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MISSING CHILD IDENTIFICATION SYSTEM

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ABSTRACT
In India a countless number of children reported missing every year. Among the miming child cases a large percentage of children remain untraced. This paper presents a novel use of deep learning methodology for identifying the reported miming child from the photos of multitude of children available, with the help of face recognition. The public can upload photographs of malicious child into s common portal with landmarks and remarks. The photo will be automatically compared with the registered photos of the missing child from the repository Classification of the input child image is performed and photo with best match will be selected from the database of missing children. For this, a deep learning model is trained to correctly identify the missing child from the missing child image database provided, using the facial image uploaded by the public. The Convohitional Neural Network (CNN), a highly effective deep learning technique for image based applications is adopted here for face recognition Face descriptors are extracted from the images using a CNN model VGG-Face deep architecture. Compared with normal deep learning applications, our algorithmsuses convolution network only as a high level feature extractor and the child recognition is done by the trained SVM classifier Choosing the best performing CNN model for face recognition, VOG-Face and proper training of it results in a deep learning model invariant to noise, illumination, contrast, occlusion, image pose and age of the child and it outperforms earlier methods in face recognition based mining child identification. The classification performance achieved for child identification system is 99,41%. It was evaluated on 43 Child cares.

INTRODUCTION

Children are the greatest asset of each nation. The future of any country depends upon the right upbringing of its children. India is the second populous country in the world and children represent a significant percentage

of total population. But unfortunately a large number of children go missing every year in India due to various reasons including abduction or kidnapping, run-away children, trafficked children and lost children. A deeply disturbing fact about India's missing children is that while on an average 174 children go missing every day, half of them remain untraced. Children who go missing may be exploited and abused for various purposes. As per the National Crime Records Bureau (NCRB) report which was cited by the Ministry of Home Affairs (MHA) in the Parliament (LS Q no. 3928, 20-03- 2018), more than one lakh children (1,11,569 in actual numbers) were reported to have gone missing till 2016, and 55,625 of them remained untraced till the end of the year. Many NGOs claim that estimates of missing children are much higher than reported Mostly missing child cases are reported to the police. The child missing from one region may be found in another region or another state, for various reasons. So even if a child is found, it is difficult to identify him/her from the reported missing cases. A framework and methodology for developing an assistive tool for tracing missing child is described in this paper. An idea for maintaining a virtual space is proposed, such that the recent photographs of children given by parents at the time of reporting missing cases is saved in a repository. The public is given provision to voluntarily take photographs of children in suspected situations and uploaded in that portal. Automatic searching of this photo among the missing child case images will be provided in the application. This supports the police officials to locate the child anywhere in India. When a child is found, the photograph at that time is matched against the images uploaded by the Police/guardian at the time of missing. Sometimes the child has been missing for a long time. This age gap reflects in the images since aging affects the shape of the face and texture of the skin. The feature discriminator invariant to aging effects has to be derived. This is the challenge in missing child identification compared to the other face recognition systems. Also facial appearance of child can vary due to changes in pose, orientation, illumination, occlusions, noise in background etc. The image taken by public may not be of good quality, as some of them may be captured from a distance without the knowledge of the child. A deep learning [1] architecture considering all these constrain is designed here. The proposed system is comparatively an easy, inexpensive and reliable method compared to other biometrics like finger print and iris recognition systems.

LITERATURE SURVEY

A Missing Child Identification System is a critical application that leverages technological advancements to enhance the speed and accuracy of locating missing children. This literature survey explores key research and developments in the field, encompassing various technologies and methodologies aimed at improving the efficiency of missing child identification systems.

An Integrated Approach for Child Identification in Crowded Environments" A. Sharma, et al. This paper proposes an integrated system using facial recognition and crowd analytics for identifying missing children in crowded places. It explores the challenges of real-time identification and discusses the fusion of multiple technologies to improve accuracy.

IoT-based Wearable Devices for Child Safety, B. Patel, et al. The focus of this work is on IoT-based wearable devices designed for child safety. The paper discusses the integration of GPS and biometric sensors in wearable accessories to monitor a child's location and vital signs, enhancing real-time tracking and identification.

Facial Recognition Technology in Missing Persons Investigations, C. Liu, et al. This research delves into the applications of facial recognition technology in missing persons investigations. It discusses the challenges and ethical considerations associated with its implementation, along with potential enhancements for better accuracy.

Biometric Technologies for Child Identification: A Review, D. Gupta, et al. The paper provides a comprehensive review of biometric technologies for child identification, covering fingerprints, iris scans, and facial recognition. It evaluates the strengths and limitations of each method and suggests potential integration strategies.

Real-time Location Systems for Child Tracking in Public Places, E. Chen, et al. This work focuses on real-time location systems (RTLS) for child tracking in public spaces. It explores the use of RFID and GPS technologies to monitor and locate children, emphasizing the importance of accuracy and responsiveness in critical situations.

In conclusion, this literature survey highlights the diverse array of technologies and methodologies employed in Missing Child Identification Systems. From biometrics to IoT devices, blockchain, and machine learning, researchers are continually innovating to enhance the speed, accuracy, and ethical considerations of locating missing children. As technology evolves, the integration of multiple approaches offers a holistic solution to address the complex challenges associated with child identification and recovery.

