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A ROBUST IDENTIFYING MISSING CHILD USING DEEP LEARNING AND SVM

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ABSTRACT: In India a countless number of children are reported missing every year. Among the missing child cases a large percentage of children remain untraced. 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.

The Convolutional 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 pre-trained CNN model VGG-Face deep architecture. Compared with normal deep learning applications, our algorithm uses 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, VGG-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 missing child identification. The classification performance achieved for child identification system is 99.41%. It was evaluated on 43 Child cases.

1. 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 55,625of 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. child is found, it is difficult to identify him/her from the reported missing cases. A framework and methodology for

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developing an as 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 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

2. LITERATURE SURVEY

Title : " Deep knowledge"

Author-1: Y. LeCun,Y.Bengio, andG. Hinton,"

Content: Deep knowledge", Nature, 521 (7553) 436 – 444, 2015. Deep knowledge allows computational models that are composed of multiple processing layers to search out representations of knowledge with multiple situations of abstraction. These styles have dramatically bettered the state-of-the- art in speech recognition, visual beholding, object discovery and cornucopia of other disciplines like drug discovery and genomics. Deep knowledge discovers intricate structure in large data sets by using the back propagation algorithm to point how a machine should change its internal parameters that are accustomed cipher the representation in each caste from the representation with in the former caste. Deep convolutional nets have led to advancements in processing images, video, speech and audio, whereas intermittent nets have shone light on successive data like text and speech.

TITLE: "histograms of acquainted slants are used for Face recognition"

Author-2: O. Deniz,G. Bueno, J. Salido, and F.D. la Torre

Content: Pattern Recognition Letters, 32 (12) 1598 – 1603, 2011. Still-to- video face recognition (FR) plays a awfully important part in video surveillance, allowing to admit individualities of interest over a network of video cameras. Watch-list netting may possibly be a challenging video surveillance operation, because faces captured during enrollment (with still camera) may differ significantly from those captured during operations (with surveillance cameras) under hysterical internee conditions (with variations in,e.g., disguise, scale, illumination, occlusion, and blur). Also, the facial models used for identical are generally designed a priori with a limited number of reference stills. during this paper, a multi-classifier system is proposed that exploits sphere adaptation and multiple representations of face captures .A specific ensemble of exemplar-SVM (eSVM) classifiers is supposed to model the only real reference still of every target existent, where different arbitrary sub spaces, patches, and face descriptors are employed to return up with a various pool of classifiers. to boost soundness of face SVMs are trained using the limited number of labeled faces in reference stills from the enrollment sphere, and an cornucopia of unlabeled faces in

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estimation vides from the functional sphere. Given the force of 1reference target still, a specialized distance predicated criteria is proposed supported parcels of e-SVMs for dynamic selection of the foremost competent classifiers per inquiry face. The proposed approach has been associated to exposure systems for still to video FR on vides from the COX-S2V dataset.

3 EXISTING SYSTEM

Earliest methods for face recognition commonly used computer vision features such as HOG, LBP, SIFT, or SURF.

Each face image corresponds to a child and child face recognition is considered as an image category classification problem.

Disadvantages:

- A deeply disturbing fact about India's missing children is that while on an average174 children go missing every day, half of them remain untraced.
- There is so system to identify the photographs of children with different lighting conditions, noises and also images at different ages of children.

4. PROPOSED SYSTEM

Identification is proposed which employees principal component analysis using Eigenvectors is used for face recognition system. 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 This system is evaluated with the deep learning model which is trained with feature representations of children faces.

Advantages

- The proposed system is comparatively an easy, inexpensive and reliable method compared to other bio-metrics like finger print and iris recognition systems.
- Features extracted using a CNN network for getting facial representations gives betterperformance in face recognition than handcrafted features.

5. METHODOLOGY

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. 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. The system also generates various statistical reports. The public can upload photo of any suspicious child at any time into the portal with details like place, time, landmarks and remarks. The photo uploaded by the public will be automatically compared with photos of the registered missing children and if a matching photo with sufficient score is found, then an alert message will be sent to the concerned officer. The message will also be visible in the message box of the concerned officer login screen. The portal for the public can also be maintained as a mobile app, where he or she can upload photo of suspicious children with details. In the mobile app, location of the person updating the photo will also be automatically recorded. Whenever public uploads photo of a suspected child, the system generates template vector of the facial features from the uploaded photo. If a matching is found in the repository, the system displays the most matched photo

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and pushes a message to the concerned Officer portal or SMS the alert message of matching child. Similarly the Officer can check for any matching with the database at any time using the proposed system.

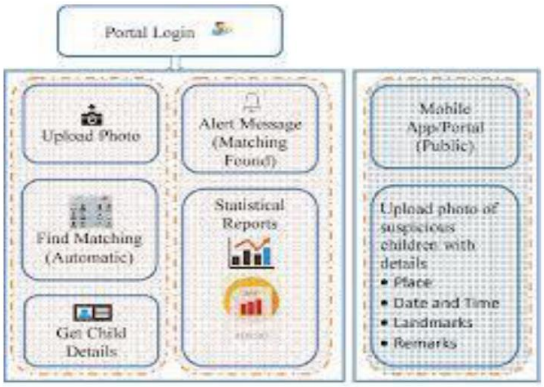


Fig: System Architecture

6. IMPLEENTATION

Face Detection 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.

Extraction:

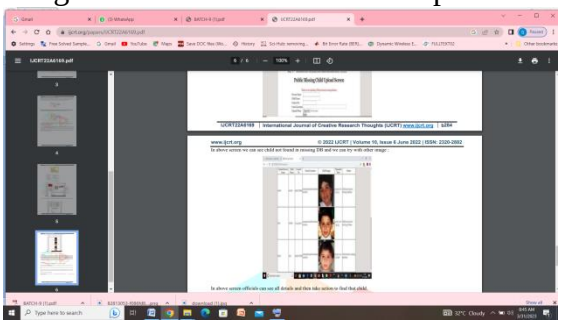
Sixty eight specific points (landmarks) that are existing on every face are figured out by using the face landmark estimation algorithm. From the landmarks found, image transformations like scaling, shearing and rotation are used by the Open CV's affine transformation to make the lips and eyes appear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

Features Comparison:

The face images are then passed through deep convolutional neural network. By doing this, we obtain 128 measurements which are 128-dimension hyper sphere. 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.

7. 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.



8. CONCLUSION:

A missing child identification system is proposed, which combines facial feature extraction based on deep learning and matching based on LBPH. We use the Gabor filter for iris detection. The classification achieved a higher accuracy of 90%which proposed methodology of face recognition could be used for reliable missing children identification.

FUTURESCOPE:

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.

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