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Efficient Tracking of Missing Person Using AI

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Abstract: For a very long time, law enforcement and search and rescue organizations have struggled to locate missing people. However, recent developments in artificial intelligence (AI) have made it possible to create more effective strategies for locating the missing person. One possible tactic is to use AI algorithms to examine a variety of data sources, like as social media posts and surveillance camera footage, in order to build a detailed profile of the whereabouts and conduct of the missing person. By combining these numerous data sources, AI systems might help detectives uncover trends and anomalies that might be indicative of the missing person's travels or activities. Face recognition has emerged as a popular and difficult problem in the image processing field, which is currently one of the technology trends. Finally, depending on past information and other important factors such as facial features, AI-powered predictive models can be created to assist authorities in anticipating where missing persons may be located. These models can support search and rescue teams. The application of AI technologies has the potential to completely transform the way missing people are tracked and located, offering quicker and more accurate findings while requiring less time and money to conduct a search.

Keywords: Artificial intelligence, image processing, CNN, missing person, open cv

I. INTRODUCTION

Every day, enormous numbers of people around the world go missing, including children, teenagers, mentally challenged individuals, elderly individuals with Alzheimer's, etc. Most of them are still unidentified. The approach suggested in this paper would speed up face recognition searches and benefit both the public and law enforcement. The tracking of missing persons is a critical and challenging task for law enforcement and search and rescue organizations. Traditional techniques of looking for missing people can be time-consuming, resource-intensive, and frequently have a low success rate. However, recent developments in artificial intelligence (AI) have made it possible to create missing person tracking strategies that are more effective and efficient. CNNs are a common deep learning algorithm type used for image processing and recognition tasks. Due to their aptitude for analysing and identifying facial features, they have been discovered to be particularly effective at facial recognition. Large datasets of face images can be used to train CNNs to learn and recognise features that tell one person apart from another. In this research, we provide a solution for effective AI-based missing person tracking. Personal data about the missing individual, including their name, age, physical description, last known whereabouts, and any additional relevant data, will be gathered and stored by the system in a centralised database.

They can then be used to identify and authenticate someone by comparing a face in an image or video with a face in a database. The technical components of face recognition, such as image acquisition, feature extraction, and classification, will be discussed. We will also look at the legal and moral issues surrounding the use of CCTV cameras for facial recognition.

II RELATED WORK

Topic: AI-Assisted Search for Missing Children(!)
Year of Publish: Oct, 2022
Published By: Sowmya M. R.; Kirti Chaudhary; Soumya R; Prity Panjiyar
Using this application, a person's photo can be uploaded if found suspicious by the user. There is an option of submitting the photo obliquely or anonymously. Along with the location, this image is saved in the database. The GUI application applies a machine learning algorithm to compare user-submitted photos with those uploaded by the police. Any matches along with the place where the missing individual was last seen if they are discovered can displayed.

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Topic: AI for Detection of Missing Person(2)
Year of Publish: May ,2022
Published By: B. Vinavatani; Medha Rachel Panna; Premila H Singha; G. Jaspher Willsie Kathrine
Artificial intelligence (AI) has been developed to help humans and machines communicate more effectively. The proposed mechanism has been successfully implemented to accurately identify a face with a precision of 90% when compared to 59% using KNN and 43% using SVM with PCA. A facial recognition system is a computer application that can recognize or verify a person by analyzing a digital image or a video frame from a video source. Facial feature detection and recognition are extensively used in current world scenarios and technologies.

Topic: Locating Missing Persons Using Artificial Intelligence(3)
Year of Publish: May,2020
Published By: Mithilesh Kumar, Shikar Singh, Dr.S.Sasidhar babu
Every day more than five hundred missing person complaints are approximated to go unanswered in India. an organization called as find me group FMG that is currently active in the united states led by former field experts is committed to solve the problems that lead to such scenarios. they have introduced and made use of the missing person intelligence synthesis toolkit mist which adopts a driven-data approach to the given problem. using the same approach and slightly building upon the foundation provided by FMG we aim to tackle this problem by taking search locations on the basis of the data on hand ranks and orders the locations based on the likelihood as well as the probability allocated to the search areas based on the prior information and previous performances that are taken individually as well as a group. we compared and contrasted our approach with the current practices adopted by several organizations and entities and found that this method gives us a slight but significant advantage over many of such approaches. It is worth noteworthy that it could actually reduce the search area leading to a reduction of many square kilometers over several cases that were examined in the conducted experiments. missing individual incidents have been on a steady rise in India for the past many years.

Topic: Face Recognition Technologies in the Big Data Era: Ethical and Privacy Issues(4)
Year of Publish: Jun,2020
Published By: Wang, T., Wu, X., Yang, Z., & Lu, H.
The authors argue that face recognition technologies have significant potential for improving security and public safety, but also raise concerns regarding data privacy, surveillance, and discrimination. They review the current state-of-the-art in face recognition technologies and discuss the ethical and legal frameworks that govern their use. They also analyze the implications of big data on face recognition and highlight the need for responsible and transparent implementation of these technologies. The paper concludes with a set of recommendations for policymakers and stakeholders to address the ethical and privacy issues associated with face recognition in the big data era.

