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MISSING CHILD IDENTIFICATION SYSTEM USING DEEP LEARNING AND MULTICLASS SVM

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ABSTRACT

Numerous Indian children go missing each year. Many missing children go unfound. This article uses deep learning and facial recognition to identify a missing kid from a large number of child images. Public portals allow uploading suspicious kid photos with places and comments. The picture will be automatically compared to the repository's missing kid photographs. Classifying the supplied kid picture selects the best match from the missing children database. Using public face images, a deep learning model is trained to properly identify the missing kid from the missing child picture database. For facial recognition, the Convolutional Neural Network (CNN) is used. Pre-trained CNN model VGG-Face deep architecture extracts face descriptors from photos. Our technique employs convolution network just as a high-level feature extractor and SVM classifier for kid identification, unlike deep learning applications. VGG-Face, the best CNN model for face recognition, and adequate training provide a deep learning model invariant to noise, lighting, contrast, occlusion, picture posture, and kid age that surpasses prior approaches in missing child identification. Child identification system categorization is 99.41%. 43 Childcases were examined.
KEY WORDS: Missing child identification, face recognition, deep learning, CNN, VGG-Face, Multi class SVM..

1. INTRODUCTION

The most valuable resource that every country has is its young population. The proper upbringing of a nation's next generation is essential to that nation's success in the future.

Children make up a considerable proportion of India's overall population despite the fact that the nation has the world's second highest population density. Unfortunately, a significant number of children vanish every year in India for a variety of causes, including abduction or kidnapping, runaway children, children who are trafficked, and misplaced children. The fact that just half of India's missing children have been located is one of the most upsetting aspects of the country's child population crisis. On average, 174 children go missing every single day in India. Children who are reported missing run the risk of being used and mistreated for a variety of reasons. According to the report from the National Crime Records Bureau (NCRB), 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 were reported to have gone missing till 2016, and 55,625 of them remained untraced until the end of the year. In actual numbers, this number was 1,11,569 children. Many nongovernmental organizations (NGOs) hold the belief that the actual number of children who go missing is substantially greater than what is reported. The majority of situations involving missing children are brought to the attention of law enforcement. For a variety of circumstances, the kid who has been reported missing from one location may have been moved to another region or state. Therefore, even if a kid is located, it will be difficult to distinguish that youngster from the other children who have been reported missing. In this research, both a conceptual framework and a technique for the creation of an assisting tool for the search for a missing kid are detailed. It has been suggested that a virtual location be kept up-to-date in order to house a repository for the most current images of children that were provided by their parents at the time that they reported their children as missing.

The public is granted permission to freely snap images of youngsters in potentially dangerous settings, and those photographs may then be submitted to that website. Within the program, a feature that allows for automatic searching of this picture among the missing kid case photographs will be supplied. This provides the authorities all the help they need to find the youngster wherever in India. When a kid is located, the picture taken at that time is compared to the photographs that the police or guardian had uploaded at the time the child was reported missing. Sometimes it has been a significant amount of time since the youngster was last seen. This age difference is reflected in the photos since aging changes the contours of the face as well as the way the skin looks and feels. It is necessary to develop the feature discriminator that is invariant to the effects of aging. When contrasted to other facial recognition systems, this is the problem presented by the detection of missing children. Additionally, the facial look of a kid may alter owing to changes in stance, orientation, lighting, occlusions, or background noise, among other factors. There is a possibility that the photograph shot by the public is not of high quality since some of them may have been taken at a distance without the child's awareness.

2. LITERATURE SURVEY

The first approaches for face identification often included the use of computer vision characteristics such as HOG, LBP, SIFT, or SURF [2, 3]. However, the results of face recognition are improved when features are handmade instead of retrieved via a CNN network for generating facial representations. [4] makes a suggestion for the identification of missing children, in which the principal component analysis and Eigen vectors used by workers of the facial recognition system are applied. It is possible for users to look for other members of the social network VK by submitting an image to the website known as FindFace [5]. FindFace makes use of a facial recognition neural network algorithm that was built by N-Tech Lab in order to match faces in images that were submitted by its users with faces that were published on VK, with a stated success rate of 90%.

Deep Knowledge by Y. LeCun, Y. Bengio, and G. Hinton, published in Nature 521 (7553), pages 436–444, in the year 2015.

Deep knowledge makes it possible for computer models to seek for representations of knowledge that include several circumstances of abstraction. These models are constructed of numerous processing layers. The current

state of the art in voice recognition, visual beholding, object finding, as well as a plethora of other fields like as drug development and genetics, has been significantly improved as a result of these techniques. Deep knowledge can find intricate structures hidden within large data sets by employing an algorithm known as backpropagation, which indicates to a machine how its internal parameters, which are used to cipher the representation in each caste based on the representation in the caste that came before it, should be altered. Deep convolutional networks have led to breakthroughs in the processing of pictures, video, voice, and audio. Intermittent networks, on the other hand, have shed light on sequential data such as text and speech.

