Missing Child Identification using HOG and KNN

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Abstract: *Every year, many number of missing children are reported in India. With the aid of facial recognition, our project aims an application using Machine Learning technology to locate missing child reported among many children images that are available. A shared platform allows users to post pictures of suspicious children along with descriptions and landmarks. The newly entered image is categorized and automatically compared to the repository's missing-child photos. The database is searched for the image that most closely matches the user-input child image and display the results to the users for further processing. In order to do this, the user-posted photograph and the provided database of missing child images will be used to train a machine learning model to accurately identify the missing child. In this system, for Face recognition process, we are using HOG (Histogram of Oriented Gradients) which is a standard technique for face feature extraction. The HOG features are extracted for the test image and also for the training images and finally for classification we are using KNN algorithm which effectively recognize the face Labels from the input child image.*

Keywords: HOG, KNN, Machine Learning, Face Recognition, CNN, LBPH, PCA, SURF, HAARIS,Database

1. Introduction

Nowadays facial identification and facial recognition has been used as one of the biometric features. Facial Recognition is performed by extracting all the facial features of a person. No two persons can have the similar facial features. Based on this perspective, we are creating a system that may be used to identify missing children quickly. As we know India is ranked second as most populated world's country. There are many children present here. Kidnapping of children occurs for a number of reasons, including human trafficking, forced labor, unlawful organ transplantation, the adoption industry, and unauthorized medical testing. Most of the children remain unfound.

According to the data from the National Crime Records Bureau, Children disappear in India for every eight minutes, and 40% of them are never discovered. There are many missing child cases pending that are yet to be resolved. For a variety of reasons children who are missing in one area could turn up in another area. In this missing child identification project, we are performing the facial identification of the missing child by calculating the facial features from the given input image and comparing it with the images of the missing child database. This helps the authority people to search the missing child as fast as possible. It also makes easier for the police to find the missing child in any region.

2. Literature Review

In this paper "Missing Child Identification using LBPH algorithm", a system for missing child identification that combines face feature extraction using deep learning with matching using the LBPH algorithm. Features of the face are extracted by using the LBPH algorithm. Here, features of Iris of the missing child are extracted using Gabor filter algorithm. Iris recognition is performed to identify the persons based on their iris. For facial identification they have developed a model which in the backend machine learning

server. Matching is performed based on the Iris of the missing child stored in the database and the Iris of the uploaded photo.

In this research paper “Facial Feature Extraction for face Recognition” different facial feature extraction techniques such as HOG, LBPH, PCA, SURF, HAARIS are tested and the dataset had roughly 100 pictures (60 training images, 40 testing images). For feature similarity they used KNN algorithm. Hog is used for the feature extraction of the face. SURF algorithm has got 55% accuracy. By implementing with PCA, it has given 72% accuracy. Hog algorithm has performed efficiently when compared with the other algorithms such as SURF, LBPH, PCA and Harris. Hog algorithm got 85% accuracy when compared with other algorithms.

The K-Nearest Neighbor Method for Face Identification has two phases: the training phase and the testing phase. The dataset used for the training phase includes 790 photos with different angles of 158 persons. One of the most common extraction techniques is PCA. This algorithm is used for the feature extraction in this project. With the least amount of information loss, the PCA method reduces data dimensions. Biometrics, feature extraction, image processing, data compression, and other applications rely on this approach. This approach has given 81% accurate results when k value equals to 1. Ask value increases, the accuracy of the algorithm gets decreased.

The CNN-based deep learning technique is used for feature extraction and the support vector machine classifier is used for categorizing various children in this missing child identification system. They have taken 43 children images and developed a model to identify the image of the children with different angles. The deep learning model used to assess this system was developed using feature representations of children's faces.

3. Methodology

3.1 System Architecture

It comprises of a nationwide gateway where the identity and photograph of the missing child can be stored. When a missing child is reported, the responsible officer uploads the youngster's picture into the portal along with the FIR. The database's photographs of the children are available for public search for any matching child. The most relevant situations will be suggested by the system. When a match is made, the officer can obtain the child's information.

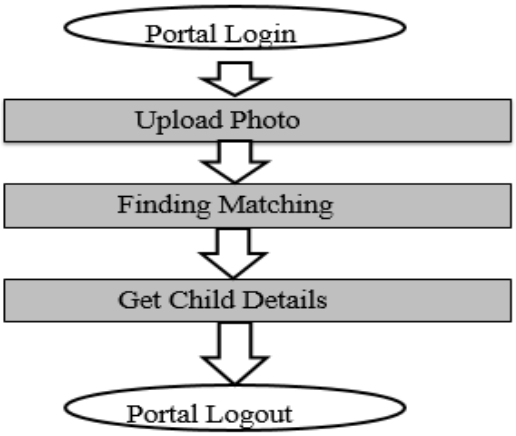

Figure 1 Architecture of the proposed System

3.2 User Interface

By using pyQt5 tools, we are developing a user interface which is a desktop application. Through user interface, the authority and users can register in the portal using authority login page or user login page respectively. The registered user's data is stored in MySQL database. Registered users can login anytime into the portal using the credentials like username and password.

