International Journal of Research in Engineering, Science and Management
Volume-3, Issue-4, April-2020
www.ijresm.com | ISSN (Online): 2581-5792

Mobile Application for Human Facial Recognition to Identify Criminals and Missing People Using Tensor Flow

R. Jhanani[1], S. Harshitha[2], T. Kalaichelvi[3], V. Subedha[4]
[1,2]*Student, Department of Computer Science & Engineering, Panimalar Institute of Technology, Chennai, India*
[3,4]*Professor, Department of Computer Science & Engineering, Panimalar Inst. of Technology, Chennai, India*

***Abstract*: A biometric software application capable of solely distinguishing or substantiating a person by comparing and analyzing patterns supporting the person's contours from a digital image or a frame from a video source. There are multiple methods through which face recognition systems work, but generally, they work by comparing and contrasting selected countenance from given image with faces within a database. It's also described as a Biometric AI application which may identify a person by detecting patterns supporting the person's facial features and texture. A face recognition system uses bio metrics to map countenance from a photograph or video. Three-dimensional face recognition technique uses 3D sensors to capture information about the form of a face. This information is then used to identify distinctive features on the surface of a face, a bit like the contour of the attention sockets, nose, and chin. One advantage of 3D face recognition is that; it's not suffering from changes in lighting like other techniques. It also can identify a face from a variety of viewing angles, including a profile view. 3D data points from a face widely improves the accuracy of face recognition. A new method is to introduce how to capture a 3D picture by using tracking cameras that time at different angles; a camera is going to be pointing at the front, left and right view of the topic. All these images will work together so it can track a subject's face in real time and be ready to detect the face and recognize. It then compares the knowledge with a database of known faces to seek out a match. When the face of the missing person has been recognized it'll automatically send the geo-location to the police headquarters e-mail and therefore the one that has filed the FIR.**

***Keywords*: 3D face recognition, Biometric software application, Camera, Geo location, Person, 3D picture, 3D sensors.**

1. Introduction

Face recognition automatically determines if two faces are likely to correspond to an equivalent person. Note that at this point, the Google Face API only provides functionality for face detection and not face recognition. Face detection is the process of automatically identifying human faces in visual media. A face that's detected is reported at an edge with an associated size and orientation. Once a face is detected, it is often looked for landmarks like the eyes and nose. Face tracking extends face detection to video sequences. Any face appearing during a video for any length of your time are often tracked. That is, faces that are detected in consecutive video frames are often identified as being an equivalent person. Note that this is often not a sort of face recognition; this mechanism just makes inferences supported the position and motion of the face(s) during a video sequence. A landmark is a point of interest within a face. The left eye, right eye, and nose base are all samples of landmarks. The Face API provides the power to seek out landmarks on a detected face. Classification is determining whether a particular facial characteristic is present. For example, a face is often classified with regards as to if its eyes are open or closed. Another example is whether or not the face is smiling or not. ML kit plays a major role in facial recognition. ML Kit may be a mobile SDK that brings Google's machine learning expertise to Android and iOS apps during a powerful yet easy-to-use package. Whether one is a new or experienced user in machine learning, one can implement the functionality they would like in only a couple of lines of code. On the other hand, if one is an experienced ML developer, ML Kit provides convenient APIs that assist one to employ their custom Tensor Flow Lite models in their mobile apps.

The outlay of crime and missing cases in India is intensifying day by day. A system is developed to scale back the crimes and therefore the missing cases happening within the locality. The proposed system is an android application, which helps a common man to file a complaint against crime or about the missing of a person to the superior authorities. The superior authority can view the complaint filed by the user and take up the specified measures to unravel the case. The users need to register in order to file a complaint and further can check their account to know the developments of his/her case. This system is very useful for the investigation department to speed up in their investigation and track the status of multiple cases at a time. The authorities can find the crime ratio in society through the proposed app. In missing person cases, the user can upload the person's details along with the photograph. By using these complaints, Relative of lost person will go to trust rather than going to the police station to launch a complaint. This information will be stored on server which can be accessed by police and also normal people who are working in some organizations like NGO etc. Some existing application does not show the proper information about the Missing person, by using

our application we can analyze the mission person by using ML if the face matches with already stored in our database then it automatically sends the SMS notification to the one who rises the complaint about missing person and an e-mail is sent to the police officials along with current Geo-location of the missing person. Finally, after the person is identified all details of that person is deleted from the database. This application empowers highly qualified nonprofit groups with an equivalent transformative technology employed by governments and enforcement agencies. This mobile app often captures photographs of potential victims from a secure distance. Potential matches are checked against a watch list of missing persons and alerts are distributed to essential personnel within the sector and headquarters.

