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FACE IDENTIFICATION RETRIEVAL SYSTEM

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ABSTRACT

Face Recognition technology is the fastest growing technology for safety and security. The main part of Face Recognition techniques is Face Detection and Face Recognition. Face Recognition is the most complicated and challenging step for the detection and recognition of the face which need more accuracy and efficient performance. Face Detection detects the size and position of the face from the image. In this paper,mainly implementing two subsystems: namely face detection and Face Recognition. Face detection is done using HAAR cascade classifier to detect the face and Local Binary Pattern Histogram for extracting the facial features without losing any important features of face which is stored in database. If the features are matched then the person is matched else it shows unmatched.

KEYWORDS

Detection; Local Binary Pattern; Face recognition;HAAR cascade Classifier; Facial features;

1. INTRODUCTION

Facial recognition technologies have grown fast in the last few years. Effective facial detection and identification is important today in the fields of social development, public safety, national security and others. The most complicated and hence challenging step of face recognition is face detection which needs to be highly accurate as well as efficient performance-wise.The two parts of facial recognition technology are face detection and face recognition Face detection comprises of gathering of information such as size and position of the face from image or video stream which is noted.Position of the nose, space between the eyes and a few other things are the rules governing the process of face detection. There is a pre-defined manual standard sample which facilitates the process of temple matching and then the search window is used to explore the other possible face areas. The factors like direction, size and rotation of the face can affect this otherwise simple method which we just mentioned. In a video stream or an image, face detection is implemented for finding a human face and its poses. It is one of the most important information processing approaches. Few of the issues which are encountered while performing the most common types of face detection are as follows: Complicated imaging circumstances may cause difficulty to distinguish between foreground and background. Using bigger and better samples while training a good template can be a solution. But, since this method is based on single RGB (Red Green Blue) camera without depth

information, it might lead to another problem. The face object on the camera could be a real face or a picture of a face printed on a magazine or a paper. Hence, in this method traditional camera is not valid to ascertain the real face. The next part is the face recognition process which consists of gathering of information from the face.The main advantages of face recognition and biometric identification process lies in its simplicity. Collection of data can be easily done by a camera which does not need to be of very high quality. Thus the collection procedure is highly convenient, budgeted and equipment is easily available. Other techniques like Iris recognition, fingerprint identification require consent of people whereas in face detection and recognition we do not need to disturb others. The system can detect the target face under any lighting condition. Post-processing of the image maybe adversely affected if the face is not correctly extracted from the background image. Skin color has several advantages in comparison with many other features like forehead, nose, cheek and chin.It proposes a method of face detection using Haar cascade classifier.Then, an image is scanned using the classifier. If Haar-like features are found, then a face is detected in the image. The next step is database creation using an YML file. Though skin color method is used extensively, a non-human face with similar skin color is difficult to differentiate. Therefore, after the use of HAAR-like feature for face detection, the local feature recognition, LBP (Local Binary Patterns) method is utilized for face recognition. As we have mentioned before, though face recognition technique is a useful Identification tool but this technique is also vulnerable to several kinds of attacks. Yet, the most demanding work is detection of concealed face in image processing field because of the factors like low resolution of image, illumination changes and movement of Object, etc.In today's world, face detection and recognition for real-time detection system, the important issue here is speed enhancement and time-complexity reduction.

2. RELATED WORKS

The author Z.Wanghave developed Multicore Processor project. In this paper they have used ZYNQ chips and multi core processor. The input and output of the images can be done in the core processor. Parallel detection uses the cascade classifier algorithm like AdaBoost.The multi core processor give the best result and performance of the algorithm.

The author Sang-Seol Lee et al have developed hardware based method for human-robot interaction using LBP. By resizing image and by applying LBP for face detection is done. It finds the particular texture of the image by using AdaBoost-based 4 cascade classification to decide face detection regions with associated confidence. Face detection is done by local binary pattern histogram.The minimum face detection can be carried out on 22x24 pixel size. The face detection hardware needs lot of memory space to store gray images so the face detection needs an external memory. The images are stored in the form of FIFO.

Authors S. Naveen, R.S LBP and BSIF mask detection. In this paper they have used lbp for feature extraction and face detection. BSIF is used for mask detection and eliminated the mask in the image. If it detects face then the user will get authenticated using local binary pattern algorithm.

Z.Jun, H. Jizhao proposed Face detection based on LBP. In this paper they mainly concentrated on the detection of the face they have not concentrated on the

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recognition part. The image face features are extracted and detected using Local Binary Pattern (LBP). LBP detects the size, position and poses of the image. LBP is algorithms which gives best result for face detection with less errors. It gives almost best accuracy of the face detection.