3.3 Preprocessing

The HOG algorithm is used to first preprocess the input raw image, standardizing it in a manner that is compatible, and identifying the face region of the uploaded input image. The HOG algorithm creates the gradients for each pixel in the input image by segmenting the image into cells based on the size of the input image in order to find the face feature vectors. This procedure is repeated for each picture of a missing child obtained with a digital camera or a mobile phone in order to create the database for the face recognition system. The photographs in the database right now have parts of the faces cropped for additional analysis.

3.3.1 HOG Algorithm

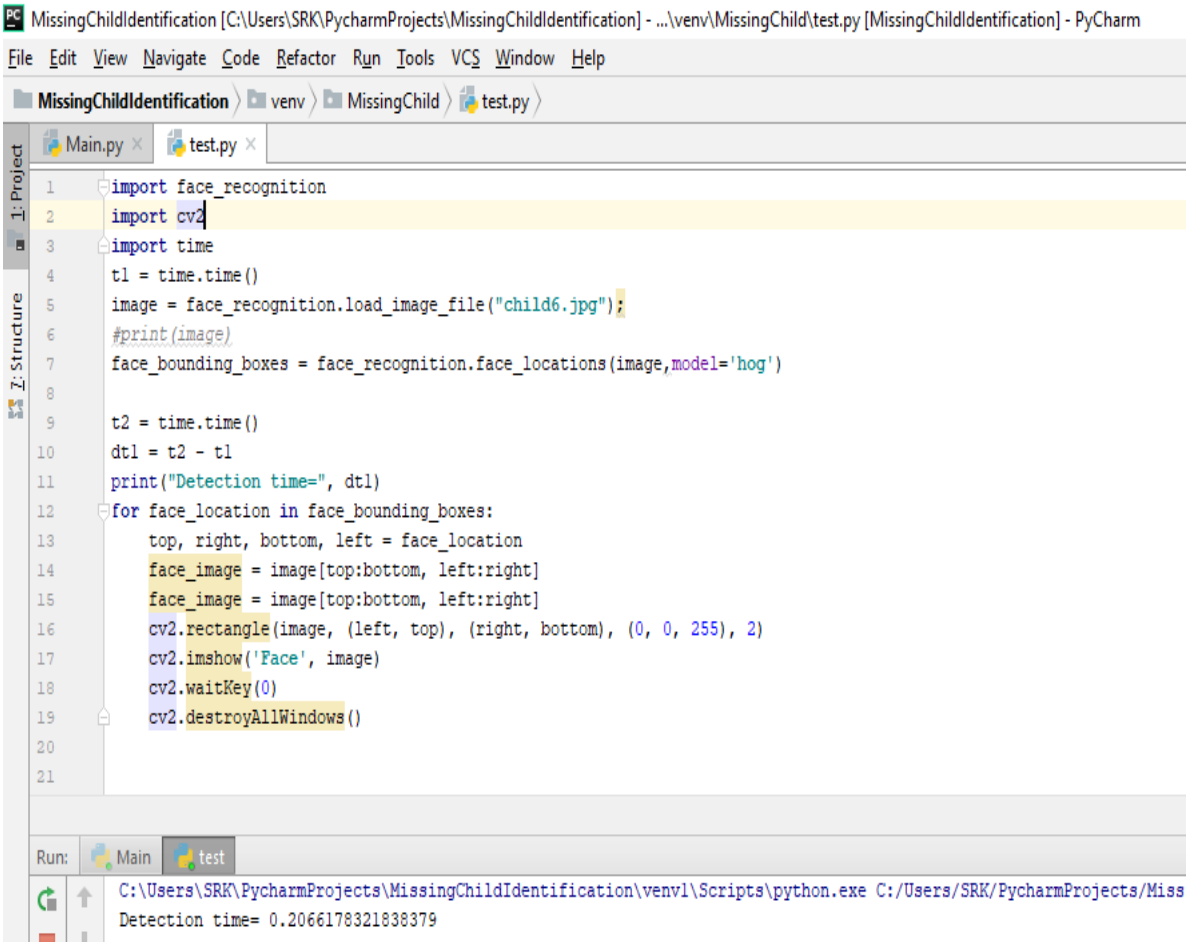

Figure 2 HOG Algorithm in python

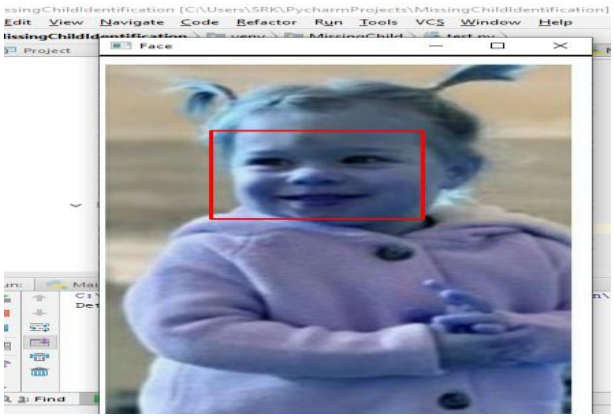

Figure 3 Face Recognition by HOG

3.4 Upload Child image

The public and authorities can upload photos with all the necessary information, including city, landmarks, and comments, using the credentials they used to register. These photos are then kept in the MySQL database. The concerned official may post the information along with a recent photo of the child into the portal whenever the police file a FIR regarding a missing person case. Similarly, via the user login page of the portal, the general public can post a photo of a suspicious child discovered nearby. The alert message "image uploaded successfully" is displayed to the user shortly after the image has been uploaded with the necessary information. The image is then saved in the database of training images and can be retrieved whenever a match is discovered while the specific photo is being searched for by different officers or people.

3.5 Search Child image

Similar to the upload option, the search option is available to both government officials and the general public, which allows users to search among the various child images present in the database, Utilizing the KNN algorithm, the search procedure begins by training on the repository's photos. After all of the photos have been classified into distinct classes during training. All of the training photos are compared to the testing image that was uploaded via the search function. As a result, the image with the best match retrieved along with all the relevant information (child id, location, and remarks), and a notification message is sent to the appropriate authority who uploaded the corresponding child photo. Similar to this, the suggested method enables the authority to check for matches in the database at any moment**.**

