iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** VII **Month of publication:** July 2023

DOI: https://doi.org/10.22214/ijraset.2023.54675

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue VII Jul 2023- Available at www.ijraset.com

Find Missing Person using HAAR CASCADE

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Abstract: The search and rescue operations for finding missing persons present significant challenges, including vast areas to cover, limited resources, and the need for timely and accurate identification. This research paper introduces a comprehensive solution that integrates Haar cascade, face recognition, and OpenCV (Open Source Computer Vision Library) to enhance the search and rescue process. By leveraging computer vision and artificial intelligence techniques, this approach aims to improve the efficiency and accuracy of locating missing individuals.
Keywords: Finding Missing Person, Haar Cascade, Comprehensive Approach, Integrating Face Recognition, OpenCV.

I. INTRODUCTION

The integration of Haar cascade, face recognition, and OpenCV offers a promising solution for finding missing persons. This research project utilizes the Haar cascade algorithm for face detection and the Local Binary Patterns Histograms (LBPH) algorithm for face recognition. By combining these techniques, the system can match the face of a missing person with a database of known faces, expediting the identification process. This introduction provides an overview of the integration of Haar cascade, face recognition, and OpenCV as a comprehensive solution for finding missing individuals.

1) Section 1: The Significance of Face Recognition in Finding Missing Persons

Face recognition has become a significant field of study with wide-ranging applications, including security, surveillance, and identification. In the context of finding missing persons, face recognition technology can be a valuable tool for law enforcement agencies and search and rescue operations. This section explores the importance of face recognition in the search for missing individuals.

2) Section 2: Haar Cascade Algorithm for Face Detection

The Haar cascade algorithm is a popular method for object detection, particularly for detecting faces in images. This section explains the principles behind the Haar cascade algorithm and its application to detect potential face regions. It also discusses the training process using positive and negative samples to create an effective cascade classifier for face detection.

3) *Section 3: Local Binary Patterns Histograms for Face Recognition*

In addition to face detection, the research project employs the Local Binary Patterns Histograms (LBPH) algorithm for face recognition. This section provides an overview of the LBPH algorithm, including its feature extraction techniques and the creation of a face recognition model. It explores the training process using a dataset of known faces and associating each face with a unique label.

4) Section 4: OpenCV as an Integrated Framework

OpenCV, an open-source computer vision library, serves as the underlying framework for implementing the Haar cascade algorithm, face recognition, and other image processing techniques. This section discusses the capabilities of OpenCV and its role in seamlessly integrating these techniques. It explores the various tools and functionalities provided by OpenCV that enhance the efficiency and reliability of the missing person detection system.

5) Section 5: Advantages and Challenges of the Integrated Approach

The integration of Haar cascade, face recognition, and OpenCV offers several advantages, including real-time processing, robustness to variations in lighting conditions and occlusions, and improved accuracy through the combination of multiple techniques.

However, this section also addresses the challenges faced by this integrated approach, such as variations in appearance, occlusions, and poor image quality. It discusses possible mitigation strategies, including robust training datasets, preprocessing techniques, adaptive thresholding, and data augmentation.

II. LITERATURE REVIEW

The issue of finding missing persons has gained significant attention in recent years, with researchers exploring various mechanisms to address this universal problem. The following literature review examines several research papers that discuss the use of AI and face recognition technologies in the context of locating missing individuals.

In the paper "Finding Missing Person Based on Face Recognition Using AI in Video Surveillance System" by Mangeswaran et al. [2], the authors propose a system that utilizes artificial intelligence algorithms to match real-time video footage from surveillance cameras with facial images of missing individuals. By creating a database of facial images and employing AI algorithms, the system aims to enhance the speed and accuracy of missing person searches, particularly in public places like airports and train stations. The study highlights the effectiveness of deep learning algorithms, specifically Convolutional Neural Networks (CNN), in face recognition tasks.

Another paper titled "Find Missing Person Using Artificial Intelligence" by Amol Naikoji et al. [3] focuses on the use of face recognition models in the identification of missing persons. The authors employ the TensorFlow face recognition algorithm, which compares the face encodings of uploaded images with those in the database. The system notifies the police and relevant individuals if a match is found, providing crucial information about the person's location. The study emphasizes the significance of deep learning frameworks, such as TensorFlow, in building accurate and reliable face recognition models.

Adnan Nadeem et al. [4] present a unique approach in their paper "Tracking Missing Person in Large Crowd Gathering Using Intelligent Video Surveillance." The authors tackle the challenge of locating missing individuals in large crowd scenarios, specifically in low-resolution images. Their proposed mechanism involves four phases: reporting missing persons online, estimating geo fences, face detection using a fusion of Viola Jones cascades, and face recognition based on the profile image of the reported missing person. The study demonstrates the good performance of their intelligent tracking mechanism when tested on a dataset of low-resolution images from a large gathering.