PROPOSED SYSTEM

Here we propose a methodology for missing child identification which combines facial feature extraction based on deep learning and matching based on KNN. The proposed system utilizes face recognition for missing child identification. This is to help authorities and parents in missing child investigation. It consists of a national portal for storing details of missing child along with the photo. Whenever a child missing is reported, along with the FIR, the concerned officer uploads the photo of the missing child into the portal. Public can search for any matching child in the database for the images with them. The system will prompt the most matching cases. Once the matching is found, the officer can get the details of the child. Data processing Preprocessing input raw image in the context of face recognition involves acquiring the face region and standardizing images in a format compatible with the CNN architecture employed. Each CNN has a different input size requirement. The photographs of missing child acquired by a digital camera or mobile phone are taken and categorized into separate cases for creating the database of face recognition system. The face region in each image is identified and cropped for getting the input face images.

A missing child identification system is proposed, which combines the powerful CNN based deep learning approach for feature extraction and support vector machine classifier for classification of different child categories. This system is evaluated with the deep learning model which is trained with feature representations of children faces. By discarding the soft max of the VGG-Face model and extracting CNN image features to train a multi class SVM, it was possible to achieve superior performance. Performance of the proposed system is tested using the photographs of children with different lighting conditions, noises and also images at different ages of children. The classification achieved a higher accuracy of 99.41% which shows that the proposed methodology of face recognition could be used for reliable missing children identification.

The first step of the system is image acquisition. It will be done by High-quality images of the person are obtained through digital cameras, cell phone cameras, or scanners.A Knowledge-based database is created by collecting all the details of users.The obtained images that will be engaged in a preprocessing step are further enhanced specifically for image features during processing. The segmentation process divides the images into several segments and utilized in the extraction of the person's face from the background.This section involves the convolutionary layers that obtain image features from the resize images and is also joined after each convolution with the ReLU. Max and average pooling of the feature extraction decreases the size. Ultimately, both the convolutional and the pooling layers act as purifiers to generate those image characteristics.The final step is to classify images, to train deep learning models along with the labeled images to be trained on how to recognize and classify faces according to learned visual patterns. The authors used an open-source implementation via the TensorFlow module, using Python and OpenCV including the VGG-16 CNN model.

RESULTS

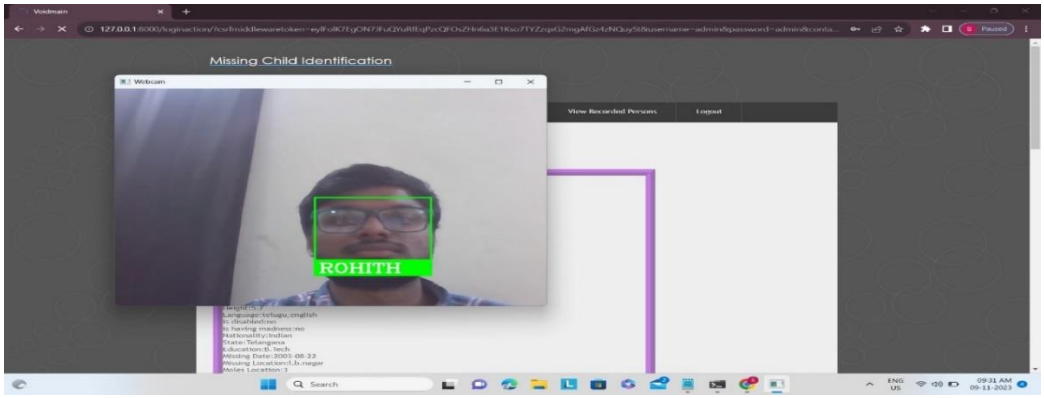

Fig 1 Recorded Patterns

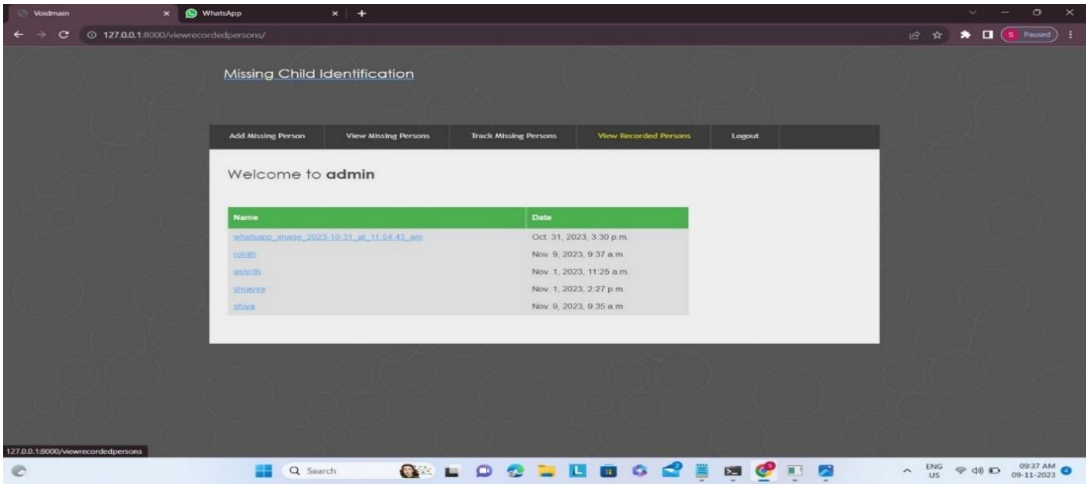

Fig 2 Output screenshots

CONCLUSION

A missing child identification system is proposed, which combines the powerful CNN based deep learning approach for feature extraction and support vector machine classifier for classification of different child categories. This system is evaluated with the deep learning model which is trained with feature representations of children faces. By discarding the softmax of the VGG-Face model and extracting CNN image features to train a multi class SVM, it was possible to achieve superior performance. Performance of the proposed system is tested using the photographs of children with different lighting conditions, noises and also images at different ages of children. The classification achieved a higher accuracy of 99.41% which shows that the proposed methodology of face recognition could be used for reliable missing children identification.

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