2. Literature survey

Image quality is usually degraded by blur caused by, for instance, misfocused optics or camera motion. Blurring also can vary the performance of computer vision algorithms if the image features computed are sensitive to those deteriorations. In this paper, we have discussed about the image descriptor supported local phase quantization that's robust to centrally symmetric blur. The descriptor mentioned as local phase quantization (LPQ) are often wont to characterize the underlying image texture. We also present a decorrelation scheme and intend three approaches for drawing out the local phase information. Different combinations of them end in totally six variants of the operator which will be used alternatively. We show experimentally that these operators have slightly diversifying performance under different blurring conditions. In all test cases, the new descriptors can outperform two state-of-the-art methods, namely, local binary pattern (LBP) and how supported Gabor filter banks [1].

Today's modern face super-resolution methods are utilized to intricate neural networks (CNN) to deduce high resolution (HR) face images. When handling very low resolution (LR) images, the interpretation of these CNN based methods greatly varies. Meanwhile, these methods tend to supply over-smoothed outputs and miss some textural details. To orate these summons, this paper presents a wavelet-based CNN approach which may ultra-resolve a really low resolution face image of 16 × 16 or smaller pixel size to its larger version of multiple scaling factors (2×, 4×,8× and even 16×) during a unified framework. Distinct from traditional CNN methods directly deducing HR images, our approach firstly acquires a knowledge to foretell the LR's corresponding series of HR's wavelet coefficients before renovating HR images from them. To capture both global topology information and native texture details of human faces, we present a versatile and extensible convolutional neural network with three sorts of loss: wavelet prediction loss, texture loss and full-image loss. Extensive experiments demonstrate that the presented approach achieves more appealing results both quantitatively and qualitatively than state-of the-art super-resolution methods. [7]

Low resolution (LR) could even be a crucial issue when handling world face recognition problems. The execution of traditional recognition algorithms will drop because of the loss of facial information in original high resolution (HR) images. In order to solve the existing problem, we propose an efficient approach named Simultaneous Discriminant Analysis (SDA). SDA learns two mappings from LR and HR images respectively to a typical subspace where discrimination property is maximized. In SDA, (1) the info gap between LR and HR is reduced by mapping into a typical space; and (2) the mapping is designed for preserving most discerning information. then, the normal classification method is applied within the common space for final decision. Extensive experiments are conducted on both FERET and Multi-PIE, and thus the results clearly show the generality of the propound SDA over state-of-the-art methods [3].

Practical video scene and face recognition systems are sometimes exasperated with low-resolution (LR) images. The faces could also be very small albeit the video is obvious, thus it's difficult to directly measure the similarity between the faces and therefore the high-resolution (HR) training samples. Face recognition assisted traditional super-resolution (SR) methods usually have curbed performance because the target of SR won't be according to that of categorization, and time-consuming SR algorithms aren't suitable for real-time applications. In this paper, a replacement feature extraction method called coupled kernel embedding (CKE) is proposed for LR face recognition with none SR preprocessing. In this technique, the original kernel matrix is constructed by concatenating two discrete kernel matrices within the diagonal direction, therefore the semi positively precise properties are conserved for optimization. CKE addresses the matter of comparing multimodal data that are difficult for conventional methods in practice thanks to the shortage of an efficient similarity measure. Particularly, different kernel types (e.g., linear, Gaussian, polynomial) are often integrated into a consistent optimization objective, which can't be achieved by simple linear methods. CKE solves this problem by minimizing the dissimilarities captured by their kernel Gram matrices within the LR and HR spaces. In the implementation, the nonlinear objective function is minimized by a generalized eigenvalue decomposition. Experiments on benchmark and real databases show that our CKE method indeed improves the popularity performance [4].