Topic: Face Detection and Recognition System using Digital Image Processing(5)
Year of Publish: March,2020
Published By: Gurlove Singh, Amit Kumar Goel
Then the whole process is repeated thereby helping in developing a face recognition model which is considered to be one of the most extremely deliberated biometric technology. Basically, there are two type of techniques that are currently being followed in face recognition pattern that is, the Eigenface method and the Fisherface method. The Eigenface method basically make use of the PCA (Principal Component Analysis) to minimize the face dimensional space of the facial features. The area of concern of this paper is using the digital image processing to develop a face recognition system. While recognizing any individual, the most important attribute is face. It serves as an individual identity of everyone and therefore face recognition helps in authenticating any person's identity using his personal characteristics. The whole procedure for authenticating any face data is sub-divided into two phases, in the first phase, the face detection is done quickly except for those cases in which the object is placed quite far, followed by this the second phase is initiated in which the face is recognized as an individual. The area of concern of this paper is using the digital image processing to develop a face recognition system.

III METHODOLOGY

The primary objective of this research project is to find the missing person in the crowd with less period of time and location and make the task of missing person easier.

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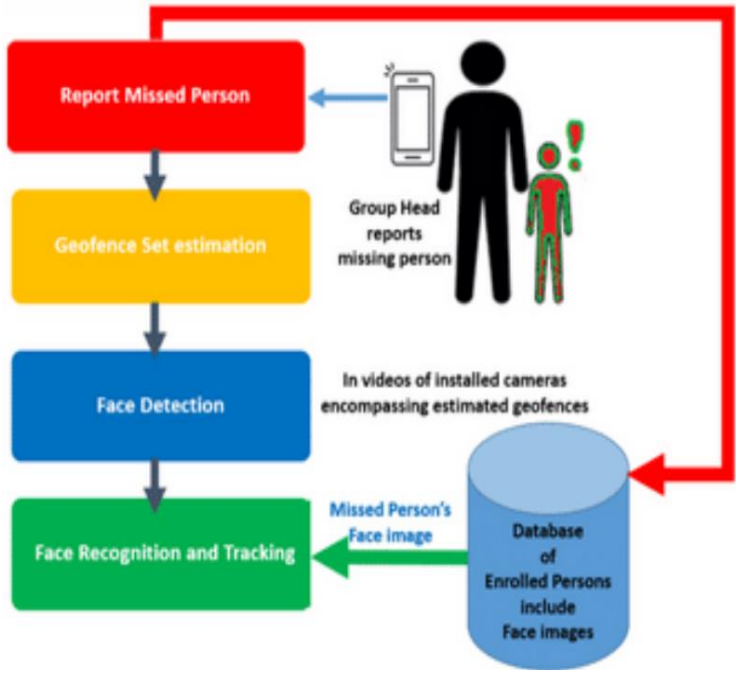

FIG.1: System Architecture of the proposed methodology

Image acquisition: The image is captured, scanned and converted into a manageable entity. This process is known as image acquisition. In this face images are given as input through digital camera and stored in the hard disk. Two images have to be given as input, an old and young photograph of a person.

Image Pre – processing: The aim of pre-processing is an improvement of the image data that suppresses the unwanted distortions or enhances some image features. The images are first converted into gray scale image, then are resized to a specific shape and perform some filtering operations for image enhancement.

Segmentation: In this step, the features extracted from the candidate regions are used to segment the target object from the background. This can be achieved using various segmentation algorithms such as region growing, watershed, or graph cuts. The output of this step is a binary mask that indicates the location of the target object in the image.

Normalization: The extracted features are normalized to remove any variations caused by lighting, pose, or facial expressions. This may involve techniques such as Z-score normalization, contrast normalization, or histogram equalization.

Face Detection: The input images are checked for faces. If faces are detected, then the faces are cropped and are further passed on to the next process. Else, the user is prompted to input a proper photograph.

Feature extraction: In this step it is a very crucial role in any of the machine learning task. It could be considered as a process of dimensionality reduction, where very relevant features are considered for training. Here, multiple models are considered, hence model specific feature extraction technique is applied to its corresponding model.

Database Management: The system maintains a database of all the missing persons and their information. This database is updated regularly to include new missing persons and remove resolved cases.

