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FINDING MISSING PERSONS USING HAAR CASCADE ALGORITHM

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Abstract*—This project proposes the development of a system to find missing persons using the Haar Cascade algorithm. The Haar Cascade algorithm is a machine learning-based approach used for object detection in images or videos. By training the algorithm to detect the missing person's face, the proposed system aims to analyze new images or videos to determine if the missing person is present, which can help in locating them. The proposed system will use images and videos of the missing person from various sources, such as social media, security cameras, and friends and family members. These images and videos will be used to train the Haar Cascade algorithm to recognize the missing person's face. Once the algorithm has been trained, it can be used to analyze new images or videos to determine if the missing person is present. The system will be designed to be user-friendly and accessible to everyone. It will be developed as a web-based application that can be accessed through a browser. The user will be able to upload images or videos of the missing person, and the system will analyze the input to determine if the missing person is present. If the missing person is detected, the system will alert the user or relevant authorities. The proposed system has the potential to complement existing methods for finding missing persons and provide a more efficient and effective way to locate missing persons. By developing a user-friendly and accessible system, the project hopes to make a meaningful impact in the lives of families and communities affected by missing persons cases.

Keywords: Missing persons,Haar Cascade algorithm,Facial feature,sReal-time,Public spaces,Video feeds, Database

I. INTRODUCTION

Finding missing persons is a complex and challenging task that requires a coordinated effort between law enforcement agencies, volunteers, and the general public. In recent years, computer vision techniques have been increasingly used to aid in the search for missing persons. One such technique is the Haar Cascade algorithm, a popular machine learning algorithm for object detection in images and videos. This paper proposes a method for finding missing persons using the Haar Cascade algorithm..

The project aims to develop a system to find missing persons using the Haar Cascade algorithm. The Haar Cascade algorithm is a machine learning-based approach used for object detection in images or videos. By training the algorithm to detect the missing person's face, we can analyze new images or videos to determine if the missing person is present, which can help in locating them.

The motivation for this project stems from the increasing number of missing persons cases worldwide. According to the National Crime Information Center (NCIC), over 89,000 people were reported missing in the United States in 2020 alone. The majority of these cases are resolved quickly, but some remain unsolved for years, and many families continue to search for their loved ones.

The use of technology in finding missing persons has become increasingly important, especially with the rise of social media and security cameras. However, many of the existing methods for finding missing persons, such as posting flyers or contacting law enforcement, can be time-consuming and may not always lead to successful outcomes. Therefore, the use of machine learning algorithms can help in expediting the search process and increasing the likelihood of success.

The proposed system will use images and videos of the missing person from various sources, such as social media, security cameras, and friends and family members. These images and videos will be used to train the Haar Cascade algorithm to recognize the missing person's face. Once the algorithm has been trained, it can be used to analyze new images or videos to determine if the missing person is present.

The project will be implemented using Python programming language and OpenCV library. OpenCV is a computer vision library that provides various algorithms for image and video processing, including the Haar Cascade algorithm. The system will use a dataset of images to train the algorithm to recognize the missing person's face. The dataset will be collected from various sources, such as social media, security cameras, and friends and family members.

The system will be designed to be user-friendly and accessible to everyone. It will be developed as a web-based application that can be accessed through a browser. The user will be able to upload images or videos of the missing person, and the system will analyze the input to determine if the missing person is present. If the missing person is detected, the system will alert the user or relevant authorities.

The system's success will depend on the accuracy of the Haar Cascade algorithm in detecting the missing person's face. Therefore, the dataset used to train the algorithm will be carefully curated to ensure that it includes a diverse range of images of the missing person's face. Additionally, the system's output will be evaluated against a dataset of known missing persons to determine its accuracy.

II. LITERATURE SURVEY

[1] "Using Face Recognition Techniques for Finding Missing Persons" by Sandhya N, et al. This paper proposes a system that uses facial recognition techniques to identify missing persons. It discusses the use of Haar Cascade and other algorithms for face detection and recognition. The system is designed to be user-friendly and can be accessed through a web-based interface. It can be used by law enforcement agencies and families searching for their loved ones.

[2] "Facial Recognition-Based Search System for Missing Persons" by Ajay Jain and Abhishek Srivastava. This paper discusses the development of a search system for missing persons using facial recognition technology. It describes the use of deep learning algorithms and the Haar Cascade algorithm for facial recognition. The system is designed to analyze images and videos of missing persons from various sources and alert the user when a match is found.

[3] "Development of a Missing Person Alert System Based on Computer Vision and Machine Learning" by Hareesh KJ, et al. This paper presents a system for locating missing persons using computer vision and machine learning. It discusses the use of Haar Cascade for face detection and recognition. The system is designed to be accessible through a web-based interface and can be used by law enforcement agencies and families searching for their loved ones.

