the users, and maintaining the system online. They are also responsible for CRUD (Create, Read, Update, Delete) missing persons data, wherein they can create new missing person information, update the existing one, and delete closed or stale cases. Admins are also responsible for screening reports, prevention of double-reporting, and data integrity. Admins are also responsible for authorizing users' access, approving or rejecting submitted cases, and ensuring system security against abuse. When a match is executed by an Identification by Facial Recognition, admins are able to cross-match the matched records before sending the notification alert to the respective authorities and kin. Admins are able to make reports, study missing persons trends, and cooperate with police departments or NGOs to further simplify search operations. Having done such crucial administrative work, they are able to continue pushing the system and being in motion, in safety, meaning the likelihood of finding lost individuals and reuniting them with families is improved.

User Actions

User Actions within the system for missing persons identification are alternative actions that can be performed by registered users within the system. Users can report a missing person by filling in information such as name, age, last known address, contact information, and missing person image. This information is recorded in a central database once it has been input for processing. Missing persons can be searched for by users by uploading a photograph, which the AI face recognition system cross-matches records for possible matches. The system sends a notification to the user when a match is found and further guidance on what to do next is issued. Users can also receive a notification prompt when a match is found within their report to allow them to respond in time. Apart from searching and reporting, the users can view updates of cases in progress, track case status, and contact officials or administrators when the need arises. Users, in some systems, may also volunteer themselves or assist search operations, helping authorities trace missing persons. Overall, user interaction is for the sake of making the site interactive and helpful so that people can help identify and recover missing persons and receive updates on relevant cases.

V. OUTPUT

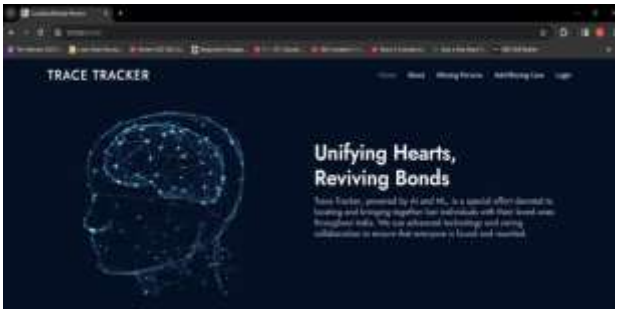

Figure 3. Home Page

In fig 3. The image is of the home page a system based on AI and ML to trace and reunite missing people with their families. The black home page has an image of a futuristic digital brain, symbolizing the application of advanced technology for the solution of actual problems. The slogan, "Unifying Hearts, Reviving Bonds," echoes the system's mission of building relations and restoring lost people back to their homes. The navigation bar consists of Home, About, Missing Persons, Add Missing Case, and Login modules that ensure a systematic flow for the users to submit cases, retrieve information, and trace missing people efficiently. The project is artificial intelligence and collaboration in an attempt to establish an efficient mechanism for missing persons' cases.

Trace Tracker is an artificial intelligence (AI) system to track missing individuals efficiently using Artificial Intelligence (AI) and Machine Learning (ML). Trace Tracker is a reporting platform for missing persons by providing necessary details such as name, date of birth, address, contact number, Aadhar number, and date of disappearance. All these details are sent to a master database and are processed with advanced facial recognition technology to identify possible matches. When a match occurs, the system automatically sends an alert mail to authorities concerned, subscribed members, and families to allow them to initiate timely actions to reunite missing persons with their families.

The interface is user-friendly, easy to navigate, and the tabs such as Home, About, Missing Persons, Add Missing Case, and Login provided make it easily accessible and use-able for the site features. The automated alert system reduces the search process by providing a real-time update with current information, reducing response time and increasing reunification opportunities. Security and privacy are assured, too, with information of all users safeguarded while facilitating information exchange necessary for effective tracking.

Through the combination of the use of AI face recognition and easy database management system, Trace Tracker enhances missing persons search effectiveness significantly. The system is efficient in performing searches, precise in outcomes, and brings hope to worried families in the hearts. Its evolutionary approach ensures Trace Tracker encourages cooperation between the public and the authorities, enhances searches, and finds missing persons sooner.

Figure 4 .Reporting Missing Case Page

The Reporting Missing Case Page Fig 4 The image shows the "Report Missing Case" form on Trace Tracker website filled to collect crucial information of a missing individual. The chronological format provides room for first name and last name, father's name, date of birth, residence address, e-mail, mobile, Aadhar number, and date of disappearance. By recording these details, the website creates a huge database to enable searches using artificial intelligence-based technology, such as face recognition and pattern matching.

This aspect plays a crucial role in accelerating the process of reporting missing persons because it allows the authorities and the relatives to have compiled and correct information. After the case has been reported, the system can cross-match with

the information that is available to check for potential matches, thus ensuring that the missing person can be traced.

Besides, the user-friendly interface provides accessibility for easy cooperation among families, volunteers, and the police in searching for lost individuals. The form is a major part of the platform and forms the initial stage of reuniting lost persons with their respective families.

VI. CONCLUSION

The proposed missing persons identification system uses AI-powered facial recognition software to offer a computerized and cost-effective way of missing persons tracking. Utilizing Tensor Flow for advanced facial matching models, Google Firebase for secure, scalable cloud storage, and a mobile app for convenience in case reporting, the system offers convenience and ease of use to police departments, volunteers, and concerned relatives. This new system significantly enhances the effectiveness and precision of searching for missing persons and reduces the utilization of human manpower, which is normally time-consuming and prone to human error.

The greatest strength of this system is that it can be made suitable for real-time processing and storing of data using the cloud, thereby allowing real-time updating and real-time access geographically. Hence, missing persons' data like their photos, addresses of last location, and case data are readily available and processed in seconds on any approved device. Real-time accessibility speeds up response and enhances the likelihood of successful identification and reunification of missing persons with their families.

The system also promotes people's participation through volunteers' engagement in the search and identification process. Volunteers can assist in advance by sending pictures, viewing, and monitoring reported sightings. Mass action maximizes the efficiency of the search process and leads to quicker identification and longer coverage, especially where police capacity is limited. The site decentralizes effort, mobilizes the people, and has a safe and expansive base that considerably increases the chances of successful return.

Its scalability is the aspect that makes the system extendable with ease in response to growing sets of data and hence suitable for national and regional applications. It can be accessed by the NGOs, law enforcement authorities, and the humanitarian agencies and hence enable them to enhance investigative capacity, sanitize missing persons cases, and eventually reduce trauma on the affected families. The AI-driven and automated matching programs also reduce false positives to an absolute minimum and increase generalizability of the identification process to its maximum capacity.

In a nutshell, the AI-driven missing person identification platform is a solution at the vanguard of the application of artificial intelligence, cloud computing, and public participation towards ending one of the biggest social challenges. By offering an efficient, scalable, and robust platform, the project is likely to enable police stations, NGOs, and government agencies to recover missing persons at a very rapid pace, thus bringing relief and hope to families looking for their missing kin.

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