Volume 4, Issue 8, August 2014 ISSN: 2277 128X

International Journal of Advanced Research in Computer Science and Software Engineering

Research Paper

Available online at: www.ijarcsse.com

3d Image Based Face Recognition System

B.Rashida
Research Scholar,
Department of Computer Application.
BS Abdur Rahman University,
Tamilnadu, India

Dr.M.Munir Ahamed Rabbani
Professor,
Department of Computer Application.
BS Abdur Rahman University,
Tamilnadu, India

Abstract - The automatic face recognition is a rapidly growing research area which has received a lot of attention since 1960. A facial recognition system automatically identifies a person from a still image or a video source. There are several ways by which this can be achieved. One of the ways to do this is by comparing selected facial features from the image and a facial database. It finds its use in security systems and can be compared to other biometrics such as fingerprint or eye iris recognition systems. Face detection in computer vision is a difficult problem as human face is a dynamic object which has high degree of variability in its appearance. In this field, accuracy and speed identification is a main issue.This paper evaluates various face detection and recognition methods, provides complete solution for image based face detection and recognition with greater accuracy, better response rate .

Keywords: face recognition, face detection, LDA, Haar, PCA.

I. INTRODUCTION

Face recognition is not perfect and struggles to perform under certain conditions. There are two key problems for any face recognition problem: the illumination problem and pose problem. The performance of face recognition systems drops significantly when pose variations are present in input images. The task of face recognition becomes even more difficult when illumination variations are present. Face recognition applications commonly suffer from three main drawbacks: a minimized training set, information scattered in high-dimensional subspaces, and the need to incorporate new people to recognize.

Over the last few decade lots of work is been done in face detection and recognition as it's a best way for person identification because it doesn't require human cooperation so that it became a hot topic in biometrics. Since then lots of methods are introduced for detection which are considered as a milestone

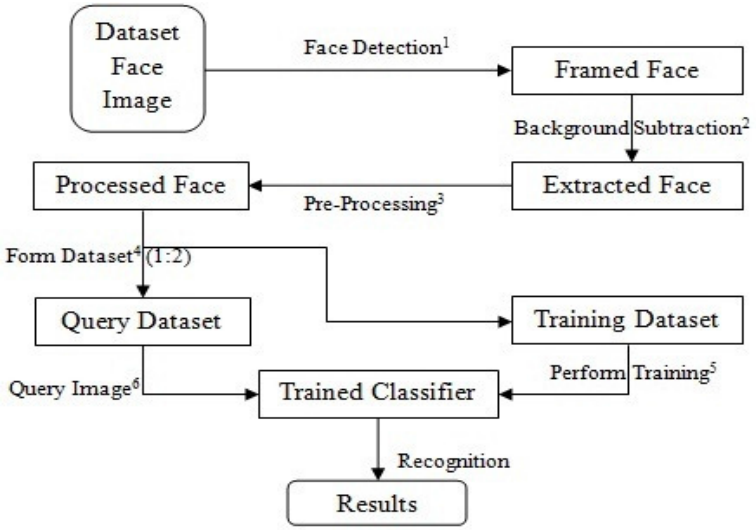

Fig. 1 System's overview.

1.1 Paper Organization

The following paper is organized as follows: section II briefs about face detection methods, section III about face recognition methods based on the results of section II. Result summery has been provided in the form of tables. Section IV provides summery about datasets that are been used in section II and section III. Conclusion is provided in section V.

II. DETECTION

Haar classifier is used and Linear Discriminant Algorithm Pattern (LDA) features whereas Support Vector Machine (SVM) classifier is used with face detection evaluation. Haar-like features are evaluated through the use of a new image representation that generates a large set of features and uses the boosting algorithm to reduce degenerative tree of the boosted classifiers for robust and fast interferences only simple rectangular Haar-like features are used that provides a number of benefits like sort of domain knowledge is implied as well as a speed increase over pixel based systems, suggestive to Haar basis functions equivalent to intensity difference readings are quite easy to compute.

Implementing system that used such features would provide a feature set that was too large, hence the feature set must be only limited to a small number of critical features which is chieved by boosting algorithm, The original LDA operator labels the pixels of an image by thresholding the 3-by-3 neighborhood of each pixel with the center pixel value and considering the result as a binary number. Each face image can be considered as a composition of micro-patterns which can be effectively detected by the LDA operator. To consider the shape information of faces, they divided face images into N small non-overlapping regions.

Fig. 3 Face detection

To minimize the effects of pose variation and illumination in extracted faces and to improve recognition results two extra actions performed in pre-processing stage: 1) Eyes detection is been used to remove head turn, tilt, slant and position of face, demonstrated in figure 4; 2) Histogram equalization is been performed.

III. FACE RECOGNITION

Eigenface considered as 2-D face recognition problem, faces will be mostly upright and frontal. That's why 3-D information about the face is not required that reduces complexity by a significant bit. It convert the face images into a set of basis functions which essentially are the principal components of the face images seeks directions in which it is more efficient to represent the data. This is mainly useful for decrease the computational effort. Linear discriminant analysis is primarily used here to reduce the number of features to a more manageable number before recognition because face is represented by a large number of pixel values. Each new dimensions is considered as a linear combination of pixel values, which form a template. The linear combinations obtained using Fisher's linear discriminant are called Fisherfaces.