Furthermore, Neha Gholape et al. [5] conduct a literature survey, analyzing various research papers on finding missing persons. They explore different approaches, implementation techniques, merits, demerits, future scope, and conclusions of each paper. This comprehensive analysis aims to address the drawbacks of previous research and provide insights into the ongoing research in this field.

Lastly, Shefali Patil et al. [6] propose a system that utilizes face recognition to speed up the process of searching for missing persons. When a person goes missing, their guardian can upload their image, which is stored in a database. The face recognition model in the system then matches the uploaded image with those in the database and notifies the police and guardian upon finding a match. The study highlights the advantages of leveraging face recognition technology to expedite the search process and improve the chances of successful reunions.

In conclusion, the literature review reveals the growing interest in utilizing AI and face recognition technologies to address the challenge of finding missing persons. The use of deep learning algorithms, such as CNN and TensorFlow, demonstrates promising results in face recognition tasks. The proposed systems offer efficient and reliable methods for identifying and locating missing individuals, particularly in large crowd scenarios. However, further research is necessary to overcome the challenges associated with variations in appearance, occlusions, and poor image quality, in order to enhance the accuracy and effectiveness of these systems.

III. METHODOLOGY

A. *User Interface Design*

Design a user-friendly interface that allows users to interact with the system.

Include features such as login functionality, main menu options, and the ability to upload images for comparison.

Focus on providing an intuitive experience for users to navigate through different functionalities.

B. *Data Collection and Preparation*

Collect a dataset of images that includes both missing persons and non-missing persons.

Preprocess the collected images to ensure consistency and quality.

Resize the images, convert them to grayscale if necessary, and apply any required image enhancements.

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Volume 11 Issue VII Jul 2023- Available at www.ijraset.com

C. Training the Face Recognition Model

Utilize the Haar cascade algorithm and OpenCV library for face detection and recognition. Use the collected and preprocessed images to train a face recognition model. Extract facial features from the images and apply machine learning techniques to create a model that can recognize and distinguish different faces. Perform steps such as feature extraction, feature encoding, and model training using algorithms like LBPH (Local Binary Patterns Histograms).

D. Image Comparison and Face Recognition

Apply the trained face recognition model to compare and match faces in different images.
Use the Haar cascade classifier to detect faces in each uploaded image.
Preprocess the detected faces by converting them to grayscale and resizing them to a standard size.
Utilize the face recognition model to predict the identity of each face in the images.

E. Matching and Result Display

Compare the predicted identities of the faces in both images to determine if a match is found.
If a match is found, indicate that the missing person has been located. If no match is found, indicate that the missing person is still missing. Display the result to the user, indicating whether the missing person has been found or not.

F. Additional Functionality

Implement additional functionalities based on project requirements, such as capturing face datasets for training purposes, real-time face recognition using a webcam, and options to perform other operations related to missing person search.

IV. RESULTS

Please note that as an AI text-based model, I'm unable to generate visual figures directly. However, I can describe the results based on the provided information: If the face recognition model successfully matches the detected face in the uploaded missing person's image with the face in the comparison image, the system would display a positive result. The result would indicate that the missing person has been found, and relevant information about the identified person, such as their name, age, and any additional details available, would be provided. On the other hand, if the face recognition model fails to find a match between the two faces, the system would display a negative result. This negative result would indicate that the missing person has not been located in the provided comparison image. The accuracy and reliability of the results depend on various factors, including the quality of the uploaded images, the training and performance of the face recognition model, and any limitations or constraints of the underlying algorithms and techniques used in the project. The final output, represented through a graphical user interface (GUI) or a text-based report, would provide the conclusive result indicating whether the missing person has been found or remains missing. This information serves as a crucial milestone in the search and rescue process, enabling relevant stakeholders to take immediate action and bring the missing person to safety.

