IJDACR
ISSN: 2319-4863

IJDACR
International Journal Of Digital Application & Contemporary Research

International Journal of Digital Application & Contemporary research
Website: www.ijdacr.com (Volume 2, Issue 9, April 2014)

An Automatic Face Detection for Video Indexing Application using Skin based Detection

Vaishali Parate
vaishaliparate@gmail.com

Divya Jain
divya_gec2@yahoo.com

***Abstract*— The problem of face recognition is all about face detection. This is a fact that seems quite bizarre to new researchers in this area. However, before face recognition is possible, one must be able to reliably find a face and its landmarks. This is essentially a segmentation problem and in practical systems, most of the effort goes into solving this task.**

This paper explores the usability of face detection to find the faces in a video sequence and assign them to the different characters. An improved face detection method based on information of skin colour and depth is proposed in this paper. The face area was detected firstly by using the YCbCr colour space algorithm. Afterwards, segmentation algorithm, is performed in two stages, where the chrominance and luminance details is employed consecutively using colour segmentation approaches. Then region grouping is achieved using an adjacency criterion. The recognition phase of the model applied using Principal Component Analysis (PCA).

***Keywords*— Face Detection, Skin Based Detection.**

I. INTRODUCTION

Face detection is a useful task in many applications such as video conferencing, human-machine interfaces, Content Based Image Retrieval (CBIR), surveillance systems etc. It is also often used in the first step of automatic face recognition by determining the presence of faces (if any) in the input image (or video sequence). The facial region, including its location and size is the output of a face detection step. In general, the face recognition problem (in computer vision) can be formulated as follows: Given still or video images of a scene, determine the presence of faces and then identify or verify one or more faces in the scene using a stored database of faces. Thus, the accuracy of a face recognition system depends on the accuracy of the face detection system. But, the variability of the appearance in the face patterns makes it a difficult task. A robust face detector should be able to find the faces regardless of their number, colour, positions, occlusions, orientations, a facial expression, etc. Although this issue is still an unsolved problem, many methods have been proposed for detecting faces.

Padmapriya et al [1], as they discussed about the face detection idea is pragmatic to real time car theft detection application. The face detection design is calculated using the Adaboost algorithm in order to mine strong classifier using Haar classifiers.

AdaBoost algorithm is to deal with very large collections of weak classifiers. In this paper, for face detection, very large training set has to be explored. In order to improve computational competence greatly and also reduce the false positive rate, a structure of gradually more complex classifiers called a cascade is built.

Sarala A. Dabhade et al [2], as they proposed the function of this module is to fix wherein an image a face is located. The face detection entity works by scanning up an image at altered scales and looking for some simple patterns that denote the presence of an appears in the centre and presented at an even size. Face detection fixes wherein an image a face is located. The face detection works by scanning up an image at different scales and looking for some simple forms that identify the presence of a face.

Wen-Chang Cheng et al [3], In his paper mentioned a cascade-Adaboost classifier, Adaboost classifier in visible layers could reach preset aims with less weak classifiers; but with the increase of layers, the samples of the remaining training set became less and similar; Adaboost classifier in rear layers needs linear grouping of more weak classifiers to reach pre-set targets, which is easy to cause over fitting and time-consuming.

IJDACR
ISSN: 2319-4863

IJDACR
International Journal Of Digital Application & Contemporary Research

International Journal of Digital Application & Contemporary research
Website: www.ijdacr.com (Volume 2, Issue 9, April 2014)

II. METHODOLOGY

The face detection stage used in our system is presented in Figure 1.

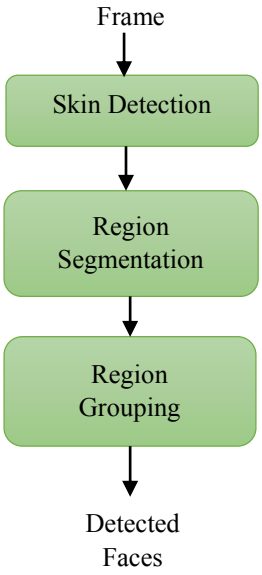

Figure 1: Detection algorithm scheme

The skin pixel detection is performed with a simple colour map, using the YCbCr colour space. The second block corresponds to the segmentation algorithm which is performed in two stages, where the chrominance and luminance information is used consecutively. For each stage an algorithm which combines pixel and region based colour segmentation techniques is used. After the segmentation, a group of connected homogenous skin-like regions is obtained. Then, potential face candidates (FC) are obtained by an iterative merging procedure using an adjacency criterion. Once the set of FC is built, it is necessary to remove the ones that do not match to any face. To that end some constrains regarding shape, size and overlapping are used.

