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A REVIEW ON FACE RECOGNITION USING CASCADE CLASSIFIER METHOD AND GENFACES ALGORITHMS

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ABSTRACT

The easiest way to distinguish each person's identity is through the face. Face recognition is included as an inevitable pre-processing step for face recognition The face recognition is done by monitoring the spatial and temporal changes of the image during a different angle of the image sequence, including its appearance, position, shape, size, etc. Facial recognition is used in many applications such as a person's identification, attendance, image verification, and biometric systems in the examination. In addition, face tracking of mainly involves two preceding steps face detection and face recognition. The area of this research face detection system with face recognition is image processing. The software requirements for this research are Matlab software.

Keywords: *Face detection, Cascade Classifier , Face recognition, Image, Matlab.*

I. INTRODUCTION

Face Recognition is a term that includes several sub-problems. There are different classifications of these problems in the bibliography. Some of them will be explained on this section. Finally, a general or unified classification will be proposed.

1.1. DIFFERENT APPROACHES OF FACE RECOGNITION:

There are two transcendent ways to deal with the face recognition issue: Geometric (highlight based) and photometric (see based). As analyst enthusiasm for face recognition proceeded, a wide range of calculations were created, three of which have been very much concentrated in face recognition writing.

1.2. RECOGNITION ALGORITHMS CAN BE DIVIDED INTO TWO MAIN APPROACHES:

Photometric stereo: Used to recuperate the state of an article from various image s taken under various lighting conditions. The state of the recouped object is characterized by a slope map, which is comprised of a variety of surface normal's (Figure 1.) [1].

Geometric: depends on geometrical connection between facial tourist spots, or at the end of the day the spatial arrangement of facial highlights. That implies that the primary geometrical highlights of the face, for example, the eyes, nose and mouth are first found and afterward faces are arranged based on different geometrical separations and points between highlights. Show in Figure 2.

1.3. POPULAR RECOGNITION ALGORITHMS INCLUDE:

- Cascade Classifier analysis using Eigenfaces Algorithm
- Principal Component Analysis using Eigenfaces, (PCA)
- Linear Discriminate Analysis,
- Real time bunch Graph Matching using the Eigenfaces Algorithm,

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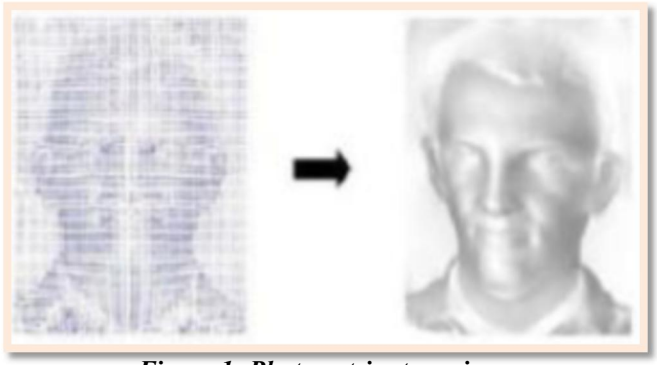

