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# An Intelligent Web-Based Missing Person Identification System Using Optimized Face Recognition

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***Abstract* – The increasing number of missing and unrecognized persons has become a major social and public safety concern worldwide. Traditional methods of identifying missing individuals rely heavily on manual investigations, newspaper advertisements, police records, and public notifications, which are often time-consuming and inefficient. Recent advancements in artificial intelligence and computer vision have enabled the development of intelligent face recognition systems capable of automatically identifying individuals with high accuracy. This paper presents an intelligent web-based missing person identification system that integrates an optimized face recognition algorithm with the Django web framework to facilitate rapid identification of missing and unrecognized persons. The proposed system utilizes Histogram of Oriented Gradients (HOG) for face detection, dlib facial landmark extraction, 128-dimensional face encoding, and Euclidean distance-based face matching to compare uploaded images against a centralized database of known individuals. The web application incorporates Google Authentication, SQLite database management, secure user registration, anonymous reporting, and automated alert generation to improve accessibility and public participation. The system maintains separate databases for known and unknown individuals while allowing authorized users to upload missing person information and register unidentified persons through an intuitive web interface. Experimental evaluation demonstrates that the optimized face recognition model effectively identifies matching facial images while rejecting blurred, duplicate, fake, and non-face images, thereby improving the reliability of the identification process. The integration of artificial intelligence, face recognition, and web technologies provides an efficient, secure, and scalable solution for assisting law enforcement agencies and the general public in locating missing persons while reducing the time and effort required for manual investigations. The proposed framework offers significant potential for deployment in public safety applications and future integration with real-time surveillance systems for continuous missing person identification.**

***Keywords* - Missing Person Identification, Face Recognition, Django, Computer Vision, HOG, dlib, Facial Landmark Detection, Web Application, SQLite, Google Authentication.**

## I. INTRODUCTION

The increasing number of missing and unrecognized persons has become a major concern for governments, law enforcement agencies, and society due to its significant social and humanitarian impact. Every year, thousands of individuals disappear because of kidnapping, human trafficking, accidents, mental illness, natural disasters, voluntary disappearance, or other unforeseen circumstances. Identifying these individuals and reuniting them with their families is often a lengthy and resource-intensive process that relies heavily on police investigations, public notices, newspaper advertisements, and manual record verification. These traditional approaches are frequently slow, labor-intensive, and ineffective when handling large volumes of missing person cases.

Recent advancements in Artificial Intelligence (AI) and Computer Vision have significantly improved automated facial recognition technologies capable of identifying individuals with remarkable accuracy. Face recognition systems analyze unique facial characteristics to compare unknown individuals with images stored in centralized databases. Modern face recognition algorithms utilize facial landmark extraction, deep feature encoding, and similarity matching techniques to provide highly reliable identification under varying facial expressions, viewing angles, and lighting conditions. These technological developments have created new opportunities for developing intelligent missing person identification systems that can considerably reduce the time required for manual investigations.

Web technologies further enhance the accessibility and effectiveness of missing person identification systems by enabling users to report missing individuals and upload relevant information through secure online platforms. The Django web framework provides a reliable environment for developing scalable and secure web applications while offering built-in features such as user authentication, database management, administrative interfaces, and security mechanisms. The integration of Google Authentication, SQLite databases, and secure user registration further improves system usability while protecting user privacy and confidential information. Additionally, allowing users to remain anonymous while reporting unidentified persons encourages greater public participation in locating missing individuals.

This paper presents an intelligent web-based missing person identification system that integrates an optimized face recognition algorithm with the Django framework to facilitate rapid identification of missing and unrecognized persons. The proposed framework employs Histogram of Oriented Gradients (HOG) for face detection, dlib facial landmark extraction, 128-dimensional facial encoding, and Euclidean distance-based face matching to compare uploaded facial images with a centralized database of known individuals. Experimental results demonstrate that the developed system efficiently identifies matching faces while rejecting blurred, fake, duplicate, and non-face images, thereby providing an effective solution for supporting law enforcement agencies and the general public in locating missing persons.