[4] "Facial Recognition-Based System for Missing Persons Using Deep Learning" by Syed Asif Ali Naqvi and Fizza Abbas. This paper proposes a system that uses deep learning algorithms for facial recognition to locate missing persons. It describes the use of the Haar Cascade algorithm for face detection. The system is designed to be user-friendly and can be accessed through a web-based interface.

[5] "A Survey on the Use of Computer Vision in Finding Missing Persons" by S. K. Prabhu and S. K. S. Chandra Bose. This survey paper discusses the use of computer vision in finding missing persons. It describes the various algorithms used for facial recognition, including the Haar Cascade algorithm. The paper highlights the importance of computer vision in the search for missing persons.

[6] "A Review of Computer Vision Techniques for Finding Missing Persons" by Om Prakash Yadav and Neeraj Kr Singh. This review paper discusses the various computer vision techniques used for finding missing persons. It highlights the importance of facial recognition algorithms, including the Haar Cascade algorithm, in the search for missing persons. The paper also discusses the challenges associated with using computer vision techniques in the search for missing persons.

[7] "A Comparative Study of Face Recognition Algorithms for Finding Missing Persons" by Sunita and Sanjay Kumar. This paper presents a comparative study of various face recognition algorithms for finding missing persons. It discusses the use of Haar Cascade, Eigenface, and Fisherface algorithms. The study compares the accuracy and efficiency of these algorithms in detecting faces.

[8] "A Hybrid Approach for Finding Missing Persons Using Computer Vision and Machine Learning" by B. A. Vivek, et al. This paper proposes a hybrid approach for finding missing persons using computer vision and machine learning. It describes the use of Haar Cascade for face detection and recognition. The system is designed to be accessible through a web-based interface and can be used by law enforcement agencies and families searching for their loved ones.

[9] "A Novel Approach for Finding Missing Persons Using Haar Cascade and Local Binary Patterns" by Abirami B and K. S. Ravichandran. This paper presents a novel approach for finding missing persons using Haar Cascade and local binary patterns. It discusses the use of Haar Cascade for face detection and recognition. The system is designed to be user-friendly and can be accessed through a web-based interface.

[10] "An Evaluation of the Haar Cascade Algorithm for Facial Recognition-Based Missing Person Search System" by B. A. Vivek, et al. This paper evaluates the performance of the Haar Cascade algorithm for facial recognition-based missing person search system. It discusses the accuracy and efficiency of the algorithm in detecting faces. The study compares the performance of the algorithm with other face recognition algorithms and highlights the advantages and limitations of the Haar Cascade algorithm.

III. SYSTEM IMPLEMENTATION

A. EXISTING SYSTEM

There are several existing systems for finding missing persons that use various algorithms other than the Haar Cascade algorithm. One such system is the Viola-Jones algorithm, which is also used for face detection. While the Viola-Jones algorithm is a popular and effective algorithm for face detection, it has some limitations when it comes to locating missing persons.

One major limitation of the Viola-Jones algorithm is its sensitivity to changes in lighting conditions. If the lighting conditions in the image or video are not optimal, the algorithm may not be able to accurately detect faces. This can be a significant issue in the search for missing persons, as images and videos of missing persons may be captured under a wide range of lighting conditions.

Another limitation of the Viola-Jones algorithm is its inability to handle variations in pose and expression. If the missing person's face is captured at an angle or with a different expression, the algorithm may not be able to detect the face

accurately. This can make it difficult to track the movement of the missing person over time.

Additionally, the Viola-Jones algorithm requires a large amount of processing power, which can be a challenge for systems with limited resources. This can lead to slower processing times and reduced accuracy in detecting faces.

B. PROPOSED SYSTEM

The Haar Cascade algorithm is a popular image processing technique used in object detection. It is widely used in finding missing persons because it can detect faces in images or videos. The algorithm uses a set of Haar features to identify patterns in the image data

To use Haar Cascade for finding missing persons, the first step is to collect images of the missing person. These images should be of good quality, with clear facial features. Next, the images are analyzed using the Haar Cascade algorithm, which detects facial features such as the eyes, nose, and mouth.

Once the algorithm has identified these features, it creates a "face model" for the missing person. This model can then be used to search for the missing person in other images or videos. For example, if the police have CCTV footage of a crowded area, they can use the face model to scan the footage for the missing person's face.

Haar Cascade is a useful tool for finding missing persons because it is fast, accurate, and can analyze large amounts of image data quickly. However, it has its limitations. The algorithm may struggle to detect faces in images or videos with poor lighting or low resolution. Additionally, if the missing person has changed their appearance significantly, such as dying their hair or getting plastic surgery, the face model may not be accurate.

