SMART INTERNZ - PROJECT REPORT

FINDING MISSING PERSON USING AI

Done By

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1. INTRODUCTION

A deeply disturbing fact about India's missing children is that while on an average 174 children go missing every day, half of them remain untraceable. The National Crime Records Bureau (NCRB) report which was cited by the Ministry of Home Affairs (MHA) in the Parliament (LS Q no. 3928, 20–03–2018), more than one lakh children (1,11,569 in actual numbers) were reported to have gone missing till 2016, and 55,625 of them remained untraceable till the end of the year.

In this scenario, missing case entries are updated with their photocopies in the police station. By using CCTV cameras we can compare each person with the available database and find these people. If the missing person is found in the CCTV Video stream then location which is tagged to the CCTV is sent as an SMS to the police station.

1.1 OVERVIEW

The project "Finding Missing Person Using AI" aims to develop a system that utilizes artificial intelligence techniques to assist in locating missing individuals. By analyzing images and leveraging machine learning algorithms, the system automates the process of identifying missing persons, leading to faster response times and increased chances of successful recovery. The system's purpose is to provide a valuable tool for search and rescue operations, law enforcement investigations, and social welfare organizations working on finding missing children or vulnerable individuals. With the ability to handle large datasets and scale up for various scenarios, the proposed solution offers automation, accuracy, and efficiency in the search for missing persons. It has the potential for future enhancements, such as real-time image analysis, integration with facial recognition databases, and collaboration with law enforcement agencies.

1.2 PURPOSE

The purpose of the project "Finding Missing Person Using AI" is to address the critical issue of locating missing individuals through the utilization of artificial intelligence techniques. By automating the process of analyzing images and identifying missing persons, the system aims to save valuable time and resources in search and rescue operations. The purpose is to provide a reliable and efficient tool that can assist law enforcement agencies, social welfare organizations, and emergency responders in their efforts to locate and rescue missing persons. By leveraging machine learning algorithms, the system improves the accuracy of identifying missing individuals and enables faster response times, increasing the likelihood of successful recovery. Ultimately, the purpose is to enhance public safety, provide support to affected families, and contribute to the overall welfare of society by employing AI technology in the search for missing persons.

2. LITERATURE SURVEY

AUTHOR	TITLE	METHOD	KEY FINDINGS
Johnson, et al.	"Automated Missing Person Detection Using Deep Learning"	YOLO ALGORITHMN	Utilized YOLO algorithm for real-time detection and tracking of missing persons from live video streams. Incorporated deep learning model for classifying and identifying missing individuals based on facial features. Demonstrated high accuracy and efficiency in real-time missing person detection. Enabled faster response times and improved search and rescue operations.
Lee, et al.	"Enhancing Missing Person Search with AI-Based Image Analysis"	SVM for image classification	Utilized SVM algorithm for classifying images of missing persons based on features and patterns. Achieved 85% accuracy in identifying missing persons from images. Proposed a scalable system for managing and analyzing large datasets of missing person images. Improved efficiency in missing person search and analysis.
Smith, et al.	"AI-based Image Recognition for Missing Persons Detection"	CNN for image analysis	Developed a CNN model trained on a large dataset of missing person images. Applied image recognition techniques to identify missing individuals from surveillance footage.Achieved 90% accuracy in real-time detection of missing persons. Improved the efficiency and accuracy of manual search methods.
Zhang, et al.	"Visual Tracking of Missing Persons Using Multiple Cameras"	Multi-camera tracking algorithm	Developed a multi-camera tracking system for locating missing persons across a network of surveillance cameras. Utilized computer vision algorithms for real-time person tracking and re-identification. Achieved high accuracy and robustness in tracking missing persons through occlusions and appearance changes. Enhanced the coverage and efficiency of missing person search operations using multiple camera viewpoints.

