International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Ai-Driven Missing Persons Identification

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Abstract:
The concerning reality that nearly half of the 174 children who disappear daily across India remain unaccounted. As per data from the National Crime Records Bureau (NCRB), a staggering number of over one lakh children (1, 11,569 in total) were reported missing by 2016, with 55,625 of them still missing by the year's end, as highlighted by the Ministry of Home Affairs (MHA) in Parliament. In response to this pressing issue and to aid law enforcement efforts, a Python-based GUI application, AI-Driven Missing Persons Identification, was developed. This application enables the police to initiate new cases and conduct searches for missing children effectively. Upon submission of a missing person's image, the application processes it on the backend and stores essential details, including the individual's name, parents' names, age, and location, in a secure database. Furthermore, an Android application has been designed for public access. Through this app, users can upload photos of suspicious individuals, either directly or anonymously. These images, along with their associated locations, are stored in the database for further investigation. Leveraging machine learning algorithms, the GUI application compares user-submitted photos with those provided by law enforcement agencies. Any matches, along with the last known location of the missing person, are promptly displayed, aiding in expedited recovery efforts.

1. Introduction:

Every year, India witnesses a distressing number of missing children, a grave concern exacerbated by the escalating crime rates. It's imperative to foster a society that prioritizes the safety and well- being of children, implementing robust systems to track and locate those who have gone missing. To combat this issue, innovative technologies such as facial recognition can be leveraged. Such advancements offer a promising solution to the daunting task of finding missing children and victims of human trafficking. Establishing a centralized database enhanced with image recognition capabilities streamlines the process of managing records, facilitating swift updates and deletions as needed. By harnessing this software, law enforcement agencies and guardians can efficiently locate missing individuals, providing a glimmer of hope amidst the prevailing uncertainty. This proactive approach not only aids in the swift recovery of missing children but also serves as a deterrent against future abductions and trafficking incidents.

2. LiteratureSurvey/Existing System:

Our project involves identifying an individual by analysing an image of their face against a database of known faces. Although it's a task human generally find simple, machine-based face recognition in uncontrolled environments like shopping centres, gambling establishments, and transportation hubs poses ongoing challenges for researchers. However, with the proliferation of photos indexed by search engines and shared on social media platforms, including diverse content such as objects, faces, and landscapes, a wealth of data has become available. This abundance of data, coupled with advancements in computational capabilities, has facilitated the development of more sophisticated statistical models for tackling the broader challenge of image analysis. This study explores the application of machine learning techniques reliant on vast datasets, such as deep convolutional neural networks, for image analysis in the context of uncontrolled facial recognition.

2.1 Existing system:

Implemented globally, ALERT systems rapidly share information on abducted children through various media. The NMPCC in Australia enhances missing persons case management, while NCMEC in the US aids in child recovery. GMCN, overseen by ICMEC, collaborates worldwide to find missing children. Mobile apps like "Missing Children Europe" and "Child ID" assist users in reporting missing persons. However, limitations include reliance on image quality, data accessibility, privacy concerns, digital literacy barriers, and ethical implications of false positives. Despite these challenges, continuous efforts are underway to improve the effectiveness and reach of these systems to safeguard vulnerable individuals.

3. Problem Statement:

In today's world, the issue of missing persons persists as a significant concern globally. Despite the existence of various resources and organizations dedicated to addressing this issue, there remains a need for a more efficient and accessible platform for missing persons identification. Traditional methods often rely on manual processes and may lack the speed and accuracy required for timely interventions.

This website will utilize advanced AI algorithms to analyse vast amounts of data, including images and identifying information, to expedite search and recovery efforts. By automating and enhancing the identification process, it aims to provide timely interventions for missing individuals. Additionally, privacy safeguards will be implemented to ensure the secure handling of sensitive data. The user interface will be designed to be intuitive and accessible, catering to individuals with varying levels of technological proficiency. Ultimately, this AI-driven platform seeks to revolutionize missing persons identification, contributing to the safety and well-being of communities worldwide.

