ISSN: 2277-9655
Impact Factor: 4.116
CODEN: IJESS7

IJESRT

INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY

FACE DETECTION AND RECOGNIZATION USING PCA ALGORITHM

Nidhi Soni*, Priya Mate
* Shri Shankaracharya Technical Campus,SSGI Dept. of Information Technology Junwani, Bhilai, Chhattisgarh, India
Shri Shankaracharya Technical Campus,SSGI Dept. of Information Technology Juwani, Bhilai, Chhattisgarh, India

DOI: 10.5281/zenodo.801247

ABSTRACT

Image databases and live video data is growing rapidly, their intelligent or automatic examining is becoming exceptionally more important. Human faces are one of very common and very particular objects that we need to try to detect in images. Face detection is very difficult task in image analysis which has each day many applications. We can illustrate the face detection problem as a computer vision task which involve in detecting one or several human faces in an image. Identification & Authentication has become major problems in present digital world. Face detection plays a significant role in identification & authentication. In this paper we propose mechanism for detecting faces from low luminance video and poor quality video files using PCA and Voila Jones Algorithm. We show effectiveness of our algorithm by taking low light video and poor quality video for comparison.

KEYWORDS: Face Detection, Face Recognization, Identity, Computer Vision.

INTRODUCTION

With the rapid growth of computational powers and availability of present sensing, investigation and representation of equipment and technologies, computers are now becoming extra and more intelligent. Number of research projects and commercial products have illustrate the capability for a computer to communicate with human in a natural way by looking at people through cameras, listening to citizens with the help of microphones, and reacting to people in a friendly behavior [6].One of the basic techniques that enables such natural human computer interaction (HCI) is face detection.

Face detection is the most important thing to the entire facial analysis algorithms, considering face alignment, face recognition, head pose tracking, face relighting, face modeling, face verification or face authentication, facial expression tracking or recognition, gender or age recognition, and many others. When computers can recognize face well which helps to understand the people's thoughts and intentions. By providing an arbitrary image, the aim of face detection is to find whether or not there are any faces in the image as if the image is present then it will return the image location and extent of each face [7].

This may appears as a vital task for human beings, it is very tough task for computers, and has been one of the most studied research topics in the past few years. The difficulty consisted with face detection can be attributed to many different variations in scale, location, facial expression, occlusions, orientation (in-plane rotation), pose (out of-plane rotation), and lighting conditions.

Face Detection

Face detection illustrate the presence and location of a face in an image, by determining the face from all other patterns present in the scene. This needs appropriate face modeling and segmentation. The approach should also take into account the sources of variation of facial appearance like viewing geometry (pose), illumination (color, shadowing, and self-shadowing), the imaging process (resolution, focus, imaging noise, perspective effects), and other factors like Occlusion [8].

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There are some other method also in which face detection are carried out by using the entire face [9], making occlusion difficult to handle. Face detection techniques classified on the basis of the image data used to aid in detection—color, geometric shape, or motion information [10].The following figure illustrate the process of face detection in a still image or image sequence.

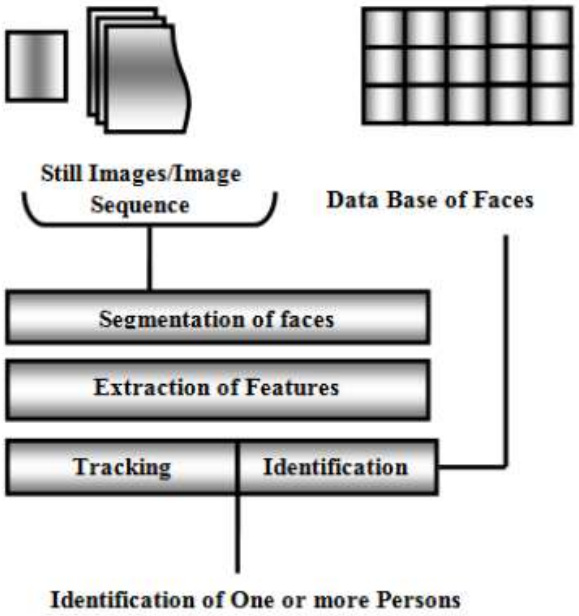

Fig.1. Face Detection Process

LITERATURE SURVEY

Vinay Rishiwal [1], focuses on developing a face recognition system using an extended PCA algorithm. The proposed algorithm uses the concept of PCA and represents an improved version of PCA to deal with the problem of orientation and lightening conditions present in the original PCA. The preprocessing phase of the proposed algorithm emphasize the efficiency of he algorithm even when number of images per person or the orientation is very different.

Maneesh Upmanyu [2], proposes algorithm which makes no restrictive assumptions on the biometric data and is hence applicable to multiple biometrics. Such a protocol has significant advantages over existing biometric cryptosystems, which use a biometric to secure a secret key, which in turn is used for authentication. Author analyze the security of the protocol under various attack scenarios. Experimental results on four biometric datasets (face, iris, hand geometry, and fingerprint) show that carrying out the authentication in the encrypted domain does not affect the accuracy, while the encryption key acts as an additional layer of security.

Wilman W. W. Zou [3], proposes a novel approach to learn the relationship between the high-resolution image space and the VLR image space for face SR. Based on this new approach, two constraints, namely, new data and discriminative constraints, are designed for good visuality and face recognition applications under the VLR problem, respectively. Experimental results show that the proposed SR algorithm based on relationship learning outperforms the existing algorithms in public face databases.