Histograms of familiar slants are employed for face identification, according to O. Deniz, G. Bueno, J. Salido, and F.D. la Torre, as published in Pattern Recognition Letters, Volume 32, Issue 12, Pages 1598–1603 in 2011.

Still-to-video face recognition, often known as FR, is an extremely useful tool for conducting video surveillance since it enables the identification of people of interest across an entire network of surveillance cameras. Faces taken during enrollment (with a still camera) may vary greatly from those caught during operations (with surveillance cameras) under hysterical internee settings, which makes watch-list netting a potentially problematic video surveillance operation (with variations in,e.g., disguise, scale, illumination, occlusion, and blur). Additionally, the face models that are used for identical are often developed a priori using just a few reference stills.

During the course of this study, a multi-classifier system that takes use of sphere adaptation and numerous representations of face captures is developed. Different arbitrary subspaces, patches, and face descriptors are utilized in order to come up with a diverse pool of classifiers, and a particular ensemble of exemplar-SVM classifiers, also known as eSVM, is intended to model the only real reference that is still present for each and every target that is currently in existence. to improve the overall soundness of the face SVMs are trained using a small number of labeled faces in reference stills taken from the enrollment sphere and a large number of unlabeled faces taken from estimate videos taken from the functional sphere.

Given the presence of one reference target still, a customized distance-based criterion that is supported by parcels of e-SVMs has been developed for the dynamic selection of the most capable classifiers for each query face. The suggested method has been connected to exposure systems in order to perform still-to-video FR on videos taken from the COX-S2V dataset. According to the findings, an ensemble of e-SVMs developed with estimate vids for sphere adaptation and dynamic ensemble selection achieves a high position both in terms of FR delicacy and computational efficiency. IEEE International Conference on Image Processing (ICIP), 2009. 2.3 C. Geng and X. Jiang, "Face identity utilizing sift features." It has been shown that the Scale-Steady-Point Transform, or SIFT, is an effective method for generic object identification and finding. In this research, we offer two novel methods for face identification called Volume-SIFT (VSIFT) and Partial-DescriptorSIFT (PDSIFT). Both of these methods support the original SIFT technique. We contrast the point predicated techniques SIFT and PDSIFT with the holistic approaches Fisherface (FLDA), the set approach (NLDA), and Eigenfeature Regularization and Birth (ERE). Experiments conducted on the ORL and AR databases demonstrate that the PDSIFT act is substantially superior than the original

SIFT manner of doing things. PDSIFT is also capable of performing at the same level as the most successful holistic technique, ERE, and greatly beats FLDA and NLDA in this regard.

Photos of children who have gone missing are saved in a database using a technique called Deep Learning-based Facial Feature Extraction, which works in coordination with SVM (Support Vector Machine). A Convolutional Neural Network is used to analyze the photos in order to discover faces and then learn the characteristics of those faces. These newly learnt characteristics were used into the training of a multi-class support vector machine classifier. They successfully identified and categorized the child via the use of this procedure. The most important distinction between their work and ours is that in our system, once a lost person is found, and if the person's face is not already existing in the database, the public who found that person can register that face as a lost person with the situation they found him or her in our portal, which wasn't proposed in their system. In contrast, in their work, once a lost person is found, and if the person's face is not already existing in the database, the public who found that person The search procedure will go more quickly as a result of this. In addition, their system is comprised of intricate algorithms, all of which serve to slow down the extraction and classification processes. These are the most significant drawbacks of the systems that were in place in the past. [1]

A technique known as Principal Component Analysis (PCA) was used in the construction of a face recognition system. The primary drawbacks of employing the PCA approach are the high computational cost of the procedure and the fact that it can only analyse faces that have facial expressions that are quite similar to one another. [2] The LBPH approach can identify people's faces. A face recognition accuracy of 70.5% was achieved by the suggested method. The LBPH algorithm does not pay attention to the degree to which brightness varies. [3] Because SIFT is based on the Histogram of Gradients, which requires the calculation of each pixel in the patch, it is computationally intensive and, as a result, takes a significant amount of time. [4] The Line Edge Method (LEM) is used for facial identification in the search for persons who have gone missing. The system operated at an efficiency level of 85%. [5] An identifying system for missing persons that makes use of radio frequency identification technology [6] One of the drawbacks of this method is that the individual being monitored is required to physically wear the RFID tag at all times, which is not possible.

3. PROPOSED SYSTEM

In this paper, an unique application of deep learning technique is presented for the purpose of identifying the kid who has been reported missing from among the images of a multiplicity of children that are accessible using facial recognition. The general population is given the ability to post images of children that raise suspicion into a central database along with landmarks and comments. The photograph will be mechanically checked with the recorded photographs of the kid who has gone missing, which may be found in the repository. A classification of the child's picture that was provided as input is carried out, and the image from the database of missing children that provides the best match will be chosen. For this purpose, a deep learning model is trained to accurately identify the missing kid by utilizing the face picture that was supplied by the public and the missing child image database that was given by the organization.

