



## **A NOVEL USE OF DEEP LEARNING METHODOLOGY FOR IDENTIFYING THE REPORTED MISSING CHILD**

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*Abstract* — 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.

### **INTRODUCTION**

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.

### LITURATURE SURVEY

**1. Y. LeCun, Y. Bengio, and G. Hinton, "Deep learning", *Nature*, 521(7553):436–444, 2015.**

Deep learning allows computational models that are composed of multiple processing layers to learn representations of data with multiple levels of abstraction. These methods have dramatically improved the state-of-the-art in speech recognition, visual object recognition, object detection and many other domains such as drug discovery and genomics. Deep learning discovers intricate structure in large data sets by using the back propagation algorithm to indicate how a machine should change its internal parameters that are used to compute the representation in each layer from the representation in the previous layer. Deep convolutional nets have brought about breakthroughs in processing images, video, speech and audio, whereas recurrent nets have shone light on sequential data such as text and speech.



**2. O. M. Parkhi, A. Vedaldi, and A. Zisserman, "Deep Face Recognition," in British Machine Vision Conference, vol. 1, no. 3, pp. 1-12, 2015.**

The goal of this paper is face recognition -- from either a single photograph or from a set of faces tracked in a video. Recent progress in this area has been due to two factors: (i) end to end learning for the task using a convolutional neural network (CNN), and (ii) the availability of very large scale training datasets. We make two contributions: first, we show how a very large scale dataset (2.6M images, over 2.6K people) can be assembled by a combination of automation and human in the loop, and discuss the trade off between data purity and time; second, we traverse through the complexities of deep network training and face recognition to present methods and procedures to achieve comparable state of the art results on the standard LFW and YTF face benchmarks.

**3. A. Vedaldi, and K. Lenc, "MatConvNet: Convolutional Neural Networks for MATLAB", ACM International Conference on Multimedia, Brisbane, October 2015.**

MatConvNet is an implementation of Convolutional Neural Networks (CNNs) for MATLAB. The toolbox is designed with an emphasis on simplicity and flexibility. It exposes the building blocks of

CNNs as easy-to-use MATLAB functions, providing routines for computing linear convolutions with filter banks, feature pooling, and many more. In this manner, MatConvNet allows fast prototyping of new CNN architectures; at the same time, it supports efficient computation on CPU and GPU allowing to train complex models on large datasets such as ImageNet ILSVRC. This document provides an overview of CNNs and how they are implemented in MatConvNet and gives the technical details of each computational block in the toolbox.

### **PROPOSED METHOD**

Earliest methods for face recognition commonly used computer vision features such as HOG, LBP, SIFT, or SURF [2-3]. However, features extracted using a CNN network for getting facial representations gives better performance in face recognition than handcrafted features.

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.

### **IMPLEMENTATION**

- Data Collection
- Data Preprocessing
- Training And Testing
- Modiling
- Predicting

### Missing Child Identification System using Deep Learning and Multiclass SVM

In this paper author is describing concept to identify missing children by using Deep Learning and Multiclass SVM classifier and to implement this project author has used below modules

- 1) Using public dataset of missing children's called FGNET is used to train deep learning CNN prediction model. After training model whenever public upload any suspected child image then this model will check in trained model to detect whether this child is in missing database or not. This detected result will store in database and whenever want official persons will login and see that detection result.
- 2) SVM Multiclass classifier use to extract face features from images based on age and other facial features and then this detected face will input to CNN model to predict whether this face child exists in image database or not.

### SAMPLE RESULTS



### 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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