3.METHODOLOGY

This paper proposes a methods that consists of 3 parts:

- Face Detection
- Database Creation
- Face Recognition

1. FACE DETECTION

The face detection process is carried out using Haar cascade classifiers. Haar cascadeclassifier ischoosen because of its speed. In HAAR cascade classifierevery region of an image is analysed using a set of classifiers called Haar features that act as a funnel called the Haar Cascade. The images are rejected as soon as possible if the features do not match with a face. The Haar detector calculates the integral of a grey scale image. Every pixel of the integral image will contain the sum of intensities of every pixel and to the left in the original image.

A Haar-object detector has taken the advantages of three rectangular featureslike Edges, lines and combinations of four rectangles in order to detect an object. A Haar-object detector finds thousands of rectangular features into regions and defines these rectangular features into regions to define an object and detect them as described in fig 1 (a)Edge Features (b) Line Features (c) Rectangular Features.

For the purpose of face detection, we used a .xml file containing a cascade of thousands of rectangular features that are present in the face. The cascade contains features like the cheeks and nose can be brighter than the eye sockets. The forehead is the brightest region of the face. Thousands of these comparisons are conducted in real time to make sure that a single frame of video contains a face.

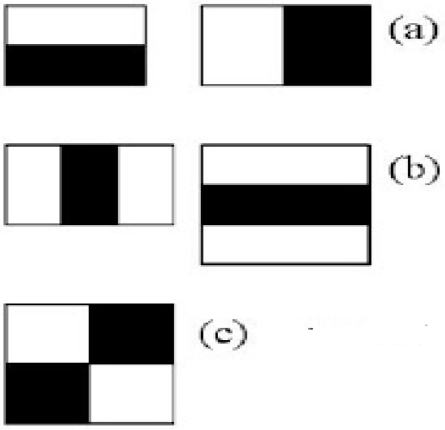

Figure 1 (a) Edge Features (b) Line Features (c) Rectangular Features

2. DATABASE CREATION

The database creation is the most important part of the process. The Haar cascade face detector is used to detect a face in an image or a video frame. Once a face is detected, the image is saved in a folder.

The images saved by the face detector, which are used to create a .yml file by the trainer, are then consulted by the face recognition algorithm to recognize a face from a real time video or an image. The names of the individuals are stored in the database with an id. The corresponding ids are stored with the images of the faces in the file. The images are resized and converted to gray scale images. Conversion into gray scale images makes the intensities a lot more prominent for the following stage to work properly.

3. FACE RECOGNITION

In this paper, Local Binary Patterns Histogram (LBPH) algorithm to perform facial recognition. The LBPH algorithm will looks at 9 pixels at a time i.e 3x3

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pixels to construct a histogram. The algorithm uses the following parameters:
Radius which is used to build the circular local binary pattern and represents the radius around the central pixel. It is usually set to 1.
Neighbours: Sample points that isrequiredto build the circular local binary pattern. It is usually set to 8.
Grid X: Cells in the horizontal direction. The more cells, the finer the grid, the higher the dimensionality of the resulting feature vector. It is usually set to 8.
Grid Y: Cells in the vertical direction. The more cells, the finer the grid, the higher the dimensionality of the resulting feature vector. It is usually set to 8.
In case of LBPH, the pixel in the center is compared with all the other pixel values. If the pixel value is greater than the pixel value in the center it is denoted by 1, else it is denoted by 0(fig. 4). The transition from 1's to 0's and 0's to 1's signifies the presence of edges which may be considered as essentially the change of illumination. The algorithm is also illumination invariant in case of non-uniform illumination. Hence the difference between any pixel value and the pixel value in the center remains the same. The 1 and 0 representation does not need to be altered. One downside to this algorithm is the existence of shadows which can cause non-uniform illumination.

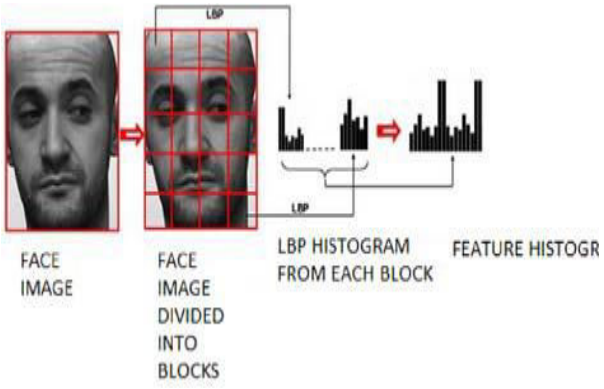

Fig 2: Extraction of feature histogram from a face image.