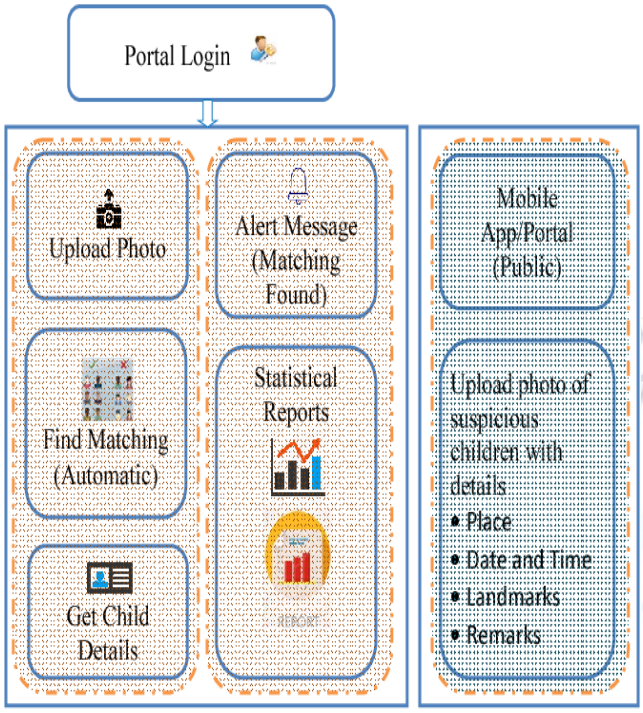
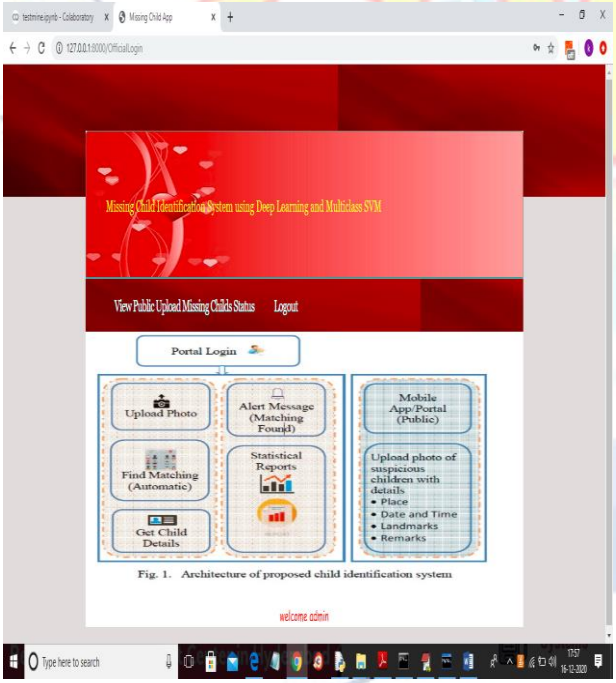


Figure 1: Proposed System Architecture

4. RESULTS



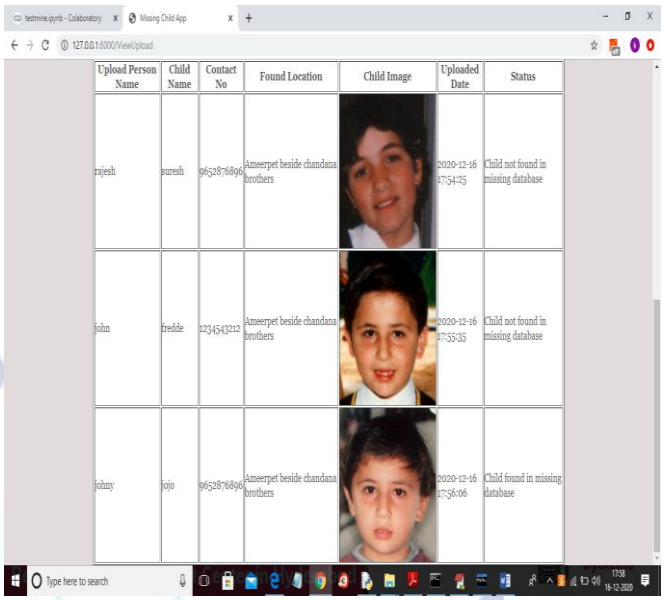


Figure 2: Prediction Result

5. CONCLUSION

A strong CNN-based deep learning strategy for feature extraction and a support vector machine classifier for categorization of distinct kid categories are combined in the proposed method for identifying missing children. This method uses the support vector machine classifier. The deep learning model, which is trained using feature representations of children's faces, is used to conduct the evaluation of this system. It was able to attain improved performance by doing the following: removing the softmax from the VGG-Face model; extracting CNN image features; and training a multi class support vector machine. The performance of the proposed system is evaluated using pictures of children taken under a variety of lighting circumstances and with varying levels of background noise, as well as images of children at varying ages. The classification reached a better accuracy of 99.41%, which demonstrates that the suggested approach of facial recognition might be employed for accurate identification of missing children.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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