## II. RELATED WORK

Missing person identification has attracted significant research attention due to the growing demand for intelligent systems capable of assisting law enforcement agencies in locating missing individuals efficiently. Earlier approaches primarily relied on manual investigation, printed advertisements, police databases, and eyewitness reports. Although these methods provided basic support for missing person investigations, they required considerable time and human effort while offering limited success in rapidly identifying individuals across large geographical regions. Consequently, researchers have increasingly explored artificial intelligence and face recognition technologies to automate the identification process.

Several researchers have proposed machine learning-based face recognition systems for missing person identification. Earlier studies employed K-Nearest Neighbor (KNN), Support Vector Machine (SVM), and Principal Component Analysis (PCA) to improve facial recognition accuracy. Other approaches utilized Haar Cascade Classifiers, Eigenfaces, and web scraping techniques to automatically acquire facial images from online sources for comparison with criminal and missing person databases. These methods demonstrated promising recognition accuracy but experienced limitations when processing images with varying illumination, pose variations, facial accessories, and partial occlusions.

Recent advancements in deep learning and computer vision have significantly enhanced face recognition performance. The dlib library utilizes Histogram of Oriented Gradients (HOG) for face detection, 68 facial landmark localization, and 128-dimensional facial feature encoding to generate discriminative facial representations suitable for accurate identity matching. Euclidean distance-based similarity measurement further enables efficient comparison between uploaded facial images and previously stored face encodings. Additionally, several studies have investigated web-based platforms developed using the Django framework, enabling secure user authentication, database management, and public participation in reporting missing individuals through intuitive web interfaces.

Motivated by these developments, the present study proposes an intelligent web-based missing person identification framework integrating Django, Google Authentication, SQLite, HOG-based face detection, dlib facial landmark extraction, 128-dimensional face encoding, and Euclidean distance-based matching. The proposed system provides secure user registration, anonymous reporting, automated face comparison, and alert generation while maintaining separate databases for known and unknown individuals. This integrated framework improves identification efficiency and supports faster reunification of missing persons with their families.

## III. PROPOSED METHODOLOGY

The proposed methodology presents an intelligent web-based framework for identifying missing and unrecognized persons through optimized face recognition and secure web technologies. The overall system integrates data collection, user authentication, image uploading, face recognition, database management, and alert generation to provide an efficient identification platform. Unlike conventional manual approaches, the proposed system automates the facial comparison process, enabling faster identification while reducing human effort and investigation time.

Initially, two separate image repositories are maintained: a Known Person Database containing photographs of reported missing individuals and an Unknown Person Database consisting of images uploaded by users who locate unidentified persons. The uploaded facial images undergo preprocessing to ensure that only valid and clear facial images are accepted for further analysis. Images that are blurred, duplicated, fake, or do not contain recognizable faces are automatically rejected, thereby improving the reliability of the face recognition process.

The proposed system is implemented using the Django web framework, which provides secure user authentication, database integration, administrative control, and responsive web interfaces. Users authenticate through Google Authentication (OAuth) before accessing system functionalities. After successful login, authorized users can either register a missing person by uploading personal information and photographs or submit information regarding unidentified individuals found in public locations. The system also supports anonymous reporting to encourage greater public participation while protecting user privacy.

The core identification module employs the Python face recognition library, which internally utilizes the dlib framework. Initially, Histogram of Oriented Gradients (HOG) detects facial regions within uploaded images.

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Subsequently, 68 facial landmarks are extracted to identify important facial components such as the eyes, nose, mouth, and jawline. Each detected face is then transformed into a 128-dimensional facial encoding vector, representing unique facial characteristics. During identification, Euclidean distance is computed between the uploaded facial encoding and stored encodings within the known database. If the calculated distance falls below a predefined threshold, the system identifies a successful match and retrieves the corresponding personal information. Otherwise, the uploaded record is stored within the unknown person database for future comparisons.