Figure 1: Photometric stereo image

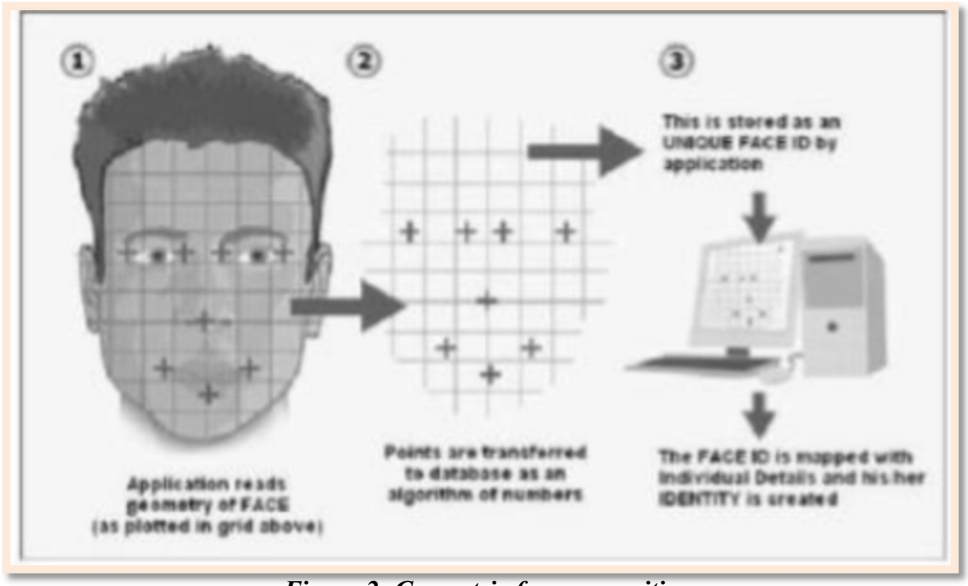

Figure 2: Geometric face recognition

2. FACE DETECTION PROBLEM STRUCTURE

Face Detection is a concept that includes many sub-problems. Some systems detect and locate faces at the same time, others first perform a detection routine and then, if positive, they try to locate the face. Then, some tracking Algorithms may be needed - see Figure 3.

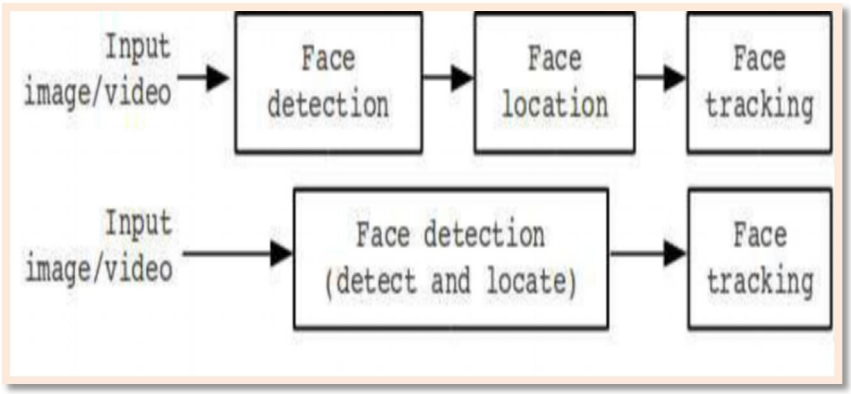

Figure 3: Face detection processes

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3. LITERATURE REVIEW

Reshma M R, Kannan. B et al 2019, study on this paper face recognition technology has gained attention over past years owing to its broad applications. It is a potential research area in the scope of image analysis, computer vision and pattern recognition. The requirement of identifying an authentic user through different authentication mechanisms are increasing rapidly following the intense concerns about security, and rapid advancement in networking, communication, and mobility. Face recognition is an area which has attained attention over the last few decades. The traditional applications of face recognition system, especially those used for access control, authentication, and surveillance, usually need maximum information of face to attain exceptional performance in recognition. Occasionally it is difficult to get access of a full face under certain restricted situations. For example, a non-cooperative face can lead to face occlusion. For recognizing an arbitrary image captured in an unconstrained environment is a more challenging condition in video surveillance, handheld devices etc. Numerous methods have been devised for unconstrained face recognition with remarkable achievements. This paper provides an overview of different partial face recognition approaches proposed [1].

