Face Recognition using Textural and Decisive Method

Rajani R H[1] Rajashekhar B S[2]
[1,2]Assistant Professor
[1,2]Department of Electronics and Communication Engineering
[1,2]SAIT, Bengaluru, Karnataka, India

Abstract— With the rapid advancement of image processing techniques, face recognition becomes very interesting and effective problem in terms of their morphological and structural characteristics. In this paper decision, region, brightness and boundary based methods are combined for better and effective implementation for face recognition. In this proposed method first finding the boundary and brightness characteristics of the given image then finding the region based on metrics and Euclidian distance calculations. Finally, features of the region are extracted based on decisive method. This proposed method will gives very high accuracy in face detection.

Key words: Metrics, Face Recognition, Euclidian Distance, Feature Extraction

I. INTRODUCTION

Biometric face recognition is the emergent area of bioengineering. As the requirement of higher levels of security rises, there is a more scientific mathematical introduction for Face Recognition. Pixel Arithmetic for readers who are attentive in the mathematical perspective and representation of pixels in face recognition applications. Automated face recognition is a relatively new concept. Developed in the 1960s, the first semi-automated system for face recognition required the manager to locate topographies, such as ears, nose, eyes and mouth on the photos before it calculated detachments and ratios to a common reference point, which were then compared to reference data.

In the 1970s, Goldstein, Harmon, and Lesk used 21 specific subjective markers such as hair color and lip thickness to automate the recognition. The problem with both of these early solutions was that the measurements and locations were manually computed.

Face recognition has several advantages over other biometric modalities such as fingerprint and iris: besides being natural and nonintrusive, the most important advantage of face is that it can be captured at a distance and in a covert manner. Face identification involves one-to-many matching that compares a query face against multiple faces in the enrollment database to associate the identity of the query face to one of those in the database. Face recognition has been widely reviewing from long days and it is still attractive and much attentive because of its big prospective in retreat, reconnaissance and human computer intellectual interface [1], etc. A essential matter in face recognition is to discover sufficient and discriminative skins for face illustration [2]. As one of the most perceptible and stimulating complications in computer visualization and shape recognition[3].

The recognition of a probe face image is usually achieved by categorizing the prominent attributes extracted from the face image [4]. The most common class recognizer for face recognition may be the nearest neighbor classifier [5][6] because of its simpleness and effectiveness. In order to minimize Nearest Neighbor's inadequacy that only single training section is used to indicate the inquiry face image, Lu and Li estimated the nearest prominent attributes line classifier [7], which uses two training trials for each category to characterize the query face.

The nearest prominent attributes plane classifier, which uses three samples to depict the test image introduced by Wu and Chien [8]. Thereafter, the nearest subspace and local subspace methods of classifiers using larger training samples for face representation were introduced. [9][10] and which represent the query sample by all the training samples of each class. Though nearest subspace technique, confined subspace methods accomplish good performance than nearest neighbor classifier, altogether these approaches with holistic face topographies [11][12]are not vigorous to face occlusion [13].

In this paper texture and structural primitives, brightness and decisive combined approach is used for face identification.

II. IMPLEMENTATION AND DESIGN

Fig.1 shows the block diagram of structural and decisive combined approach for face recognition. In this method input image used may be color or grey image. Initially the image is undergone through brightness correction and skin color detection for an identification of face structure. Suppose if the skin is not detected the process is stopped at this stage.

An image lacks contrast when there are no sharp differences between black and white. Brightness refers to the overall lightness or darkness of an image. To change the contrast or brightness of an image, the Adjust Contrast tool performs contrast stretching. In this process, pixel values below a specified value are displayed as black, pixel values above a specified value are displayed as white, and pixel values in between these two values are displayed as shades of gray. The result is a linear mapping of a subset of pixel values to the entire gray range black and white pixels produces an image of higher contrast.

- Step1: Get the input image is either color or gray image.
- Step2: Detect the skin color using luminance Y and chrominance components (Cr and Cb). For skin detection measure,

```
[SkinIndexRow,SkinIndexCol]=find(10<Cr&Cr<45)
start  i=1: length(SkinIndexRow)
     S(SkinIndexRow(i),SkinIndexCol(i))=1;
Stop
```

If skin not found discard detection.

- Step3: Find skin color blocks by using BWLABEL with 8 neighbors pixels and Measure properties of image regions.