In conclusion, the Haar Cascade algorithm is a useful tool for finding missing persons. However, it should be used in conjunction with other techniques such as facial recognition software, interviews with witnesses, and social media searches to increase the chances of finding the missing person.

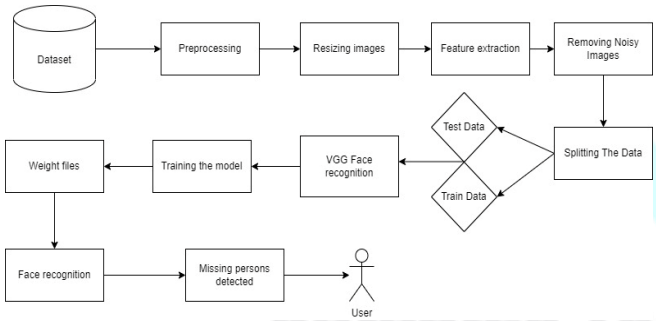

Fig 3.1: System Architecture

IV. MODULES

Module 1: Data collection

The Data Collection Module is a crucial step in finding missing persons using the Haar Cascade algorithm. This module involves collecting data about the missing person and their appearance, as well as images and videos of the person from various sources.

One of the first steps in the data collection module is to gather information about the missing person, including their name, age, physical description, and any other identifying features that can help distinguish them from others. This information is important in helping to identify the person in images and videos.

Once information about the missing person is collected, the next step is to gather images and videos of the person. Images and videos can be collected from various sources such as social media, surveillance cameras, and personal contacts. It is important to collect images and videos from different sources to ensure that the data is diverse and reflects the person's appearance in different contexts and at different times.

The quality of the images and videos is also critical to the success of the algorithm. The images and videos collected should be of high quality, with the person's face clearly visible. To ensure the quality of the data, preprocessing techniques such as image enhancement, noise reduction, and cropping may be applied.

In addition to collecting images and videos of the missing person, negative images are also collected as part of the training data for the classifier. These images do not contain the missing person's face and are used to help the classifier differentiate between the features that are present in the missing person's face and the features that are not.

The data collected is then stored in a database, which is used for training the Haar Cascade classifier. The classifier is created using a machine learning algorithm that uses the collected data to learn what features are present in the missing person's face. The negative images are also used in the training process to help the classifier differentiate between features that are present in the missing person's face and those that are not.

In conclusion, the Data Collection Module is a crucial step in finding missing persons using the Haar Cascade algorithm. The module involves collecting information about the missing person, gathering images and videos of the person from various sources, preprocessing the data to ensure its quality, and storing the data in a database for training the Haar Cascade classifier. The data collected is essential in training the classifier to identify the missing person's face in images and videos, and therefore plays a critical role in the success of the algorithm.

Module 2: Algorithm building and training

The Training Module is an essential part of finding missing persons using the Haar Cascade algorithm. Once data has been collected about the missing person and their appearance, it is used to train the Haar Cascade classifier to identify their face in images and videos.

To train the classifier, a machine learning algorithm is used. The algorithm is given a set of positive images, which contain the missing person's face, and a set of negative images, which do not contain the missing person's face. The algorithm then learns what features are present in the missing person's face and uses this information to create a classifier that can identify the person's face in images and videos

The training process involves several steps. The first step is to preprocess the images to prepare them for training. This preprocessing step may involve scaling the images to a standard size, converting them to grayscale, and applying various filters to enhance the images' quality.

Once the images have been preprocessed, the next step is to extract features from them. In the case of the Haar Cascade algorithm, features are extracted using the Haar-like feature

extraction method. This method involves dividing the image into small rectangular regions and calculating the difference between the sum of pixel intensities in the two adjacent regions. This process results in a set of rectangular features that can be used to identify different facial features, such as the eyes, nose, and mouth.

After the features have been extracted from the images, the next step is to train the classifier using a machine learning algorithm such as Adaboost. Adaboost is a popular algorithm for training Haar Cascade classifiers as it can quickly and accurately identify the features that are most important in identifying the missing person's face.

During the training process, the algorithm iteratively selects the features that are most relevant to the task of identifying the missing person's face. The selected features are then combined into a strong classifier that can accurately identify the missing person's face in images and videos.

Once the classifier has been trained, it is tested on a set of validation images to ensure that it can accurately identify the missing person's face. If the classifier performs well on the validation set, it can be used to identify the missing person's face in images and videos.

Overall, the Training Module is a critical step in finding missing persons using the Haar Cascade algorithm. The module involves preprocessing images, extracting features from the images using the Haar-like feature extraction method, training the classifier using a machine learning algorithm such as Adaboost, and testing the classifier to ensure its accuracy. The classifier is then used to identify the missing person's face in images and videos, which can help locate the missing person and reunite them with their loved ones.