Alina L. Machidon, Octavian M. Machidon, Petre L. Ogrutan et al 2019, The human face exhibits a high level of complexity when it is regarded as a multidimensional visual model, leading to face recognition systems that require difficult and extensive computations for coding and decoding the face image s. A well established approach in this regard is based on using principle component analysis (PCA) for both feature extraction and face recognition, known as the eigenface approach. This technique, despite a good recognition rate, suffers from the disadvantage of high computation cost due to the complexity of the PCA Algorithm. In this paper, we use a geometrical approximated PCA (gaPCA) Algorithm for computing the eigenfaces for three different datasets. The face recognition task is performed using a similarity score based on the inverse Euclidean distance for the first two datasets and using a nerual network in the third case. All the results are compared to the case where standard PCA is used. These accuracy results show that gaPCA represents a viable alternative to the classical statistical approach for computing the principal components [6].

Loris Nanni, Sheryl Brahnam et al 2019, Fundamental problem in computer vision is face detection. In this paper, an experimentally derived ensemble made by a set of six face detectors is presented that maximizes the number of true positives while simultaneously reducing the number of false positives produced by the ensemble. False positives are removed using different filtering steps based primarily on the characteristics of the depth map related to the sub windows of the whole image that contain candidate faces. A new filtering approach based on processing the image with different wavelets is also proposed here. The experimental results show that the applied filtering steps used in our best ensemble reduce the number of false positives without decreasing the detection rate. This finding is validated on a combined dataset composed of four others for a total of 549 image s, including 614 upright frontal faces acquired in unconstrained environments. The dataset provides both 2D and depth data. For further validation, the proposed ensemble is tested on the well-known BioID benchmark dataset, where it obtains a 100% detection rate with an acceptable number of false positives [7].

Deise Maia and Roque Trindade et al 2016, In this paper we portray our execution of Algorithms for face detection and recognition in shading image s under Matlab. For face detection, we prepared a feed forward neural system to perform skin division, trailed by the eyes detection, face arrangement, lips detection and face delimitation. The eyes were distinguished by investigating the chrominance and the point between neighboring pixels and, at that point, the outcomes were utilized to perform face arrangement. The lips were distinguished dependent on the investigation of the Red shading part force in the lower face area. At last, the faces were delimited utilizing the eyes and lips positions. The face recognition included a classifier that utilized the standard deviation of the distinction between shading grids of the faces to recognize the information face. The Algorithms were run on Faces 1999 dataset. The proposed technique accomplished 96.9%, 89% and 94% right detection pace of face, eyes and lips, individually. The accuracy pace of the face recognition Algorithm was 70.7% [8].

4. THE PROBLEMS OF FACE RECOGNITION

This work has presented the face recognition area, explaining different approaches, methods, tools and Algorithms used since the 60's. Some Algorithms are better, some are less accurate, some of the are more versatile and others are too computationally costly. Despite this variety, face recognition faces some issues inherent to the problem

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definition, environmental conditions and hardware constraints. Some specific face detection problems are explained in previous chapter. In fact, some of these issues are common to other face recognition related subjects

5. PROPOSED AND SYSTEM SPECIFICATION

The accompanying issue scope for this research was shown up at after reviewing the literature on the writing on face detection and face recognition, and deciding conceivable certifiable circumstances where such frameworks would be useful. The accompanying system proposed requirements were identified

- A system to detect frontal view faces in static image s
- A system to perceive a given frontal observation face
- Only vacuous,, frontal view faces will be introduced to the face detection & recognition
- All of the implemented systems have to display a high degree of lighting invariency.
- All frameworks must have close to real-time performance.
- Both completely robotized and manual face detection must be supported
- Frontal view face recognition will be acknowledged utilizing just a solitary known image
- Automated face detection and recognition systems ought to be joined into a completely robotized face detection and recognition framework. The face recognition sub-framework must show a slight level of invariency to scaling and revolution blunders in the sectioned image separated by the face detection sub-system.

The frontal view face recognition system ought to be reached out to a posture invariant face recognition framework. Unfortunately despite the fact that we may indicate tightening conditions to our difficult space, it may not be conceivable to carefully cling to these conditions while actualizing a framework in real-world.