LDA is an order set of binary comparisons of pixel intensities between the center pixel and its eight surrounding pixels. filters can exploit salient visual properties such as spatial localization, orientation electivity, and spatial frequency characteristics. Considering these devastating capacities and its great success in face recognition Haar features are insensitive to transformations as illumination, pose and expressions although Haar transform is not specially designed for face recognition. Its transformation formula is predefined instead of learned from the face training data. Moreover PCA and LDA classifier consider global features whereas LDA and HAAR classifier consider local features, based on current facts experimental results are stated below.

Table 2: Face recognition results summery

Dataset	Recognition			
	PCA	LDA	LBP	Gabor
[1]	72.10%	79.39%	85.93%	93.49%
[2]	69.87%	76.61%	80.47%	89.76%
[3]	70.95%	78.34%	84.14%	92.68%
[4]	74.79%	81.93%	86.45%	96.91%
[5]	68.04%	73.21%	77.69%	88.93%
Mean	**71.15%**	**77.90%**	**82.94%**	**92.35%**

IV. DATASET

Five datasets been used for above experiments. In dataset, face collection with plain green background; no head scale and light variation but having minor changes in head turn, tilt, slant, position of face and considerable change in expressions. In dataset , face collection with red curtain background, variations are caused by shadows as subject moves forward, having minor changes in head turn, slant and tilt; large head scale variation; some expression variation, translation in position of face and image lighting variation as subject moves forward, significant lighting changes occur on faces moment due to the artificial lighting arrangement. In dataset, face collection with complex background; large head scale variation; minor variations in head turn, tilt, slant and expression; some translation in face position and significant light variation because of object moment in artificial light. In dataset, face collection with plain background; small head scale variation; considerable variation in head turn, tilt, slant and major variation in expression; minor translation in face position and light variation. In dataset face collection with constant background having minor head scale variation and light variation; huge variation in turn, tilt, slant, expression and face position.

V. CONCLUSION

In current work we developed the system to evaluate considered to be a bench mark. Some methods performed consistently over different datasets whereas other methods behave very randomly however based on average experimental results performance is evaluated, five datasets been used for this purpose. Face detection and recognition method's result summery is provided in table 1 .In current system Haar-like features reported relatively well but it has much false detection than LDA which could be consider being a future work in surveillance to reduce false detection in Haar-like features and for the recognition part is reported well as it's qualities overcomes datasets complexity.

REFERENCES

[1] Face Recognition Data, University of Essex,UK,Face94,http://cswww.essex.ac.uk/mv/allfaces94.html.
[2] Face Recognition Data, University of Essex,UK,Face95,http://cswww.essex.ac.uk/mv/all aces/faces95.html.
[3] Face Recognition Data, University of Essex,UK,Face96,http://cswww.essex.ac.uk/mv/all faces/faces96.html.
[4] Face Recognition Data, University of Essex,UK,Grimace,http://cswww.essex.ac.uk/mv/all faces/grimace.html.
[5] Psychological Image Collection at Stirling(PICS),PainExpressions, http://pics.psych.stir.ac.
[6] K. T. Talele, S. Kadam, A. Tikare, *Efficient Face Detection using Adaboost,* "IJCA Proc on International Conference in Computational Intelligence", 2012.
[7] T. Mita, T. Kaneko, O. Hori, *Joint Haar-like Features for Face Detection, "*Proceedings of the Tenth IEEE International Conference on Computer Vision", 1550-5499/05 ©2005 IEEE.
[8] T. Ahonen, A. Hadid, M. Peitikainen, *Face recognition withlocal binary patterns.* "In Proc. of European Conference of Computer Vision", 2004.
[9] M. A. Turk and A.P. Pentland, *Face recognition usingeigenfaces*, "Proceedings of the IEEE", 586-591, 1991.

[10] J Lu, K. N. Plataniotis, A. N. Venetsanopoulos, *Face recognition using LDA-based algorithms*, "IEEE Neural Networks Transaction", 2003.

[11] L. Wiskott, M. Fellous, N. Krger, and C. Malsburg, *Face recognition by elastic bunch graph matching*, "IEEETrans", on PAMI, 19:775–779, 1997.

[12] I. Kukenys, B. McCane, *Support Vector Machines for Human Face Detection*, "Proceedings of the New Zealand Computer Science Research Student Conference", 2008.

[13] M. M. Abdelwahab, S. A. Aly, I. Yousry, *Efficient Web-Based Facial Recognition System Employing 2DHOG*, arXiv:1202.2449v1 [cs.CV].

[14] W. Zhao, R. chellappa, P. J. Phillips, *Face recognition: A literature survey, "ACM Computing Surveys (CSUR)*", December 2003.

[15] G. L. Marcialis, F. Roli, Chapter: *Fusion of Face Recognition Algorithms for Video-Based Surveillance Systems*, Department of Electrical and Electronic Engineering- Univ- ersity of Cagliari- Italy.

[16] Rabbani, M.A. and C. Chellappan, 2007. *A Different Approach to Appearance -based Statistical Method for Face Recognition Using Median*. Int. J. Comput. Sci. Network Secuity., 7: 262-267

[17] A. Suman, *Automated face recognition: Applications withinlaw enforcement. Market and technology review, "NPIA"*, 2006.