{'Area' 'Euler Number' 'Orientation' 'Bounding Box' 'Extent' 'Perimeter' 'Centroid' 'Extrema' 'Pixel Idx List'' 'Convex

Area' 'Filled Area' 'Pixel List' 'Convex Hull' 'Filled Image' 'Solidity' 'Convex Image' 'Image' 'Sub array Idx' 'Eccentricity' 'Major Axis Length' 'Equivalent Diameter' 'Minor Axis Length'}.

- Step4: Adjust the height and width of the blocks. Calculate height to width ratio (hByW) and compute vertical and horizontal mouth, nose, eyes and eyebrow histograms.
- Step5: Make the decisions according to ratio using standard thresholds of the facial parts structures of the face. If the structured regions are matched that becomes the region of interest to detect the face otherwise say it's not a facial structure.

The set of functions are included in ROI that defines region of interest on the image target. The ROI is implemented to draw various shapes and these returns the information about the coordinates of the region of interest.

ROI is the toolbox includes a set of functions that defines a region-of-interest on the target image. Then calculate the boundary of the skin color detected area and find shape and region over the boundary.

- Step6: Once the face is detected, go to identification of the face by comparing standard trained face database by extracting the object features like nose, teeth, eyes, head, forehead, ears, chin, chicks, eyebrows, using decisive based algorithm, uses the two Morphological operations called OPEN, CLOSE and Euclidian distance, pattern direction. The images are expanded and background noise Peake's are removed by OPEN function defined in the region of interest and an image is shrinked then small cavities are eliminated by CLOSE function.

The Euclidian distance sd(1), distance measurement between the pixels and pattern direction detection dd(1) are given by ,

$$Sd = \sqrt{(xi - xj)^2 + (yi - yj)^2} \quad \text{.....(1)}$$

$$dd = \min(|\theta i - \theta j|, 360 - |\theta i - \theta j|) \quad \text{.....(2)}$$

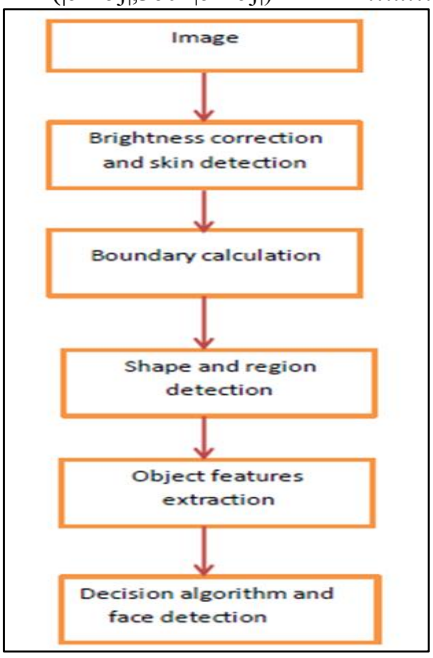

Fig. 1: Block diagram of structural and decisive combined approach for face recognition.