5.1. CASCADE CLASSIFIER USING EIGENFACE ALGORITHM

CASCADE ALGORITHM

1) Resize all image I faces to m*m
2) Remove average
3) Create matrix X of faces each row m*m totla size of X is (m*m) * I
4) Calculate average face
5) Remove average face from X
6) Compute the covariance matrix Ev X'*X , Ev size is I*I
7) Compute eigen values and eigen vectors “Ev” , to compute the eigne faces need to go object Ev to higher dimension
8) Compute the linear combination of each original face
9) Given new face project it to eigen face and compute distance to each eigen face this is the recognition.

Proposed Algorithm

```
function output_value = load_database();
persistent loaded;
persistent numeric_Image ;
if(isempty(loaded))
{
 all_Image s = zeros(I*I,X);
 for i=1:40
 cd(strcat('s',num2str(i)));
 for j=1:10
 image _Container = imread(strcat(num2str(j),'.pgm'));
 all_Image s(:,(i-1)*10+j)=reshape(image _Container,size(image _Container,1)*size(image _Container,2),1);
 end
 display('Doading Database');
 cd ..
 end
 numeric_Image = uint8(all_Image s);
```

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```
end
loaded = 1;
output_value = numeric_Image ;
}
```

6. CONCLUSION

The most challenging part for face recognition using a cascade classifier based on eigenface is changes in details such as background, facial expression, illumination, scale sensitivity, posture, etc. These problems reduce the efficiency of the system. These issues might be to some degree sensible yet are not so much avoidable. Although much research has been done in this area, the cascade classifier based eigenface algorithm can be upgraded.

Despite the fact that the issue of facial recognition dependent on cascades classifier is still a classification problem of faces and non-faces at various stages, the dispersion among faces and non-faces is totally extraordinary, so expelling various features and using different classifications methods may be necessary. Face recognition also occurs in other dares, such as expression recognition or body motion recognition. Overall, face recognition methods and emerging techniques may be of use in other areas. Therefore, In this way, it isn't just an uncertain issue yet additionally a wellspring of new applications and challenges.

REFERENCE

1. Reshma M R, Kannan. B, "*Approaches on Partial Face Recognition: A Literature Review*", Proceedings of the Third International Conference on Trends in Electronics and Informatics (ICOEI 2019) IEEE Xplore Part Number: CFP19J32-ART; ISBN: 978-1-5386-9439-8
2. W. Zhao, R. Chellappa, A. Rosenfeld, and P. Phillips. Face recognition: A literature survey. ACM Computing Surveys, pages 399–458, 2003
3. M. Turk. A random walk through eigenspace. IEICE Transactions on Information and Systems, E84-D(12):1586–1595, December 2001.
4. M.-H. Yang, D. Kriegman, and N. Ahuja. Detecting faces in image s: A survey. IEEE Transactions on Pattern Analysis and Machine Intel-ligence, 24(1):34–58, January 2002
5. M. C. Nechyba, L. Brandy, and H. Schneiderman. Lecture Notes in Computer Science, volume 4625/2009, chapter PittPatt Face Detection and Tracking for the CLEAR 2007 Evaluation, pages 126–137. Springer Berlin / Heidelberg, 2009
6. Alina L. Machidon, Octavian M. Machidon, Petre L. Ogrutan , "Face Recognition Using Eigenfaces, Geometrical PCA Approximation and Neural Networks" 978-1-7281-1864-2/19/$31.00 ©2019 IEEE.
7. Loris Nanni, Sheryl Brahnam,and Alessandra Lumini, "Face Detection Ensemble with Methods Using Depth Information to Filter False Positives", Sensors **2019**, 19, 5242.
8. Deise Maia and Roque Trindade, "Face Detection and Recognition in Color Image s under Matlab" , International Journal of Signal Processing, Image Processing and Pattern Recognition Vol.9, No.2 (2016), pp.13-24.
9. Adrian Rhesa Septian Siswanto, Anto Satriyo Nugroho, Maulahikmah Galinium , "Implementation of Face Recognition Algorithm for Biometrics Based Time Attendance System".