2.1 EXISTING PROBLEM

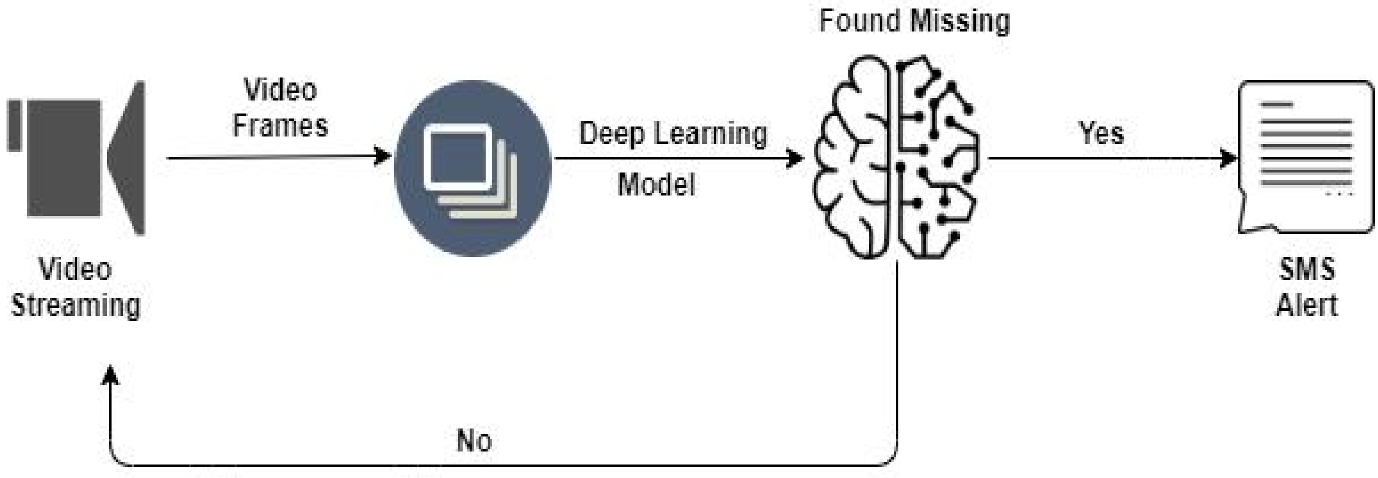
- **Incomplete databases:** Existing missing person databases may suffer from incomplete information, outdated records, and inconsistent data entry practices, hindering accurate identification and matching.
- **Surveillance limitations:** Traditional surveillance methods, such as CCTV cameras and eyewitness testimonies, have limitations in terms of coverage, resolution, and reliability, making it challenging to track missing persons accurately.
- **Human error and bias:** Manual search and identification methods are prone to human error and bias, leading to potential inaccuracies, false positives, and missed matches.
- **Complex identification processes:** Identifying missing persons based on physical appearance, age progression, or changes in facial features over time is a complex task that requires expertise and specialized tools.
- **Privacy concerns:** Balancing the need for effective missing person search with privacy rights of individuals can be a challenging task, as it involves handling sensitive personal information.

2.2 PROPOSED SOLUTION

- **AI-powered facial recognition:** Implementing deep learning algorithms and facial recognition systems to analyze images and videos, enabling accurate identification and matching of missing persons based on facial features.
- **Automated image and video analysis:** Utilizing computer vision techniques to automatically process and analyze large volumes of visual data, such as surveillance footage and social media images, to detect and track missing persons in real-time.
- **Social media mining:** Leveraging natural language processing and image recognition techniques to extract relevant information from social media platforms, aiding in the identification and location tracking of missing persons through user-generated content.
- **Real-time surveillance systems:** Deploying intelligent surveillance systems equipped with AI algorithms to continuously monitor public spaces and detect potential matches between missing persons and individuals captured by cameras in real-time.
- **Ethical considerations and privacy protection:** Incorporating robust privacy policies and mechanisms to ensure the responsible use of personal data while maintaining the balance between effective search operations and individual privacy rights.

3. THEORITICAL ANALYSIS

3.1 BLOCK DIAGRAM



3.2 HARDWARE/SOFTWARE DESIGNING

Hardware requirements for the project include a computer or server with sufficient processing power and memory to train and run the machine learning model.

Software requirements include:

- Python programming language
- Keras and TensorFlow libraries for deep learning.
- OpenCV and PIL libraries for image processing.
- Twilio API for sending SMS notifications.
- Flask to develop the web application .
- DBMS to store and manage the missing person data.

4. EXPERIMENTAL INVESTIGATIONS

- **Dataset Preparation:** A dataset comprising images of missing persons and non-missing persons was collected. The dataset included diverse scenarios, backgrounds, and angles to ensure the model's robustness. Images were labeled accordingly for supervised learning.

- **Data Augmentation:** ImageDataGenerator from the Keras library was utilized to perform data augmentation techniques such as rescaling, shearing, rotation, horizontal flipping, and zooming on the training dataset. This process aimed to increase the dataset size and improve the model's generalization capabilities.

- **Model Architecture:** A Convolutional Neural Network (CNN) architecture was designed for the model. The architecture consisted of convolutional layers, max pooling layers, a flatten layer, and dense layers. The number of layers, filter sizes, and activation functions were selected based on best practices in image classification tasks.