Final predictions: Predictions from different models are obtained. The predictions will be binary classification from each model. Once all the predictions are collected, the maximum occurrence of a particular class of prediction, i.e., “Yes” or “No” will be predicted

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IV.RESULTS AND DISCUSSION

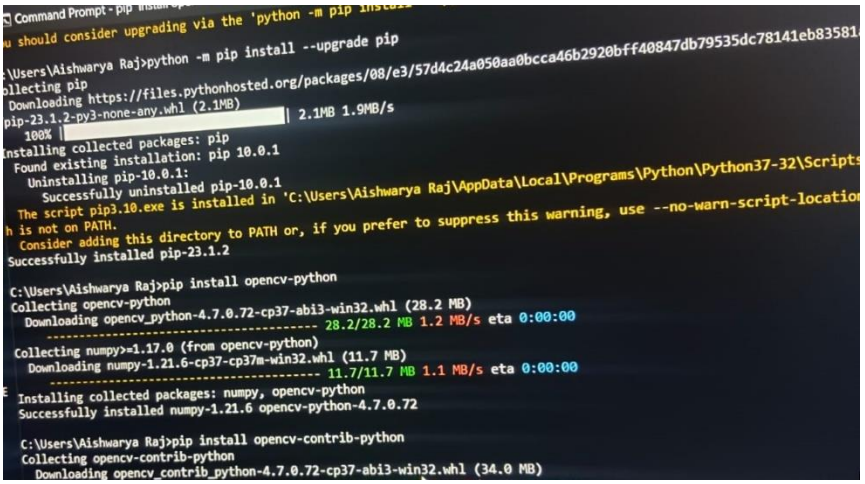

Fig1: Screenshot of importing libraries

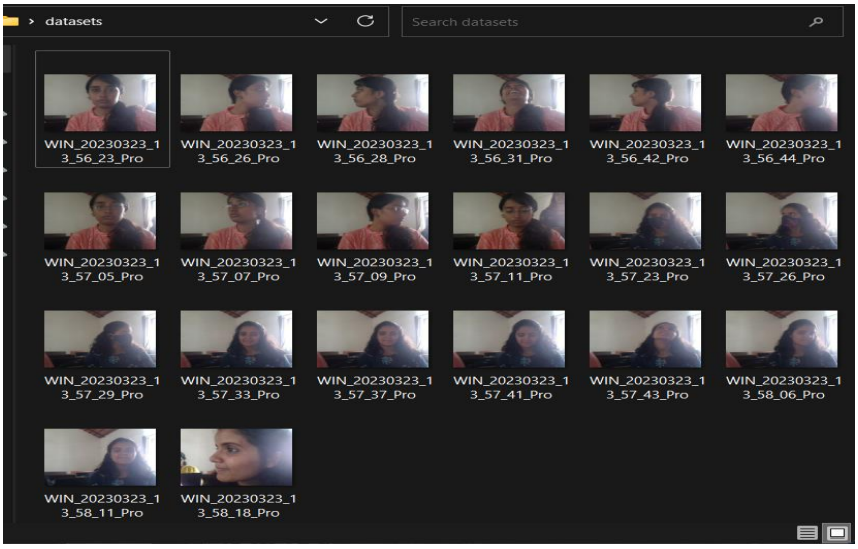

Fig 2: Screenshot of attributes in the dataset

```python
# Import OpenCV2 for image processing
import cv2

# Start capturing video
vid_cam = cv2.VideoCapture(0)

# Detect object in video stream using Haarcascade Frontal Face
face_detector = cv2.CascadeClassifier('haarcascade_frontalface_default.xml')


# Start looping
while(True):

    # Capture video frame
    _, image_frame = vid_cam.read()

    # Convert frame to grayscale
    gray = cv2.cvtColor(image_frame, cv2.COLOR_BGR2GRAY)

    # Detect frames of different sizes, list of faces rectangles
    faces = face_detector.detectMultiScale(gray, 1.3, 5)

    # Loops for each faces
    for (x,y,w,h) in faces:

        # Crop the image frame into rectangle
        cv2.rectangle(image_frame, (x,y), (x+w,y+h), (255,0,0), 2)


        # Display the video frame, with bounded rectangle on the person's face
    cv2.imshow('frame', image_frame)

    # To stop taking video, press 'q' for at least 100ms
    if cv2.waitKey(100) & 0xFF == ord('q'):
        break
```

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Fig 3: Screenshot of the code snippet

V. CONCLUSION

In conclusion, effective missing person tracking using AI is a crucial use of computer vision and machine learning methods. Using cutting-edge algorithms for facial recognition, segmentation, normalisation, and classification, a reliable and accurate system that can locate missing people and assist in bringing them back to their family can be created. Deep convolutional neural networks (CNNs) are used in this paper's methodology for face tracking and identification, coupled with a number of image processing algorithms for segmentation, normalisation, and feature extraction. To enable it to precisely match new photos and video frames against the database, the system can be trained using a sizable dataset of missing persons and their distinguishing attributes, such as facial characteristics. It is conceivable to develop a system that can rapidly and effectively identify missing people, even in difficult circumstances with poor visibility or image quality, by utilising the power of AI and computer vision. In their quest to find missing people and return them to safety, law enforcement organisations and families can greatly benefit from the assistance that such a system can provide. By combining new algorithms for normalisation, feature extraction, and classification, as well as by investigating novel methods for data augmentation and transfer learning, future research in this area can concentrate on increasing the accuracy and resilience of the system. To further improve its monitoring powers, the system can be expanded to incorporate more data sources like social media and open surveillance cameras.

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