However, this problem can be eliminated by choosing smaller pixel matrices radius

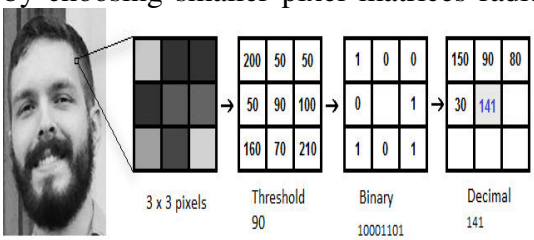

Fig 3: Conversion of grey scale image to decimal.

Using the image generated in the last step, the Grid X and Grid Y parameters may be used to divide the image into multiple grids.

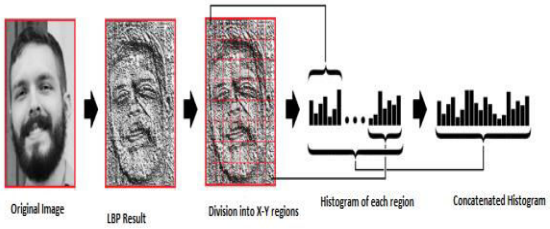

Fig 4: Obtaining Histogram of Image. (lekagulo)

Based on the image above, we can extract the histogram of each region as follows :
• As we have an image in gray scale, each histogram (from each grid) will contain only 256 positions (0~255) representing the occurrences of each pixel intensity.
• Then, we need to concatenate each histogram to create a new and bigger histogram.
This principle can be used in image recognition in the following way: When an image or a video frame is given to the LBPH operator, the LBPH algorithm matches the input face with all the faces in the database using the histogram as a texture descriptor.
On finding a match, it produces the identity of the face with the name at the bottom. In the following section we present the experimental results performed based on the methods proposed in the

above section, along with statistics on the performance of each.

4. RESULTS AND DISCUSSION

PROPOSED SYSTEM:In this paper we used three methods namely face detection, database creation and face recognition.

- **Face detection:**The face detection carried using Viola Jones detection algorithm. The main reason to choose Viola Jones detection algorithm which detects faster and time consuming is less. It also identifies the every features of the image face in pixel. It identifies position, size and shape of the face features.

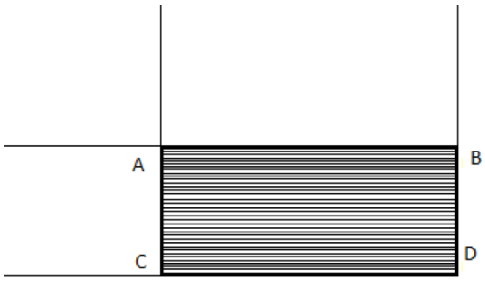

Fig 5: Integral image

- **Database creation:** in this project we collected images faces and created a data base using yml file. Where it can store moe than five peoples image face at a time in the data base.

- **Face recognition:** in face recognition we used a method called Local Binary Patterns (LBP) histogram. This method calculates the every pixel of the image. The image is firstly extract the features of the image and divides in pixel.

In the open eyes and smiling faces, key points are detected in the image using LBP algorithm. This method has proven to capture more information about image structure than any other traditional algorithm. Also lesser features of the completed feature set are seen to make the training. This colour scheme consists of three channels. It is widely used in the coding process of digital video.

Results show detection rate of 79.80% to 99.20% for the method proposed in the paper and a rate of 65.40% to 91.90% for skin color detection method when carried out on FERET database. Carrying the experiment out on YALE-B database, a recognition rate of80.6% to 99.8% was seen for the proposed method and 60.4 to 92.4% for skin color based detection. The process is divided into 3 phases namely, Feature extraction, Face detection and false candidate elimination. The image is first downscaled and then from each of the downscaled images, the facial features are extracted. The features then go through a Naive Bayesian classifier to identify candidate faces. Then skin color and face overlapping elimination is done.

5. CONCLUSION

A face detection and recognition method is discussed in this paper. To detect the faces, Haar classifier has been used which produces maximum error rate of 1.5%, 2.0% and 0.9% in image file. For face recognition, LBPH algorithm has been used with high recognition rate and maximum error of 0.45% which shows that the algorithm is efficient.. This system was tested under very robust conditions in this experimental study and tried with the real-world performance with more accuracyThis was one of the system requirements. The most suitable real-world applications for face detection and recognition systems are for matching and surveillance. The real-time automated pose invariant face detection and recognition system proposed and would be ideal for crowd surveillance applications. If such a system were widely implemented it's

potential for locating and tracking suspects for law enforcement agencies is immense.

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