Person re-identification (ReID) is the task of spontaneously matching persons across surveillance cameras with location or time differences. Nearly all proposed ReID approaches exploit body features. Even if successfully captured within the scene, faces are often assumed to be unhelpful to the ReID process. As cameras and surveillance systems improve, `Facial ReID approaches earned attention. The following contributions are made during this work: 1) We express a high-quality dataset for person re-identification featuring faces. This dataset was collected from a true surveillance network during a municipal mass rapid transit system, and includes an equivalent people

appearing in multiple sites at multiple times wearing different attire. 2) We involve new DNN architectures and patch matching techniques to handle face misalignment in quality regimes where land marking was found to be deficient. We further boost the performance by adopting the fully convolutional structure and spatial pyramid pooling (SPP).

Face images apprehended by surveillance videos have limited resolution. Due to this mismatch, it's difficult to match high-resolution (HR) faces with low-resolution (LR) faces. Recently, multidimensional scaling (MDS) has been employed to unravel the matter. In this letter, we proposed a more discriminative MDS method to find out a mapping matrix, which projects the HR images and LR images to a standard subspace. Our method is discerning since both interclass distances and intraclass distances are taken into account. We add an interclass constraint to enlarge the distances of various subjects within the subspace to make sure discriminability. Besides, we consider not only the connection of HR-LR images, but also the connection of HR-HR images and LR-LR images so as to preserve local consistency. Experimental results on FERET, Multi-PIE, and SC face databases showcases the effectiveness of our proposed approach.

Advanced mobile devices with an application of Google Project Tango which may trace the motion and therefore the orientation of the device and reconstruct the 3D scenes in real time. Since users always use such devices to scan the important 3D scenes under severe camera motion, the image blur results in the distortion within the depth images of the scene. However, traditional image deblur methods cannot efficiently address this problem since they deblur images without considering 3D information within the depth images. In this paper, we use Google Tango mobile devices equipped with 3D sensors to deblur the depth images for the high accuracy of 3D reconstruction in the real 3D scenes. These sensors can provide the precise geometry data of camera motion trajectory such this enables us to fast recover the unknown parameters of the 3D information on the depth images without huge time-consumption estimations. Experiments show that our algorithm outperforms previous approaches in not only smaller running time but also the better quality of the restored depth image.

3. Existing system

Despite the fact that facial recognition systems have reached monumental presentation in recent years, the low-resolution face recognition task remains redoubtable, especially when the low resolution faces are apprehended under non-ideal conditions, which is widely ubiquitous in surveillance-based applications. Faces apprehended in such situations are often befoulded by blur, non-uniform lighting, and non-frontal face pose, it is analyzed that the face recognition techniques using data capture under low-quality conditions within the wild. we offer an inclusive analysis of the experimental results for two of the most essential applications in real time surveillance and express practical approaches to handle both cases that show promising performance. The succeeding three benefactions made were, (i) apprehension of experiments to gauge super-resolution methods for low-resolution face recognition; (ii)studying face re-identification on various public face datasets including real time surveillance and low-resolution subsets of largescale datasets, presenting a baseline result for several deep learning-based approaches, and improve them by introducing a generative adversarial network pre-training approach and fully intricate architecture; and (iii) exploring the low-resolution face identification by engaging a state-of-the-art supervised discriminative learning approach. The evaluations are overseen on demanding portions of the SC face and UCCS face datasets.

Number of apps for finding missing person is available, but the scope of tracing the missing person is incomplete and its only in the poster level and to extract important features from image data, from which a description, interpretation, or understanding of the image can be provided by machine, but there is no proper processing or altering an existing image in a desired manner. Also there is no high resolution and hence there is no 100% accuracy that the victim can be found.

4. Proposed system

The information needed to perform tasks like embellishing captured pictures from user photos. Because ML Kit can perform face recognition in real time. Identify key countenance, and obtain the contours of detected faces. You can recognize entities in a picture without having to supply any additional contextual metadata, using either an on-device API. You can get the information you need to perform tasks like embellishing captured pictures from user photos.

It then sends the current GPS location to the respective family and also to the nearby police station. It can be accessed from anywhere and by anyone all over the world. This application is exclusively for finding criminals and missing people. The Facial API provides Euler Y and Euler Z angle values for identified faces, where Euler Z angle value of the face is usually submitted. The Euler Y angle is out there only using the “accurate” mode setting of the ace detector (as against the “fast” mode setting, which takes some shortcuts to form detection faster). The Euler X angle is currently not supported.

