Nearest Neighbor for Missing Child Identification

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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. 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.**

Index Terms— **Missing child identification, face recognition, deep learning, CNN, VGG-Face, KNN**

I. 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. 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.

II. 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. 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.

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III. LITERATURE SURVEY

Zhongfei Zhang;Srihari, R.K.; Rao,A. This paper presents a face detection technique and its applications in image retrieval. Even though this face detection method has relatively high false positives and low detection rate (as compared with the dedicated face detection systems in the literature of image understanding), due to its simple and fast nature, it has been shown that this system may be well applied in image retrieval in certain focused application domains. Two application examples are given: one combining face detection with indexed collateral text for image retrieval regarding human beings, and the other combining face detection with conventional similarity matching techniques for image retrieval with similar background.

Ji Tao;Yap-Peng Tan, In this paper, we propose a novel approach to automatic detection and clustering of human faces presented in videos. In each video shot, continuously appearing human faces are firstly associated to form face sequences. Instead of matching the face sequences directly, we partition them into subsequences consisting of similar poses for the ease of comparison. Face subsequences can then be clustered by graph partitioning with the computed affinity matrix. Prior to that, however, a set of constraints need to be formulated so as to incorporate domain knowledge into the graph. Moreover, we propose a constraint propagation algorithm to fully exploit the space-level implications of these constraints.

Ryo Ariizumi, Shigeo Kaneda, Hirohide Haga, A major part of electric power is supplied by thermal power stations, which emit carbon dioxide (CO2) while generating electricity. Today, since we consume a lot of electricity, we are threatened by environmental problems including global warming. One of the key points for solving these problems is developing energy-saving appliances. Televisions, which are widely used in the home, can achieve energy savings by reducing the brightness of the screen. However, unless a user adjusts it, the TV maintains the same brightness. A hand-made signal transmitter and signal receiver were also used to change the brightness of the TV. As a result of an experiment with the prototype system, we could confirm a 30% reduction of the TV's watt-hours.

IV. 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.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 KNN 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 proposed system utilizes face recognition for missing child identification. This is to help authorities and parents in missing child investigation.

V. RESULTS AND DISCUSSIONS

The face identification algorithm is implemented using MATLAB 2018a platform. The experiments are carried on Microsoft Windows 7, 64 bit Operating System with Intel core i7, 3.60GHz processors having 32GB RAM. For dealing with CNN architectures additional processing capability is needed. Use of GPU is recommended for training the models and Nvidia GeForce TitanX 12GB graphics card is used.

The user defined database includes 846 child face images with 43 unique children cases. Training and test set is prepared by splitting the database images. 80% of images from each child category are selected for training and 20% for testing, resulting in 677 training set images and 169 test set images. The training set and validation set consists of images of each child in the earlier days and testing is done with images of children after an age gap to evaluate the system in all conditions.

CNN implementation is based on MatConvNet package [9] with deep integration of CNN building blocks in MATLAB environment. Pre-trained VGG-Face CNN is also provided by MatConvNet. For the experiments here MatConvNet 1.0-beta25 version is downloaded and used.

The training set images are preprocessed to the size specified by the CNN architecture before passing to the CNN model. The face region is cropped within a rectangular region from every image of the acquired input database. The images fed to VGG-Face are of fixed size by rescaling to 224x224. The activations to the input image produced by the first fully connected layer of the VGG-Face network architecture is taken as the CNN Feature descriptor. The normalized feature vector, each having a length of 4096, is used for training the KNN classifier for classifying the image of face and recognizes the child.

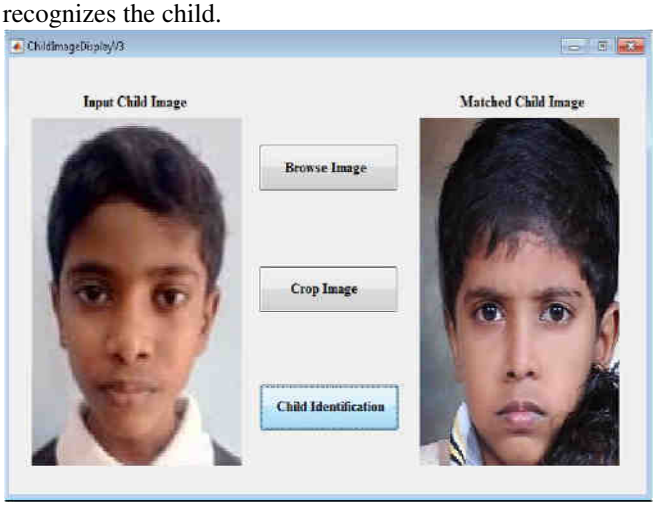

Fig. 4. GUI for child identification showing an input image and matched output image in the database

To assess the flexibility of face recognition deep architecture against variations in image quality, artificially degraded images are created. Images obtained by changing noise level, brightness, contrast, lighting conditions, obstructions, blur, aspect ratio and face positions are used for testing the child identification system.

Face identification accuracy is computed as the ratio of correctly identified face images to the total number of child face images in the test set.

CONCLUSION AND 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. The classification achieved a higher accuracy which shows that the proposed methodology of face recognition could be used for reliable missing children identification.

In the future, we are planning to extend this system further by connecting our system to public cameras and detect faces real-time. The frames will be continuously sent by the public cameras to our system where our system will be continually monitoring the frames. When a lost person is identified in any of the frames, it will be notified to the concerned authorities.

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