4. Proposed System:

a) Classification algorithm:

Supervised learning involves training a model on labelled data to make predictions. Classification, a common type of supervised learning, categorizes input data into predefined classes based on learned features. For example, it might classify items as "green" or "blue," or distinguish between "fruits" and "animals."

b) K-Nearest Neighbour Algorithm (KNN):

KNN is a simple and intuitive supervised learning algorithm. It classifies new data points by identifying the k nearest data points in the training set and assigning the most common class among them. KNN

works well for both classification and regression tasks, especially with small to moderate-sized datasets and irregular decision boundaries.

c) Methodology:

To identify facial features, the system utilizes dlib facial feature generator, which produces 68 distinct points for a face with a precision of approximately 8 decimal places. This creates a total of 128 points, considering both x and y coordinates. The system operates on a one-shot learning approach and is capable of handling multiple cases. For instance, if there are 3 reported cases, the system would generate 128 * 3 facial landmark points. These points are then used to train a KNN (K-Nearest Neighbours) classifier.

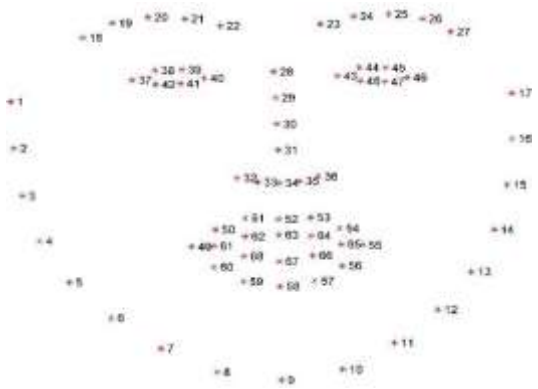

Fig 1

The KNN classifier assigns labels to the facial landmark points, categorizing them into different groups. The points are color- coded to represent different individuals: RED for Person 1, GREEN for Person 2, and BLUE for Person 3. Once trained, the KNN classifier can predict the confidence level that a set of facial landmarks corresponds to a particular individual. If the confidence level exceeds 60%, the system identifies the person as the same individual.

The code for the KNN classifier includes the following components:

1. `N_neighbours`: This parameter indicates the number of cases recorded, which in this scenario is three.
2. `X`: This matrix contains 136 columns (representing the x, y coordinates of 68 facial landmark points) and 3 rows (representing the total number of recorded cases).
3. `UniqueKeys`: This component encodes details about each person, such as their name and phone number, using LabelEncoder.

By leveraging this KNN classifier, the system can accurately predict the identity of individuals based on their facial landmarks with a confidence level threshold of 60%.

d) System Architecture:

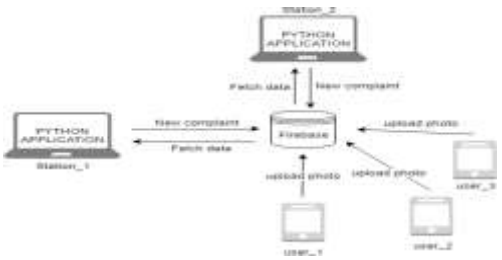

Fig 2

Python serves as the foundation for this system, featuring a straightforward GUI designed to accommodate both administrators and regular users with minimal complexity. The workflow is outlined below:

1. Admin Login:

To initiate a new case, the administrator must first log in using their designated username and password. The graphical user interface (GUI) is developed using PyQt5, with PostgreSQL serving as the chosen database backend.

2. Registering New Cases:

After successful authentication, the administrator gains access to a dedicated window where they can register new cases. This window offers options for initiating a new case, updating existing records, comparing data within the system, reviewing recently updated information, and examining confirmed cases.

3. User Submission:

Regular users can conveniently input relevant data via the GUI, including their name, phone number, and the location where the photo was taken. Additionally, users can leverage a dedicated smartphone application to capture images at their convenience, streamlining the data submission process.