A. Landmarks

A landmark may be a point of interest within a face. The left eye, right eye, and nose base are all samples of landmarks. The figure below shows some examples of landmarks:

Fig. 1. 3D Face identification

Instead of first identifying the landmarks and using them as a basis for identifying the whole face, the Face API detects the whole face independently of detailed landmark information. For this reason, landmark identification is an optional step which can be done after the face is detected. Landmark detection isn't done by default since it takes longer to run. you'll selectively specify that landmark detection should be done. Each detected landmark includes its associated position within the image.

1) Classification

Classification determines whether a particular facial characteristic is present. The Android Face API currently supports two categorizations: eyes open and smiling. The iOS Face API currently underpins the smiling stratification. Classification is expressed as a certainty value, indicating the arrogance that the facial characteristic is present. For example, a value of 0.7 or more for the smiling classification indicates that it is likely that a person is smiling. Both of these classifications rely upon landmark detection. Also note that "eyes open" and "smiling" classification only works for frontal faces, that is, faces with a little Euler Y angle (at most about 18 degrees).

Under the common methods of search used currently, the normal tactics were rated highest as compared to the fashionable digital methods. This means the fashionable technology, particularly mobile applications, has not been adopted enough during this area of application.

A biometric software application capable of uniquely identifying or verifying a private by comparing and analyzing patterns supported the person's contours. Facial recognition may be a way of recognizing a person's face through technology. A face recognition system uses bio metrics to map countenance from photograph or video. It compares the knowledge with a database of known faces to seek out a match.

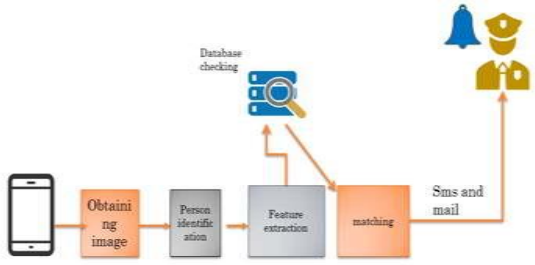

Fig. 2. Architecture diagram

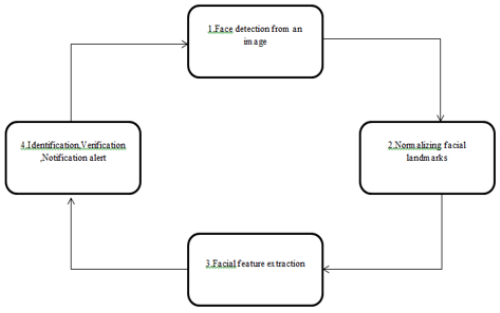

Fig. 3. Schematic diagram

Despite the fact that this kind of technology has become acceptable in society for other forms of use, it has not been leveraged for purposes of ensuring that families and friends are kept together and in-tuned because it needs to be. Technology has become an essential part of people's lives today. From laptops to cell hat are essentially really small computers, it seems most are connected.

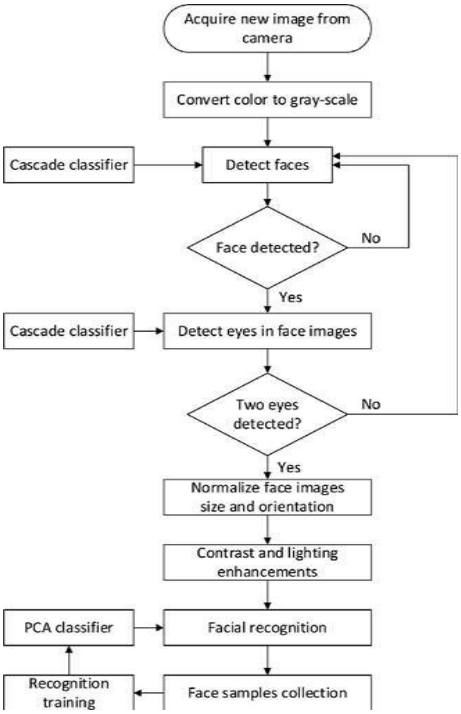

Fig. 4. Proposed system flowchart

5. Modules

A. *Module 1: Facial recognition*

Facial recognition is a renowned technology that is capable of spotting a person from their digital image or a video frame that is stored in our database. In general, they are performed by selecting specific facial features from the given image with captured faces within our database. It is also mentioned as a Biometric AI-based application that can uniquely spot a private by analyzing certain patterns that supported the person's facial textures and shape. In this module, facial recognition is used to identify and compare the image with the source database. From a video source, a video frame or digital image is obtained and from that, the person is identified.