4. Results and Discussion

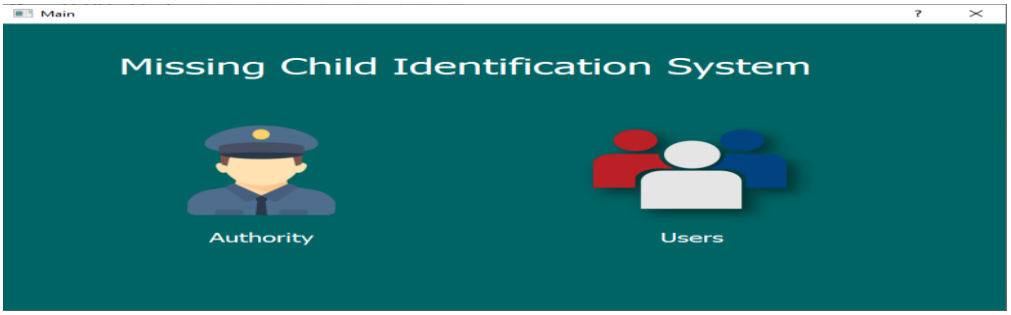

Figure 4 Main Page

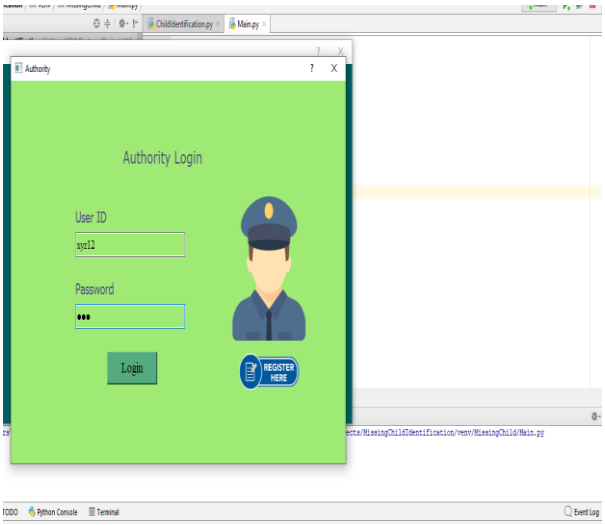

Figure 5 Authority Login Page

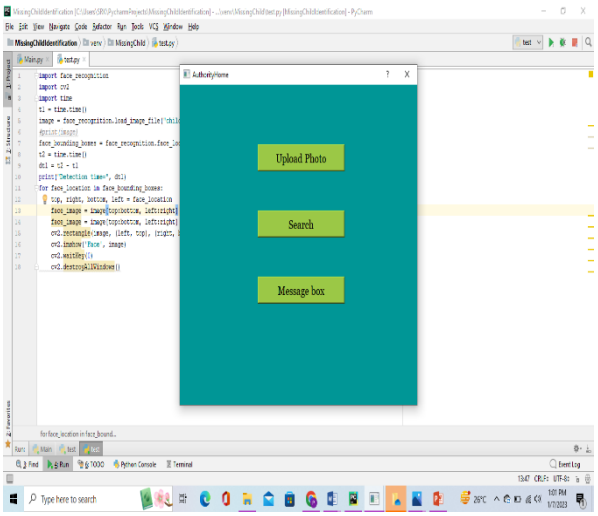

Figure 6 Authority Home Page

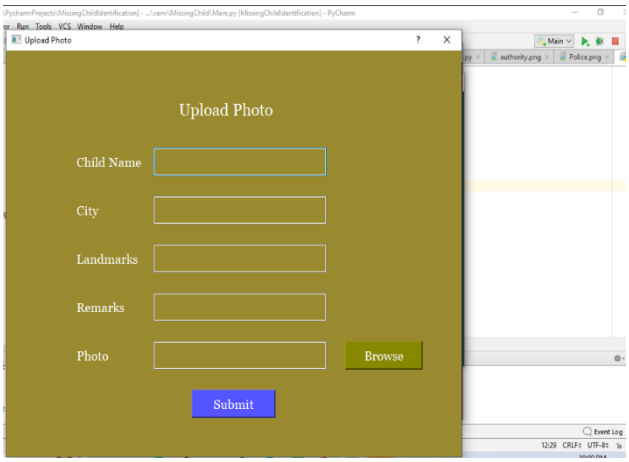

Figure 7 Upload Page

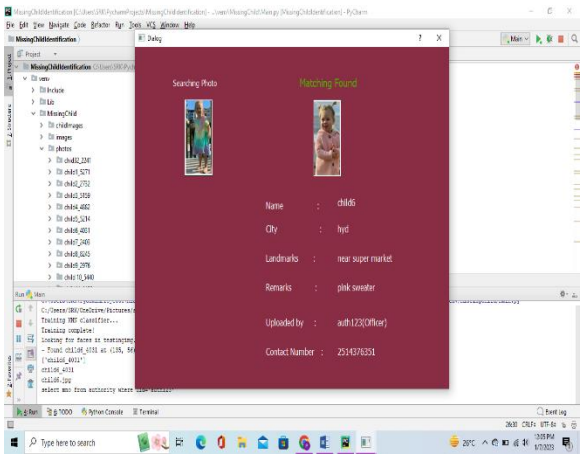

Figure 8 Search Result Page

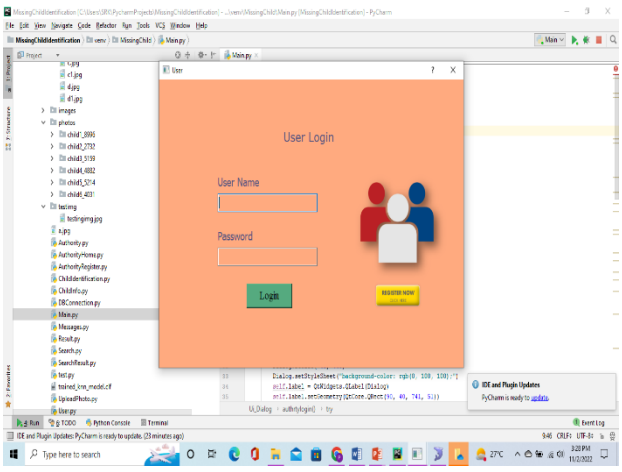

Figure 9 User Login Page

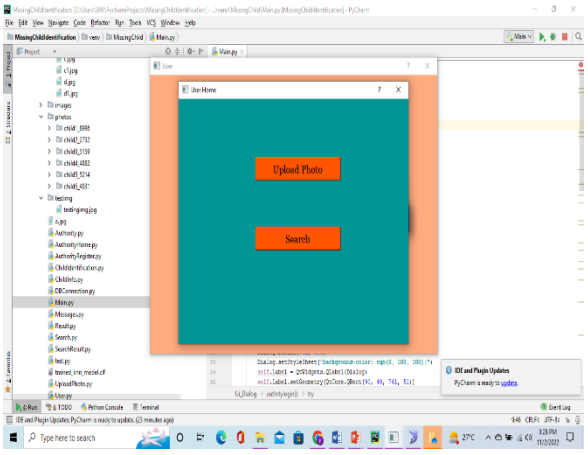

Figure 10 User Home Page

4. Conclusion

The strong HOG-based technique for feature extraction and the KNN machine classifier for the categorization of several child categories are combined in the proposed missing child identification system. Here, we assessed a dataset of 55 child photos (40 training images and 15 testing images). The dataset included a variety of photos of kids in various lighting and noise levels. Here, the face region of the training and test photos was extracted using HOG. The similarity ratio between the two photos was then calculated using KNN on preprocessed images. After a user or authority searches for a certain child photo, the system can accurately categorize photographs at 0.5 K value and provides the matching found details in a short period of time.

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