Selection criterion based on colour

Face areas are characterized to have a homogeneous chrominance component. Taking into account this fact, a new selection criterion has been designed in order to remove all the FC composed of regions whose average colour differs substantially, as is the case when hair and face are included in the same candidate.

The new criterion is based on the chrominance component of the regions that form the candidate face regions. Given a FC composed of regions R_1,R_2, R_3 and whose average values of chrominance are $C_1 = (cb_1, cr_1)$, $C_2 = (cb_2, cr_2)$ and $C_3 = (cb_3, cr_3)$ respectively, the distance between all the possible pairs of colours is obtained as follows:

$$d(c_i, c_j) = \sum_i \sum_j (cb_i - cb_j)^2 - (cr_i - cr_j)^2$$

If the distance $d(Ci, Cj)$ is greater than a certain threshold, the corresponding FC will be discarded. Using this very simple procedure, the results improve significantly and many erroneous FC are discarded.

Selection criterion based on texture

In many occasions the background has a colour very similar to that of a human face. In this case, the face detection algorithm may fail. In order to better discriminate between colour like face and not face regions, a criterion based on texture has been introduced. The selection criterion is based on the detection of the dark horizontal regions in the image (eyes, mouth, etc.). The objective is to remove all those candidates who contain totally flat texture areas.

The first step is to apply a morphological horizontal erosion of size 3 in order to remove the brightness associated with white regions (eyes, teeth, etc.). Then, a vertical close of size 15 is applied to eliminate the horizontal regions. The objective of this last step is to obtain an image with horizontal zones. After applying a texture threshold, a binary open with a square structuring element of size 3 is performed to remove the spurious zones that still remain. Once the spurious zones are eliminated, the area of white pixels is calculated. If the area of each white spot is minor than 3.5% of the total area of the FC or greater than 15%, the corresponding FC will be discarded.

IJDACR
International Journal Of Digital Application & Contemporary Research

International Journal of Digital Application & Contemporary research
Website: www.ijdacr.com (Volume 2, Issue 9, April 2014)

III. SIMULATION RESULTS

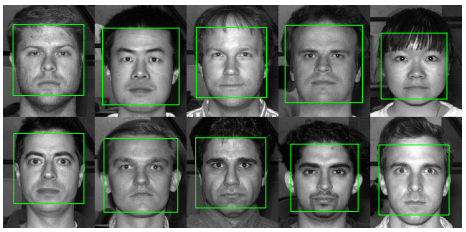

Figure 2: Image Database

Figure 3: Detection of image

IV. CONCLUSION

The paper present a preprocessing model to enhance the detection task. We used the skin colour information and depth data of human face for detection and PCA algorithm for recognition. The system is intended for video indexing applications.

V. REFERENCES

[1] S.Padmapriya & Esther Annlin KalaJames „Real Time Smart Car Lock Security System Using Face Detection and Recognition", 2012 International Conference on Computer Communication and Informatics (ICCCI - 2012), Jan. 10 – 12, 2012, Coimbatore, INDIA.

[2] Sarala A. Dabhade & Prof. Mrunal S. Bewoor „Real Time Face Detection and Recognition using Haar - Based Cascade Classifier and Principal Component Analysis" International Journal of Computer Science and Management Research Vol 1 Issue 1 Aug 2012 ISSN: 2278-733X.

[3] Wen-Chang Cheng and Ding-Mao Jhan, „A Cascade Classifier Using Adaboost Algorithm and Support Vector Machine for Pedestrian Detection" IEEE trans. on Pattern Analysis and Machine Intelligence, Vol. 32, No. 7, pp. 1239 - 1258, 2010

[4] Quanquan Gu Marina Danilevsky Zhenhui Li Jiawei Han „Locality Preserving Feature Learning" 15th International Conference on Artificial Intelligence and Statistics (AISTATS) 2012, La Palma, Canary Islands. Volume XX of JMLR: W&CP XX.

[5] Shermina.J, „Application of Locality Preserving Projections in Face Recognition", (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 1, No. 3, September 2010.

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

[7] A. Suman, Automated face recognition: Applications within law enforcement. Market and technology review, "NPIA", 2006.

[8] 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.

[9] K. T. Talele, S. Kadam, A. Tikare, Efficient Face Detection using Adaboost, "IJCA Proc on International Conference in Computational Intelligence", 2012.

[10] 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.

[11] T. Ahonen, A. Hadid, M. Peitikainen, Face recognition with local binary patterns. "In Proc. of European Conference of Computer Vision", 2004.

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