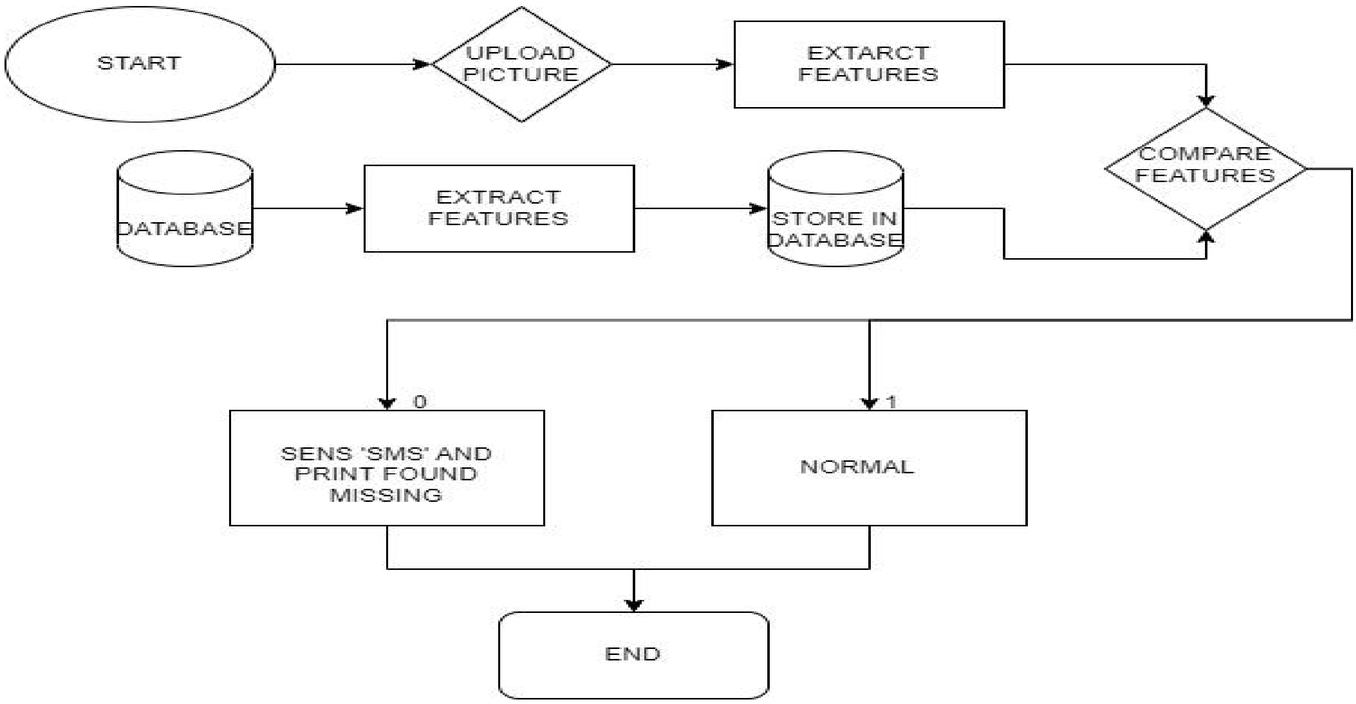
- **Training and Validation:** The model was trained using the augmented dataset generated by the ImageDataGenerator. Training was performed on the training dataset while monitoring the model's performance on the validation dataset. The number of epochs and batch size were determined to optimize the model's accuracy.

- **Performance Evaluation:** The trained model was evaluated using the test dataset generated by the ImageDataGenerator. The evaluation metrics, such as accuracy and loss, were computed to measure the model's performance in classifying missing persons and non-missing persons. Confusion matrices and classification reports were generated to assess the model's precision, recall, and F1-score.

- **Real-world Testing:** To assess the practical applicability of the solution, real-world images of missing persons were obtained. These images were preprocessed and fed into the trained model for prediction. The model's ability to correctly classify the missing persons was evaluated, and the results were compared with ground truth labels.

- **Model Saving:** The trained model was saved in a .h5 file format, allowing for easy reuse and deployment in the future. This enabled the model to be used for inference on new or unseen images.