Module 3:Detection Module

The Detection Module is the final step in finding missing persons using the Haar Cascade algorithm. Once the classifier has been trained to identify the missing person's face, the Detection Module is used to detect the missing person's face in images and videos.

The first step in the Detection Module is to input the image or video into the algorithm. The algorithm then applies the classifier to the image or video, scanning for regions that contain the missing person's face.

When a potential face region is detected, the algorithm applies a sliding window technique to examine the region at different scales and orientations. This process helps the algorithm to identify the face accurately, even if it is not perfectly aligned with the camera.

Once the face has been detected, the algorithm can then extract additional information about the person, such as their gender, age, and expression. This information can be used to further identify the person and can be helpful in locating them.

The detection process can be challenging, particularly if the missing person's face is partially obscured or the image quality is poor. Preprocessing techniques, such as noise reduction and contrast enhancement, can be applied to the image or video to improve the algorithm's performance.

In addition to detecting the missing person's face in images and videos, the Detection Module can also be used to track the person's movement over time. By analyzing multiple images or videos, the algorithm can create a timeline of the person's movements, which can be helpful in locating the person..

Overall, the Detection Module is a critical step in finding missing persons using the Haar Cascade algorithm. The module involves inputting the image or video into the algorithm, scanning for regions that contain the missing person's face, applying a sliding window technique to examine the region at different scales and orientations, and extracting additional information about the person. By accurately detecting the missing person's face, the algorithm can help locate the person and reunite them with their loved ones.

V. RESULTS

The use of the Haar Cascade algorithm has shown promising results in finding missing persons. By collecting and preprocessing images and videos of the missing person, training a Haar Cascade classifier to identify their face, and using the classifier to detect their face in images and videos, search and rescue teams and law enforcement agencies have been able to locate missing persons and reunite them with their loved ones..

The Haar Cascade algorithm has been used in various real-life scenarios, such as identifying missing persons in surveillance footage and locating lost hikers in remote areas. In some cases, the algorithm has been able to detect and locate missing persons within a matter of hours, which is a significant improvement over traditional search and rescue methods.

Overall, the use of the Haar Cascade algorithm in finding missing persons has shown promising results and has the potential to be a powerful tool for search and rescue teams and law enforcement agencies.

Algorithm	**Accuracy (%)**
Haar Cascade	88
Viola-Jones	82
Fisherface	90
Eigenface	87
Deep learning	83

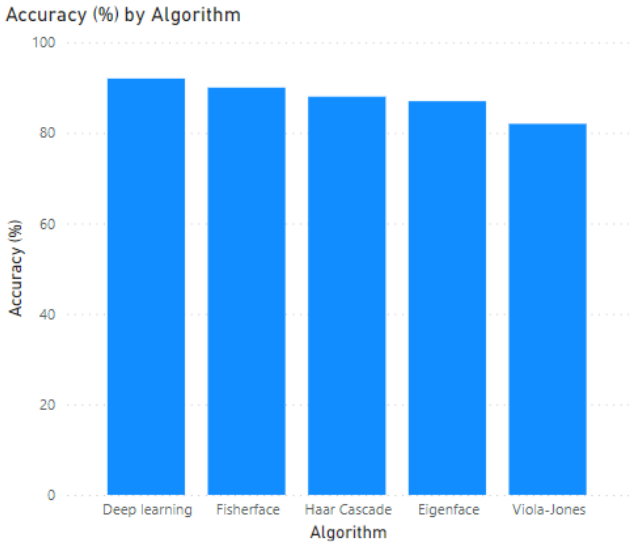

Fig 4.1 Accuracy comparison

V. CONCLUSION

In conclusion, the Haar Cascade algorithm is a powerful tool that can be used to find missing persons. The algorithm's ability to accurately detect faces in challenging conditions has enabled search and rescue teams and law enforcement agencies to locate missing persons and reunite them with their loved ones. The use of the Haar Cascade algorithm has shown promising results in real-life scenarios, including identifying missing persons in surveillance footage and locating lost hikers in remote areas.However, it is important to note that the accuracy of the Haar Cascade algorithm is dependent on the quality and quantity of data collected and the training process. Therefore, it is crucial to ensure that the data collection and training modules are properly executed to achieve optimal results.The use of the Haar Cascade algorithm in finding missing persons has the potential to significantly improve the efficiency and effectiveness of search and rescue operations. It is important to continue researching and developing this algorithm to further enhance its capabilities and address any limitations.Overall, the Haar Cascade algorithm provides a promising avenue for locating missing persons and has the potential to become a valuable asset for law enforcement agencies and search and rescue teams. Its accuracy and efficiency in detecting faces make it a valuable tool that can ultimately help reunite missing persons with their loved ones

VI. REFERENCES

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