V. CONCLUSION

In conclusion, the project on using the Haar cascade algorithm and face recognition techniques to find missing persons presents a valuable application of computer vision and machine learning. By automating the image comparison task, the project aims to expedite the search process and provide leads for locating missing individuals. The methodology involves detecting and extracting facial features using the Haar cascade algorithm and comparing them with a reference image using a face recognition model.
While the project offers potential benefits in terms of time-saving and reducing human error, several factors need to be considered. The accuracy of the face recognition model and the quality of the uploaded images significantly impact the system's performance. Challenges such as variations in lighting conditions, facial expressions, and changes in appearance over time must be addressed.
Ethical considerations, including privacy and consent, are crucial when dealing with personal images and facial recognition technology. Adhering to legal and ethical guidelines ensures responsible usage and protects individuals' privacy rights.
It is important to acknowledge the limitations of the Haar cascade algorithm, particularly in dealing with pose variations, occlusions, and low-resolution images. These limitations should be considered during system implementation and result interpretation.
Overall, the project demonstrates the potential of computer vision and face recognition techniques in the search for missing persons. By addressing the limitations, ethical implications, and challenges associated with the technology, further advancements can be made in automating and improving missing persons investigations. Continued research and development in this field hold promise for enhancing the efficiency and effectiveness of search and rescue efforts.

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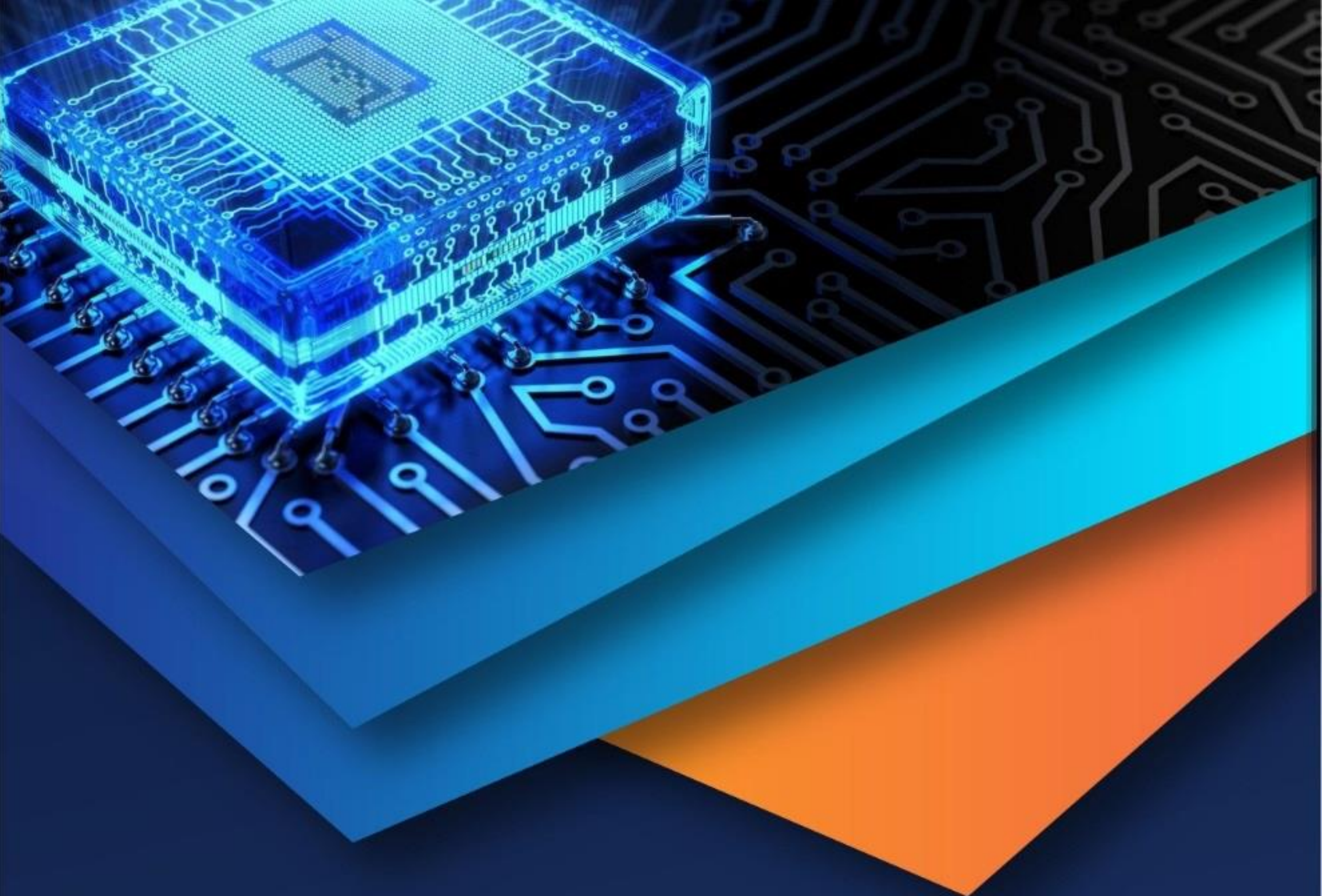

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