4. Matching Cases:

Upon submission of a user-uploaded image, the system proceeds to compare it with existing case images using the KNN technique. To facilitate this comparison, the model is trained by selecting the refresh option from the main menu. Upon clicking the match button, the model evaluates both images and provides feedback indicating whether a match has been identified or not.

Result Analysis:

User Interface:

Fig 3

Admin Login:

Fig 4

The Administrator logs in to the application by entering the credentials as shown in Fig 4. The application includes features to add a new case, refresh the model, match the missing child present in the database, view the data in the database and confirmed cases shown in Fig 6. Whenever a fresh case requires registration, new case button is clicked. It will launch a new GUI and request data from the user shown in fig 5.

Register new case:

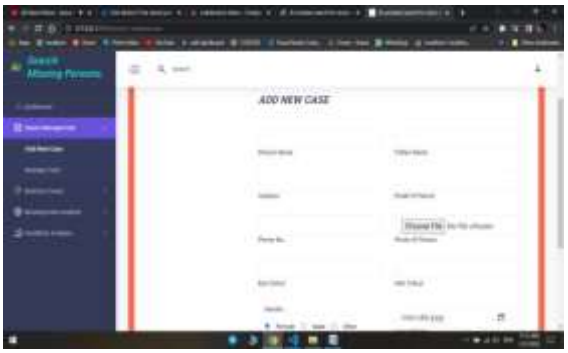

Fig 5

Manage Cases

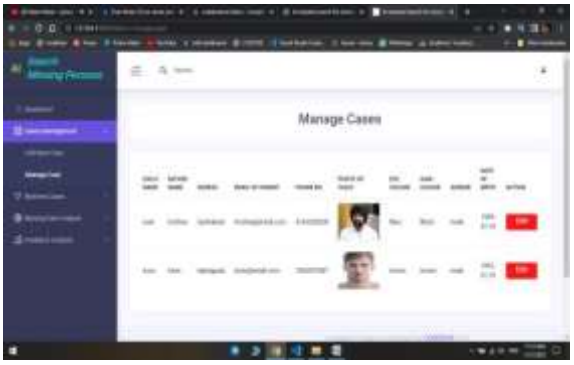

Fig 6

This is where all of the processed complaints will be kept and can be used to view submitted case after they are confirmed as shown in Fig 6. Match -The KNN classifier trained downloads all the user registered points and estimates value. It is considered a match if confidence rises to 60% or higher shown in Fig 7.

This shows that the KNN method can quickly and accurately classify new data. Although it can be used for both classification and regression, classification issues receive the majority of its employment.

In conclusion, the AI-Driven Missing Persons Identification stands as a testament to the power of technology in addressing pressing social challenges. By harnessing its capabilities responsibly and innovatively, we can continue to make meaningful strides towards ensuring the safety and well-being of our communities, particularly our most vulnerable members

When employed judiciously, this technology holds immense potential for societal benefit. Beyond its application in locating missing children, it can be adapted for use in diverse settings such as hotels, hospitals, and other public spaces to swiftly identify offenders. Furthermore, integrating Flask to develop APIs and harnessing TensorFlow for building a fully functional web application can amplify its utility and accessibility.

Finding Matches:

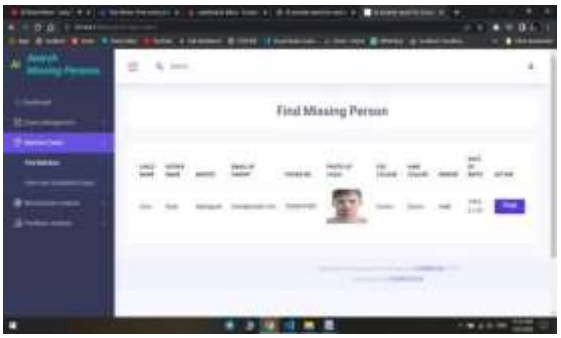

Fig 7

7. Conclusion

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