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[1]*Mr.T.Abdul Raheem*
[2]*Ganapa Sathish*
[3]*Kummari Bheemesh*
[4]*Diwan Shashavali*
[5]*Kamsali Vineeth*
[6]*Suripogula Pavanra*

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MISSING CHILD IDENTIFICATION SYSTEM USING DEEP LEARNING AND MULTICLASS SVM

[1]Mr.T.Abdul Raheem,[2]Ganapa Sathish,[3]Kummari Bheemesh,[4]Diwan Shashavali,[5]Kamsali Vineeth,[6]Suripogula Pavanraj
[1]Assistant Professor,[23456]Students
Department Of CSE
St. Johns College of Engineering & Technology, Errakota, Yemmiganur

ABSTRACT
Every year, a vast number of children in India are reported as missing. A significant proportion of missing kid situations result in the youngsters being untraced. This research introduces a new use of deep learning techniques to find missing children based on photographs of a large number of youngsters, using facial recognition technology. Members of the public have the ability to submit images of potentially suspect children to a shared online platform, along with accompanying details and descriptions. The picture will undergo an automated comparison with the recorded images of the missing kid stored in the repository. The supplied kid photograph is classified and the photo with the closest match will be picked from the database of missing children. In this process, a deep learning model is trained to accurately recognize the missing kid by using the face picture submitted by the public and comparing it with the missing child image database. Face recognition in this context utilizes the Convolutional Neural Network (CNN), a powerful deep learning method specifically designed for image-based tasks. Face descriptors are obtained from the photos by using a pre-trained Convolutional Neural Network (CNN) model called VGG-Face, which is based on a deep architecture. Our technique differs from typical deep learning applications in that it use a convolutional network just as a means of extracting high-level features. The actual detection of children is then performed by a trained SVM classifier. By selecting the most effective CNN model, VGG-Face, and properly training it, a deep learning model can be created that is unaffected by noise, illumination, contrast, occlusion, image pose, and the age of the child. This model surpasses previous methods in identifying missing children based on face recognition. The kid identification system had a classification performance of 99.41%. The evaluation was conducted on 43 instances involving children.

I. INTRODUCTION

Children are the most valuable resource of any country. The destiny of a nation is contingent upon the proper nurturing and education of its youth. India is the second most populated nation globally, with children comprising a substantial proportion of the overall population. Regrettably, a significant number of children in India go missing annually for numerous causes, such as abduction or kidnapping, children who run away, children who are trafficked, and children who are misplaced. An alarming reality about India's missing children is that, on average, 174 children disappear each day, with half of them remaining unlocated. Missing children are vulnerable to exploitation and abuse for many objectives. According to the National Crime Records Bureau (NCRB) report, which was referenced by the Ministry of Home Affairs (MHA) in Parliament (LS Q no. 3928, 20-03-2018), a total of 111,569 children were reported missing until 2016. Out of these, 55,625 children were still unaccounted for by the end of the year.

Several non-governmental organizations assert that the number of missing children is far more than what is officially reported. The majority of situations involving missing children are reported to the police. The youngster who is absent from one location may be located in another region or state due to numerous factors. Therefore, even in the event that a kid is located, it is challenging to ascertain their identity from the pool of reported missing instances. This research presents a structure and technique for creating an assistive tool specifically designed for tracking missing children. A proposal is made to establish a virtual area where current images of missing children, provided by parents during the reporting process, are stored in a repository. The public is provided with the option to freely capture images of youngsters in questionable scenarios and submit them to that site. The program will provide automatic searching of this picture inside the database of missing child case photographs.