III. RESULTS

Fig. 1: Original input image

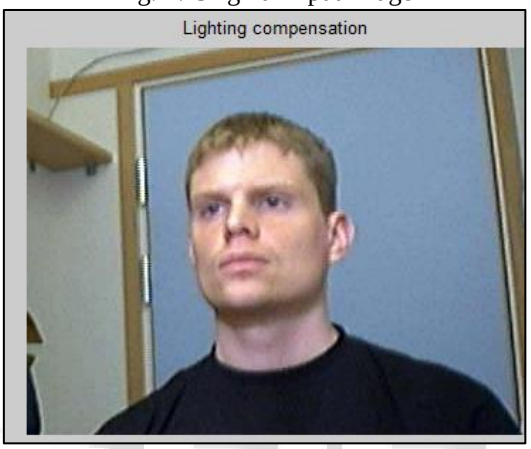

Fig. 2: Original image after light compensation

Fig. 3: ROI and Skin color detection

Fig. 4: Boundary calculation

Fig. 5: Objects features extraction

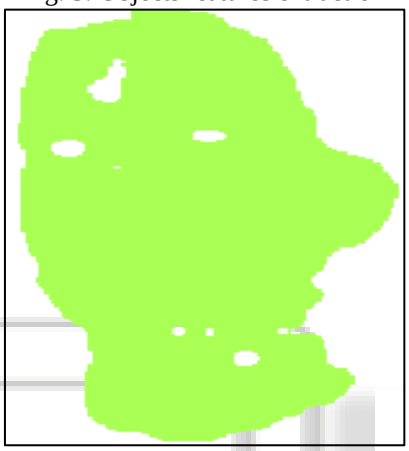

Fig. 6: face candidate

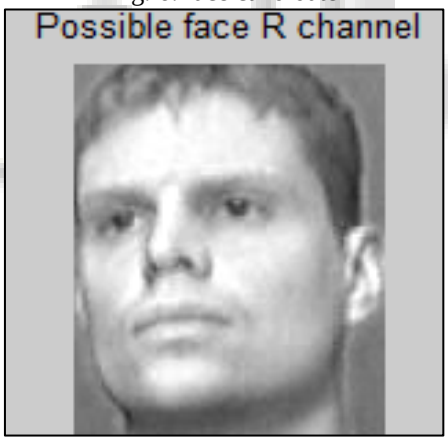

Fig. 7: Possible detected face

The above possible detected face charecteristics are compared with trained database gives very high accuracy in face recognition.

IV. Conclusion

The textural and decisive based method first detects the face object accurately and then recognizes the face with the help of trained database. But the dis advantage is that for very poor brightness this method gives less accuracy in detecting the facial features.

Acknowledgement

We the authors of this paper would like to greatfully acknowledge with thanks to Principal SaIT, Dr. H G Chandrakanth, Professor Dr. K Somashekar, and Dr. Ravishankar C V HOD ECE department for their constant encouragement and support for enabling us to submit this paper.

References

[1] Zhao, W., Chellappa, R., Phillips, P., Rosenfeld, A.: Face recognition: A literature survey. Acm Computing Surveys (CSUR) 35(4) (2003) 399–458.
[2] M. Elad and M. Aharon, "Image denoising via sparse and redundant representations over learned dictionaries," IEEE Trans. Image Processing, vol. 15, no. 12, pp. 3736–3745, 2006.
[3] O. Arandjelovic, G. Shakhnarovich, J. Fisher, R. Cipolla, and T. Darrell, "Face recognition with image sets using manifold density divergence," in Computer Vision and Pattern Recognition, IEEE Conference on. IEEE,2005, pp. 581–588.
[4] T. Kim, J. Kittler, and R. Cipolla, "Discriminative learning and recognition of image set classes using canonical correlations," Pattern Analysis and Machine Intelligence, IEEE Transactions on, vol. 29, no. 6, pp.1005–1018, 2007.
[5] R. Wang, S. Shan, X. Chen, and W. Gao, "Manifold-manifold distance with application to face recognition based on image set," in Computer Vision and Pattern Recognition, IEEE Conference on. IEEE, 2008, pp. 1–8.
[6] He, X., Yan, S., Hu, Y., Niyogi, P., Zhang, Face recognition using Laplacian faces. Pattern Analysis and Machine Intelligence, IEEE Transactions on 27(3) (2005) 328–340.
[7] Li and Lu, NFL Adaptive generic learning for face recognition from a single sample per person. In: CVPR 2010, IEEE (2010) 2699–2706.
[8] Chien and Wu, "Gabor Feature and NN based Sparse Representation for Face Recognition with Gabor Occlusion Dictionary," Proc. European Conf. Computer Vision, 2010.
[9] R. He, W.S. Zheng, and B.G. Hu, "Maximum correntropy criterion for robust face recognition," IEEE Trans.Pattern Analysis and Machine Intelligence, vol. 33, no. 8,2011.
[10] R. Wang and X. Chen, Kullback-Leibler "Manifold discriminant analysis," in Computer Vision and Pattern Recognition, IEEE Conference on. IEEE, 2009, pp.429–436.
[11] H. Cevikalp and B. Triggs, "Face recognition based on image sets," in Computer Vision and Pattern Recognition, IEEE Conference on. IEEE, 2010, pp. 2567–2573.
[12] H. J. Seo and P. Milanfar, "Face verification using the lark representation," Information Forensics and Security, IEEE Transactions on, vol. 6,no. 4, pp. 1275–1286, 2011.
[13] W.-S. Chu, J.-C. Chen, and J.-J. J. Lien, "Kernel discriminant transformation for image set-based face recognition," Pattern Recognition, vol. 44, no. 8, pp. 1567–1580, 2011.