Yogesh Maniktala [4], Biometrics are automated methods of recognizing a person based on a physiological or behavioral characteristic. Among the features measured are: face, fingerprints, hand geometry, handwriting, iris etc. Biometrics is becoming the foundation of an extensive array of highly secure identification and personal verification solutions. As the required level of security rises, the need for highly secure identification and personal verification is also growing. In this paper, we propose an algorithm for robust face recognition.

B. NAGARJUN SINGH [5], presents and analyzes the performance of Principle Component Analysis (PCA) based technique for face recognition. Author consider recognition of human faces with two facial expressions: single and differential. The images that are captured previously constitute the training set. From these images

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Eigen faces are calculated. The image that is going to be recognized through our system is mapped to the same Eigen spaces.

PROBLEM IDENTIFICATION

The main problem lies for video processing is presented below.

Illumination Problem

Illumination problem happens only when the same image with some conditions. So person need to keep with fix lighting condition, fixed the distance, same facial expression and also have the same view point. It can help to emerge extensively different when lighting condition is extensively different.

Pose Problem

Face recognition with various facial poses that is known as pose problem. If face rotation made very huge changes in face appearance it decreases recognition rate. If any person try to match same image with various facial pose, it show the different result.

PROPOSED METHODOLOGY

Our framework work with less illuminated and different pose characters. To complete the task, there exists 3 components which are presented below.

3 Components of our framework:

1. Face Recognition
2. Fate Tracking
3. Face Detection

Fig. 2 shows the architecture of our framework

Face Detection:

Viola-Jones algorithm, basically, looks at a box for a sliding window in a picture to attempt to coordinate diverse dim/light areas so it can recognize a face. The measure of the window shifts on various scales for various appearances, be that as it may, the proportion of the window stays unaltered.

Face Tracking:

We are utilizing Kanade-Lucas-Tomasi KLT method for tracking of faces. This calculation is fundamentally in feature point tracking on the main face, and continues following it until there is no feature point accessible. For the features include point set on tracking, It utilized eigenvalue calculation to discover corner focuses. Fundamentally this is Shi–Tomasi corner discovery calculation which distinguishes the corner. It specifically registers the estimation of eigenvalues to decide if it is a state of intrigue or not.

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Training:
Training is similar to the training of a decision tree. For each pass cascaded objects are trained to recognize images from the video. In this step all the cascaded object and its features are collected and saved into the database. Whenever user comes under camera, or video file is inputted, then the whole algorithm starts calculation from step 1. This step simply saves the identified object into database so to match whenever new file is given input.

EXPERIMENT AND RESULT

The major steps involved in our framework is:

- Training of Video files to detect faces and store into database
- Classification of video files to recognize faces.

We have considered two different kind of dataset

1. Low illumination
2. Poor Video Quality

Training Phase
In this step video file is given input for training of faces. Our algorithm detects faces from video file and save it into its database. In this stage, firstly the face is detected from the video and then features are extracted. After that combining all the features, image is stored into database.

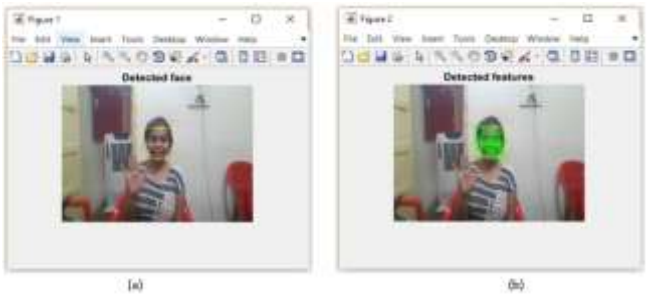

Fig. 3. Shows training steps for nidhi.mp4 (a) present's detected face from vide and (b) represents detected features from training dataset.

Recognition Step
In this step video file is given input for classification of faces. Our algorithm recognizes faces from video file and return images matched with database.

This process follows same steps as of previous one, except one step is added, i.e. recognition of faces. Firstly, framework detects face and then extract features from it. It finally matches the features from the database and return best matched image. Fig. 4 shows best matched images.

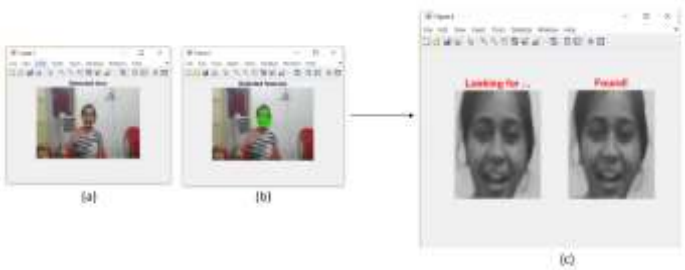

Fig.4 Shows the feature extraction and matching for recognizing faces from the video (nidhi.mp4) (a) present's detected face from video (b) represents detected features from training dataset and (c) shows the image found matched with database

CONCLUSION

Face recognition is a most challenging issue in the area of image analysis and computer vision that has received many attention over the last few decades because of its many applications present in various domains. Research

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has been conducted in this area for the past few years or so, and though enormous progress has been made, encouraging results have been received and current face recognition systems have reached a certain intensity of maturity when operating under constrained conditions; however, they are far from achieving the ideal of being able to perform adequately in all the different situations that are commonly encountered by applications concerned with these techniques in practical life.

This paper has make an attempt deal with major three two problem, the illumination issue and the camera quality issue. This paper, solves all above two issues and present best algorithm for achieving this work.

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CITE AN ARTICLE

Soni, N., & Mate, P. (2017). FACE DETECTION AND RECOGNIZATION USING PCA ALGORITHM. *INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY, 6*(5), 717-721. doi:10.5281/zenodo.801247