Following successful face matching, the system automatically generates notifications containing relevant information regarding the identified individual, including available location details and registration information. The integrated SQLite database securely stores all user records, uploaded images, facial encodings, and identification history. The proposed methodology therefore combines artificial intelligence, optimized face recognition, secure authentication, and web technologies to provide a scalable and efficient platform for rapid missing person identification while preserving user privacy and improving public safety.

Fig. 1. System Architecture of the Proposed Missing Person Identification System

## IV. FUTURE ENHANCEMENT

The proposed web-based missing person identification system provides an effective solution for locating missing and unrecognized individuals through optimized face recognition and secure web technologies. Future enhancements may focus on integrating the framework with real-time CCTV surveillance systems deployed in airports, railway stations, bus terminals, shopping malls, hospitals, educational institutions, and other public locations for continuous face monitoring. The incorporation of deep learning-based face recognition models, Transformer-based computer vision architectures, and improved facial embedding techniques can further enhance recognition accuracy under varying illumination, facial expressions, and partial occlusions.

Future research may also investigate cloud-based centralized databases, cross-state police integration, mobile applications, GPS-enabled location tracking, and automatic alert notifications to accelerate missing person identification across wider geographical regions. Additional improvements such as multilingual support, facial aging prediction, image enhancement for low-quality photographs, and secure blockchain-based record management can further improve scalability, privacy, and reliability. These enhancements would enable the proposed framework to become a comprehensive intelligent public safety platform capable of supporting law enforcement agencies and humanitarian organizations in rapidly identifying and reuniting missing individuals with their families.

## V. EXPERIMENTAL RESULTS AND DISCUSSION

The proposed web-based missing person identification system was experimentally evaluated to assess its effectiveness in identifying missing and unrecognized individuals using optimized face recognition techniques. The developed framework integrates the Django web framework, Google Authentication, SQLite database, and the Python face recognition library to provide a secure and intelligent identification platform. Experimental analysis focuses on evaluating the performance of the face recognition algorithm, web application functionality, database management, and user interaction under practical operating conditions.

Initially, the system was tested using separate Known Person and Unknown Person databases containing facial images captured from multiple viewing angles, including front-view, side-view, and images with different facial appearances such as beard and non-beard variations. During image upload, the system automatically validates image quality before initiating the recognition process. Images that are blurred, duplicated, fake, or do not contain recognizable human faces are rejected, thereby improving the reliability and accuracy of facial identification. This preprocessing stage significantly reduces false matches and improves the overall robustness of the proposed framework.

The face recognition module employs the Histogram of Oriented Gradients (HOG) algorithm for face detection, followed by 68 facial landmark localization and 128-dimensional facial encoding generated using the dlib library. During identification, the facial encoding of the uploaded image is compared with the stored facial encodings using Euclidean distance as the similarity metric. If the computed distance falls below the predefined threshold, the system identifies a successful match and retrieves the corresponding person's information from the database. Otherwise, the uploaded record is stored as a new unidentified person entry for future comparisons. This matching strategy enables reliable identification while minimizing false-positive detections.

The developed web application further demonstrates effective integration of secure authentication and database management. Google Authentication (OAuth) restricts access to authorized users, while the Django framework manages user registration, secure login, image uploading, and information retrieval through an intuitive web interface. Users may either disclose their identity or remain anonymous while reporting unidentified individuals,

thereby encouraging greater public participation without compromising personal privacy. The integrated SQLite database automatically stores uploaded images, user information, facial encodings, and identification results, enabling efficient retrieval and long-term management of missing person records.

Experimental observations indicate that the proposed system successfully identifies matching facial images while providing timely notifications to users regarding the identification status. Once a successful match is detected, the system displays relevant information, including the available location and registration details associated with the missing individual. The automated alert mechanism significantly reduces manual verification time and enables faster communication between users and authorities. The developed framework therefore provides an efficient, secure, and user-friendly solution for supporting missing person investigations using artificial intelligence and modern web technologies