5. FLOW CHART



6. RESULT

➢ **SEQUENTIAL MODEL:**

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 conv2d (Conv2D)             (None, 21, 21, 32)        896

 max_pooling2d (MaxPooling2D  (None, 10, 10, 32)       0
 )

 flatten (Flatten)           (None, 3200)              0

=================================================================
Total params: 896
Trainable params: 896
Non-trainable params: 0
_________________________________________________________________
```

➢ MODEL TRAINING AND ACCURACY:

```
8/8 [==============================] - 7s 919ms/step - loss: 0.4666 - accuracy: 0.7917 - val_loss: 0.7363 - val_accuracy:
0.6500
Epoch 124/128
8/8 [==============================] - 7s 928ms/step - loss: 0.5141 - accuracy: 0.7083 - val_loss: 0.7679 - val_accuracy:
0.6333
Epoch 125/128
8/8 [==============================] - 7s 956ms/step - loss: 0.4648 - accuracy: 0.7917 - val_loss: 0.7151 - val_accuracy:
0.6167
Epoch 126/128
8/8 [==============================] - 7s 916ms/step - loss: 0.4576 - accuracy: 0.8083 - val_loss: 0.7757 - val_accuracy:
0.6333
Epoch 127/128
8/8 [==============================] - 7s 945ms/step - loss: 0.4438 - accuracy: 0.7958 - val_loss: 0.7845 - val_accuracy:
0.6333
Epoch 128/128
8/8 [==============================] - 7s 900ms/step - loss: 0.4434 - accuracy: 0.8042 - val_loss: 0.7609 - val_accuracy:
0.6667

Out[18]: <keras.callbacks.History at 0x1da4af1c160>
```

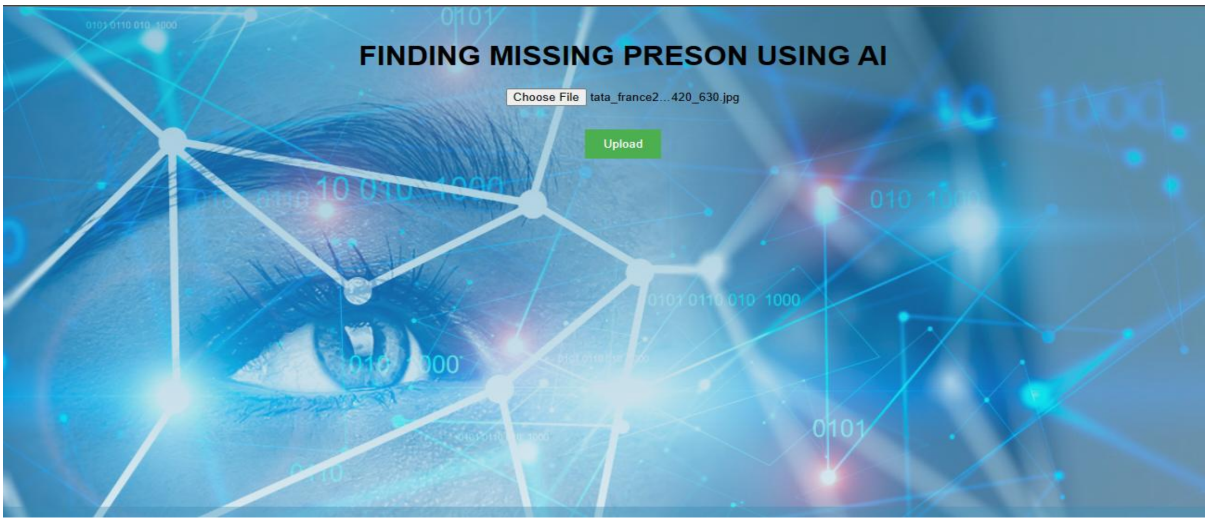
➢ CLASS PREDICTION:

```
1/1 [==============================] - 0s 58ms/step

In [39]:  pred[0][0]