This enables law enforcement personnel to track the whereabouts of the youngster across India. When a kid is located, the picture taken at that moment is compared to the photographs that were supplied by the Police or guardian when the child went missing. Occasionally, the youngster has been absent for an extended duration. The age difference is evident in the photographs since the process of aging impacts the facial structure and skin quality. We need to develop a feature discriminator that is not affected by aging effects. The issue lies in the detection of missing children, which sets it apart from other facial recognition algorithms. The facial look of a kid might vary owing to factors such as variations in stance, orientation, lighting, occlusions, and noise in the background. The photographs taken by the public may lack high quality, since some of them may be obtained from a considerable distance without the child's awareness. An architecture for deep learning, taking into account all of these constraints, has been developed here. The suggested technology provides a cost-effective and dependable alternative to current biometric methods such as fingerprint and iris recognition systems.

II. SYSTEM ANALYSIS

EXISTING SYSTEM

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.

DISADVANTAGES:

Earliest methods for face recognition commonly used computer vision features such as HOG, LBP, SIFT, or SURF. However, features extracted using a CNN network for getting facial representations gives better performance in face recognition than handcrafted features.

PROPOSED SYSTEM

This paper presents a novel use of deep learning methodology for identifying the reported missing child from the photos of multitude of children available, with the help of face recognition. The public can upload photographs of suspicious child into a 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.

ADVANTAGES:

A deep learning 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.

SYSTEM ARCHITECTURE

WORK FLOW OF FACE RECOGNITION Here we propose a methodology for missing child identification which combines facial feature extraction based on deep learning and matching based on support vector machine. The proposed system utilizes face recognition for missing child identification. This is to help authorities and parents in missing child investigation. The architecture of the proposed frame work is given below

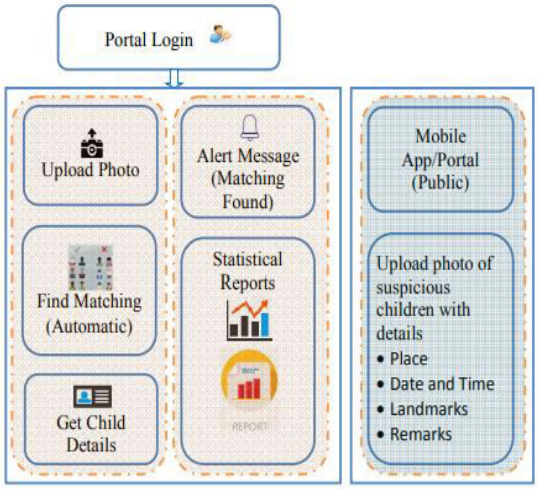

Fig: 1. Architecture of proposed child identification system

III. IMPLEMENTATION

MODULES

A.Face Detection

Firstly, face patterns are generated using Histogram of Oriented Gradients (HOG) algorithm. The images are made black and white. Here, the part of the images that looks more like the original HOG face pattern is found. Finally, the detected face is bounded by a bounding box.

B.Extraction : Sixty eight specific points (landmarks) that are existing on every face are figured out by using the face landmark estimation algorithm. From the landmarks found, image transformations like scaling, shearing and rotation are used by the OpenCV's affine transformation to make the lips and eyes appear in the same location on every image.

C.FeaturesComparison : The face images are then passed through deep convolutional neural network. By doing this, we obtain 128 measurements which are 128 dimension hypersphere. And no one knows which parts of the face the 128 measurements representing. All we know is that the network outputs the same 128 numbers for two different images of the same person.

D.Result Matching: Finally, a linear SVM classifier is used to recognize the face. The classifier has been trained in such a way that it can take the measurements from a test image and gives the closest match as output.

IV. CONCLUSION

A suggested method aims to integrate a CNN-based deep learning technique for extracting features with a support vector machine classifier for categorizing various types of missing children. This system is assessed using a deep learning model that has been built using feature representations of children's faces. Superior performance was achieved by removing the softmax layer of the VGG-Face model and using CNN image features to train a multi-class SVM. The performance of the proposed system is evaluated by testing it with pictures of children under various lighting situations, levels of noise, and at different ages. The classification attained a superior accuracy of 99.41%, indicating that the suggested approach for facial recognition might be used for dependable identification of missing children.

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