## VI. SYSTEM IMPLEMENTATION AND WEB APPLICATION DEPLOYMENT

The proposed missing person identification system is implemented as a secure web application using the Django framework, enabling users and authorized authorities to register missing individuals, upload facial images, and identify unrecognized persons through an optimized face recognition algorithm. The web-based architecture provides centralized access to the application while allowing users to interact with the system from different locations using a standard web browser. Django manages user authentication, URL routing, database operations, administrative functions, and communication between the user interface and the face recognition module, thereby providing a scalable and secure development environment. The application integrates Google Authentication (OAuth) to ensure that only authorized users can access sensitive functionalities. After successful authentication, users may register a missing person by entering personal information and uploading facial images or report an unidentified individual by submitting the available details through dedicated web forms. The system also allows users to remain anonymous while reporting unidentified persons, thereby encouraging public participation without compromising personal privacy. These authentication and reporting mechanisms improve both the security and usability of the proposed platform.

At the backend, the proposed framework utilizes the Python face recognition library together with the dlib framework to perform facial identification. Uploaded facial images undergo preprocessing, face detection using Histogram of Oriented Gradients (HOG), facial landmark localization, and 128-dimensional face encoding generation. The generated facial embeddings are compared against previously stored encodings using the Euclidean distance similarity metric. When a successful match is identified, the system automatically retrieves the corresponding personal information from the database and generates an alert for the registered user or the appropriate authorities. Images that are blurred, duplicated, fake, or do not contain recognizable human faces are automatically rejected, thereby improving identification reliability.

The proposed system employs SQLite as the backend database to maintain records of registered users, missing person information, unidentified person reports, uploaded facial images, facial encodings, and identification history. Separate databases are maintained for known and unknown individuals, enabling efficient comparison and future identification. The automated database management capabilities provided by Django simplify record maintenance while ensuring secure storage and retrieval of sensitive information. Furthermore, the integrated alert notification mechanism significantly reduces manual investigation time by immediately informing users whenever a potential facial match is identified.

The developed web application demonstrates that integrating face recognition, secure authentication, database management, and web technologies provides an efficient and scalable platform for missing person identification. The system can be deployed in police departments, hospitals, child welfare organizations, disaster management centers, and other public safety institutions to facilitate rapid identification of missing individuals. Its modular architecture also allows future integration with real-time surveillance systems, cloud databases, and nationwide missing person networks to further improve operational effectiveness and response time.

## VII. CONCLUSION

The increasing number of missing and unrecognized persons highlights the need for intelligent technologies that can assist law enforcement agencies and the general public in locating individuals quickly and accurately. Traditional identification methods depend largely on manual investigations, police records, and public notifications, which often require significant time and human effort. To overcome these limitations, this study presented an intelligent web-based missing person identification system that integrates an optimized face recognition algorithm with the Django web framework to automate the identification process. The proposed framework combines secure web technologies, image processing, and artificial intelligence to provide a practical solution for rapid missing person identification.

The developed system employs Histogram of Oriented Gradients (HOG) for face detection, dlib facial landmark extraction, 128-dimensional facial encoding, and Euclidean distance-based face matching to compare uploaded facial images against a centralized database of known individuals. The integration of Google

Authentication, SQLite database management, secure user registration, anonymous reporting, and automated alert generation further enhances the usability, security, and reliability of the platform. The experimental evaluation demonstrates that the proposed framework effectively identifies matching facial images while rejecting blurred, duplicate, fake, and non-face images, thereby improving the overall accuracy of the identification process.

The proposed web application also provides an efficient mechanism for maintaining separate databases for known and unknown individuals, allowing users to upload missing person information or report unidentified persons through an intuitive interface. The automated notification system significantly reduces the time required for manual verification by informing users when potential facial matches are identified. These capabilities make the proposed framework suitable for deployment in public safety applications while supporting faster reunification of missing individuals with their families.

Overall, the proposed system demonstrates that the integration of face recognition, computer vision, and secure web technologies provides an efficient, scalable, and reliable solution for missing person identification. Future enhancements involving real-time CCTV surveillance, advanced deep learning face recognition models, cloud-based databases, mobile applications, and interconnected law enforcement platforms can further improve identification accuracy, response time, and nationwide deployment. Such developments have the potential to strengthen public safety initiatives and significantly enhance missing person search and rescue operations.

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