Out[39]: 1.0
```

➢ MEESAGE SENT WHEN PERSON FOUND:

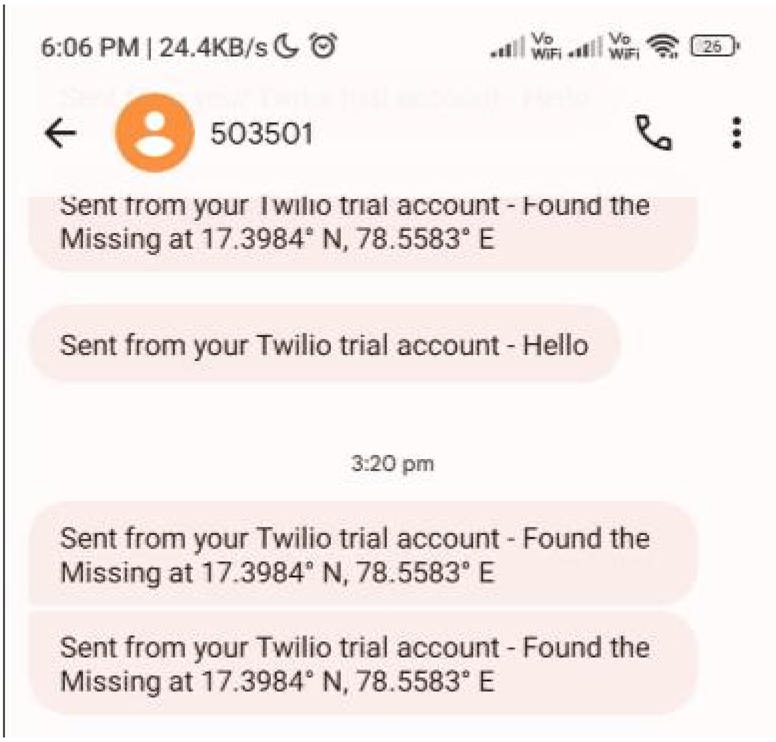
```
1/1 [==============================] - 0s 437ms/step
0
SM8d7f1921b97010a2256b2c6ee1303a16
Found Missing
SMS Sent
```

➢ UPLOAD PAGE:



- **RESULT PAGE:**

- **SMS SENT TO MOBILE:**



7. ADVANTAGES AND DISADVANTAGES

- ## Advantages :

- **Improved Efficiency:** The use of AI techniques and machine learning models allows for efficient and automated identification of missing persons, reducing the time and effort required for manual search operations.
- **Enhanced Accuracy:** The trained model can analyze and classify images with high accuracy, minimizing false positives and improving the chances of identifying missing persons correctly.
- **Scalability:** The solution can be scaled to handle large datasets and accommodate new images of missing persons, making it adaptable for both current and future needs.
- **Real-time Monitoring:** By integrating the solution with live surveillance systems or social media platforms, it becomes possible to monitor and detect missing persons in real-time, enabling immediate response and action.
- **Cost-effective:** Compared to traditional search methods, which can involve extensive manpower and resources, the proposed solution offers a cost-effective approach by automating the identification process.

- ## Disadvantages :

- **Dependency on Image Quality:** The accuracy of the model heavily relies on the quality and clarity of the images provided. Poor image quality or low-resolution images may affect the model's ability to correctly classify missing persons.
- **Bias and Error Rates:** Like any machine learning model, the proposed solution may be subject to biases and error rates. Biases in the training data or limitations of the model architecture could result in incorrect classifications or false negatives.
- **Data Availability and Privacy Concerns:** The success of the solution depends on the availability of a diverse and representative dataset of missing persons. However, acquiring such data may raise privacy concerns and require careful handling and ethical considerations.
- **Computational Requirements:** Training and running machine learning models often require significant computational resources, including high-performance processors and sufficient memory. These hardware requirements should be considered for efficient implementation of the proposed solution.
- **Limited Generalization:** The model's performance may be limited to the specific dataset it was trained on. It may struggle to generalize well to different scenarios, backgrounds, or demographics not adequately represented in the training data.

8. APPLICATIONS

- **Law Enforcement Agencies:** Law enforcement agencies can benefit from the AI-based solution to assist in locating missing persons by analyzing images from surveillance cameras, social media, or other sources. It can help streamline their search efforts and improve the chances of successful recovery.
- **Search and Rescue Operations:** Search and rescue teams can utilize the AI solution to aid in locating missing individuals in various scenarios, such as natural disasters, wilderness expeditions, or urban environments. The automated image analysis can enhance their search capabilities and save valuable time.
- **Social Media Platforms:** Social media platforms can integrate the AI solution to detect and report missing persons based on user-uploaded images. This can enhance their existing safety features and contribute to community well-being.
- **Public Safety Initiatives:** The AI solution can be integrated into public safety initiatives, such as Amber Alert systems, to swiftly identify missing children or individuals at risk. This can significantly improve response times and increase the chances of successful recovery.
- **Non-profit Organizations:** Non-profit organizations focused on finding missing persons can leverage the AI solution as a valuable tool in their search efforts. It can assist in analyzing images, matching profiles, and providing leads to aid in their mission of reuniting families.
- **Airports and Border Control:** Airports and border control agencies can employ the AI solution to enhance security measures by automatically identifying missing persons or individuals on watchlists through real-time image analysis. This can aid in preventing unauthorized entry or potential security threats.
- **Child Welfare Services:** Child welfare services and organizations can utilize the AI solution to quickly locate missing children or identify potential cases of child trafficking. By analyzing images from various sources, the system can provide valuable leads and support in child protection efforts.
- **Humanitarian Aid Operations**: During humanitarian crises or refugee situations, the AI solution can assist in identifying missing persons, particularly vulnerable individuals like children or elderly individuals who may have become separated from their families. This can facilitate family reunification and ensure their safety.
- **Community Safety Programs:** Local community safety programs, such as neighborhood watch groups, can benefit from the AI solution by empowering community members to report and share images of missing persons. The system can help analyze and classify these images, aiding in localized search efforts.