B. *Module 2: Feature extraction*

Feature extraction could also be a process of dimensionality reduction by which an initial set of knowledge is reduced to more manageable groups for processing. A characteristic of those large data sets may be a sizable amount of variables that need tons of computing resources to process. Facial feature extraction selects and/or combines variables into features, effectively reducing the quantity of knowledge that has got to be processed, while still accurately and completely describe the

first data set. The process of feature extraction is beneficial once you got to reduce the number of resources needed for processing without losing important or relevant information. Feature extraction also can reduce the quantity of redundant data for a given analysis. Also, the reduction of the info and therefore the machine's efforts in building variable combinations (features) facilitate the speed of learning and generalization steps within the machine learning process.

C. Module 3: Facial comparison and matching

In this module comparison occurs between the source database and image database. Source database contains the original image of the victims and image database contains images segmented from the video. Compare face prints or face embedding's to determine whether there is a match. How similar the embedding's got to be for a match to be established will depend upon the chosen confidence threshold. Comparisons can either be 1:1 (one-to-one) or 1:N (one-to-many), it compares an image that contains a face to one or more other facial images and establishes whether the faces likely belong to the same person; i.e. whether they are considered a match. If the match is found geo-location is returned. The process continues until the match is found.

D. Module 4: Notification alert

Once the match is found, this module automatically generates alert e-mail of the person's current location to the registered family members and the same is sent to the police officials. Now details about the identified person is automatically deleted from the database.

6. Future enhancement

The iris recognition is going through a massive phase, according to a chronicle from tech research firm TechNavio. The firm's researchers predict a 23.5 percent CAGR for this market between 2014 and 2019.The enhancement of this application leads to more accurate results. The IRICIAL processing in the initial stage is to recognize the face of the victim and generate several images at different ages, which in turn creates a more compact application and utilizes high-end camera for accurate image acquisition.

7. Conclusion

This mobile app is a family ring application which finds the missing person to re-connect them to their family by using facial recognition, Image processing. Where the authorized data is collected and maintained with the proper dataflow strategies. Once the positive response is collected immediately the message is conveyed to relatives and police station for further procedures. There are number of apps for finding missing person available, but the scope of tracing the missing person is incomplete and its only in the poster level. The proposal of our Android app will try to link the missing person with their family by providing the current image of the missing person and their current GPS location to the respective family and the nearby police station. Hence, the benefits of this application have paved the way for the police department in order to find the missing person and criminals at ease by using facial recognition, Image processing, machine learning and image mapping technologies.

References

[1] Pei Li, Loreto Prieto, Domingo Mery, and Patrick J. Flynn, "On Low Resolution Face Recognition in the Wild: Comparisons and New Techniques", IEEE transactions on information forensics and security, vol. 14, no. 8, August 2019.
[2] J. Yang, J. Wright, T. S. Huang, and Y. Ma, "Image super-resolution via sparse representation," IEEE Trans. Image Process., vol. 19, no. 11, pp. 2861–2873, Nov. 2010.
[3] C. Zhou, Z. Zhang, D. Yi, Z. Lei, and S. Z. Li, "Low-resolution face recognition via simultaneous discriminant analysis," in Proc. IEEE Int. Joint Conf. Biometrics, Oct. 2011, pp. 1–6.
[4] A. Nech and I. Kemelmacher-Shlizerman. (2017), "Level playing fifield for million scale face recognition."
[5] H. Huang, R. He, Z. Sun, and T. Tan, "Wavelet-SRNet: A wavelet based CNN for multi-scale face super resolution," in Proc. IEEE Int. Conf. Comput. Vis., Oct. 2017, pp. 1698–1706.
[6] W. Liu, Y. Wen, Z. Yu, M. Li, B. Raj, and L. Song, "Sphere Face: Deep hypersphere embedding for face recognition," in Proc. IEEE Conf. Comput. Vis. Pattern Recognit., vol. 1, Jun. 2017, pp. 1–9.
[7] Akshaya Pisal, Ravindra Sor, K.S. Kinage, "Facial Feature Extraction Using Hierarchical MAX (HMAX) Method," International Conference on Computing, Communication, Control and Automation (ICCUBEA) IEEE, 2017.