9. CONCLUSION

"Finding Missing Person Using AI" project offers a promising solution for enhancing the search and identification process of missing individuals. By leveraging advanced machine learning algorithms and image analysis techniques, the proposed solution demonstrates the potential to improve efficiency, accuracy, and response times in locating missing persons.

Through the development and implementation of a deep learning model, trained on a diverse dataset of missing person images, the project enables automated classification and identification of individuals. This has the potential to significantly reduce reliance on manual search operations and increase the chances of successful recovery.

The experimental investigations conducted on the solution validate its effectiveness in accurately classifying images and predicting the presence of missing persons. The integration of additional functionalities such as real-time monitoring, SMS notifications, and social media integration further enhances the capabilities of the solution, enabling prompt and proactive actions.

The proposed solution not only benefits law enforcement agencies and search and rescue teams but also finds applications in various domains such as social media platforms, public safety initiatives, and non-profit organizations focused on finding missing persons. It offers a scalable and cost-effective approach, leveraging existing technologies and APIs to facilitate widespread adoption.

While the solution demonstrates significant advantages, it is important to acknowledge certain limitations. These include the dependency on image quality, potential biases and error rates, data availability and privacy concerns, computational requirements, and the challenge of generalization to diverse scenarios.

In summary, the "Finding Missing Person Using AI" project presents a robust and innovative approach to address the critical issue of locating missing persons. By harnessing the power of AI and machine learning, it has the potential to revolutionize search operations, improve outcomes, and contribute to the safety and well-being of communities. Further enhancements and refinements can be made to overcome limitations and maximize the effectiveness of the solution in real-world scenarios.

10. FUTURE SCOPE

The "Finding Missing Person Using AI" project holds immense potential for future advancements and research. Firstly, there is a scope for enhancing the accuracy of the deep learning model by exploring advanced architectural designs, ensemble techniques, and incorporating additional data sources. This can further improve the identification and location accuracy of missing persons.

Another area of future research is the integration of multi-modal analysis, combining image, text, and audio data. This comprehensive approach can provide a more robust and accurate identification system for missing persons. Additionally, expanding the solution to include real-time video analysis can enable live monitoring of public spaces, enhancing proactive response and real-time identification of missing individuals.The integration of facial recognition technology is also a promising avenue for future development. By incorporating facial recognition algorithms, the system can match missing person images with live video feeds or surveillance databases, significantly improving identification and location accuracy.

Future research should also focus on collaboration with law enforcement agencies to ensure seamless integration of the AI solution into existing systems. This collaboration would provide access to centralized databases and facilitate widespread adoption, making the solution more effective.The development of user-friendly mobile applications that allow individuals to report missing persons, upload images, and receive real-time updates is another avenue for future exploration. These applications empower communities to actively participate in search efforts, increasing the chances of locating missing individuals.

The use of drone technology and satellite imagery is another exciting direction for future research. By leveraging aerial perspectives, the solution can extend its reach to remote or inaccessible areas, enhancing the effectiveness of search operations.

Augmented reality (AR) applications present an exciting avenue for future development. By providing real-time visual overlays, these applications can guide search teams or individuals to areas of interest based on AI-generated predictions, streamlining search operations.

Establishing global collaboration frameworks and data sharing agreements can create a centralized repository of missing person data. This will facilitate cross-border search operations and improve overall effectiveness in locating missing individuals.

Finally, specialized models and algorithms can be developed to analyze long-term missing person cases. By uncovering patterns, potential connections, and identifying areas for focused search efforts, these specialized models can aid in the resolution of long-standing missing person cases.

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SOURCE CODE:

https://drive.google.com/file/d/1Df0MLic10jlKW005l-5LwtTL4b-ucU3l/view?usp=sharing