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LOCAL BINARY PATTERN HISTOGRAM BASED FACE BASED FACE RECOGNITION SYSTEM

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Abstract. In this paper, there is a video based face identification system which recognizes the people at high accuracy level. Consistent, uncontrolled varieties of facial appearance because of light, stance, demeanor, and impediment should be taken care to take into consideration fruitful recognition. Two methods are for identifying the face to implement the face recognition by both face and eye dataset which eventually increases the accuracy of recognition. We are using local binary pattern histogram and Haar Cascade for our proposed face recognition system. Our system is applied for some Smartphone models.
Keywords: face recognition techniques, feature extraction, local binary pattern, Haar cascade.

1. INTRODUCTION

Main objective of our work here is to fabricate a continuous real-time capable face recognition system (FRS) for uncontrolled situations. It should deal with vigorously genuine circumstances with every one of the difficulties they bring along that make the errand harder. Frill and facial hair can cause fractional impediments. Sunlight prompts altogether different enlightenment relying upon the season of day, season and climate conditions. Regardless of this scarcely controllable characteristic impact, even the fake light sources are pulled back from the system's control if subtle recognition as hypothesized above is to be executed.

Face affirmation systems that are to be sent in a bonafide circumstance, generally encounter the issue that they are confronted with darken people. The k-closest neighbours of a test are iteratively misclassified to decide a blunder conveyance. On the off chance that arrangement of the test as any of the classes does not yield believability adequately not the same as this appropriation, it is rejected or it is grouped.

Video-based assessment outflanks outline based assessment since the expanded measure of accessible information settles a few ambiguities. Clearly, both weighting plans enhance the order execution over uniform weighting. The mix exploits both to perform shockingly better.

In our proposed work on video based face recognition system, we have drawn algorithms for dataset creators, trainer and detection. The remaining part of the proposed paper is organized in the following sections: Section 2 describes the literature survey out on few face and video recognition approaches; Section 3 covers the proposed systems with algorithms on dataset creators, trainer and detection; Section 4 describes the result analysis; and finally, Section 5 concludes the paper.

2. LITERATURE SURVEY

Face recognition is a standout amongst the most appropriate utilizations of face detection. It's a genuine test to assemble a mechanized system which breaks even with human capacity to perceive faces. While conventional face recognition is ordinarily in light of still pictures, confront recognition from video groupings has turned out to be prevalent as of late because of more bounteous data than still pictures. Video-based face recognition system design and different methodologies are utilized as a part of video-based face recognition system [1]. Few drawbacks of face recognition system and video recognition have these drawbacks: i) The local information is very important to facial image analysis, it is not well exploited ii) personal specific facial dynamics are useful for discriminating between different persons, however the intra-individual fleeting data which is identified with outward appearance and feelings is additionally encoded and utilized iii) equal weights are given to the spatiotemporal features despite the fact that some of the features contribute to recognition more than others iv) a lot of methods can only handle well aligned faces thus limiting their use in practical scene.

Face recognition is the capacity of classify an arrangement of pictures in light of certain unfair highlights. Order of the recognition examples can be troublesome issue and it is still extremely dynamic field of research. The paper presents theoretical structure for enlightening investigation on strategies of face recognition systems. It plans to depict the past examines have been think about the face recognition system, all together degree on the calculations, uses, benefits, difficulties and issues in this felids. Face pictures are the contributions of the face recognition system, there are a deferent calculations, and strategies utilized for faces perceiving, despite the fact that, the fields still have a difficulties and confinements; it is still now require more precise procedures, particularly for the 3D, likewise the catching innovation expects of participation subject still face an issues and, difficulties, moreover the extension of current face recognition has a more serious issue of face identification, the system require parameters prompting lessened poor speculation abilities, and

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face recognition assignments are required for given highs pictures location. At long last specialists find that the difference in recognition rate isn't considerable when the quantity of shrouded neurons is more than 40, the analyst suggests that there's a requirements for assessment contemplates, and inquiries about particularly on confront recognition field and 3D, all together decreases issues and difficulties in the felids, will ideally for new propelled strategies and techniques soon systems and techniques [2].

proposed correspondence innovation and software engineering has made video-based face recognition goes about as an essential part in human-machine interface and propelled correspondence. The primary target of this paper portrays a review of video-based face recognition modules and methodologies. Still-to-Even now, Video-to-In any case based strategies just endeavor less and physiological data of the face however in Video-to-Video based strategies have progressively and copious data. In future video-based face recognition has made extraordinary test and to embraced in genuine application.

Appearance-based approach represent an object in terms of several object views (raw intensity images). An image is considered as a high-dimensional vector, i.e., a point in a high-dimensional vector space. Many view-based approaches use statistical techniques to analyses the distribution of the object image vectors in the vector space, and derive an efficient and effective representation (feature space) according to different applications. Given a test image, the similarity between the stored prototypes and the test view is then carried out in the feature space [4].

Researcher [5] proposed ideas to originate from the need of programmed recognitions and reconnaissance systems, the enthusiasm for human visual system on confront recognition, and the plan of human-PC interface. These inquiries about include information and scientists from controls, for example, neuroscience, brain research, PC vision, design recognition, picture preparing, and machine learning, and so on.

It will enthusiasm to see where confront recognition innovation will take us next. Open air picture examination, projection of age changes, execution in bigger databases, and correlations of various articulations will enhance, as will our capacities to recognize duplicity and other passionate states. This will acquire progresses prescription and security as we mechanize our essential personnel of perceiving and perusing faces [6].

3. PROPOSED SYSTEM

In our proposed model, we planned to use local binary pattern histogram. Local Binary Pattern (LBP) is a simple yet very efficient texture operator which labels the pixels of an image by thresholding the neighborhood of each pixel and considers the result as a binary number. Take a 3×3 window and move it across one image. At each move (each local part of the picture), compare the pixel at the centre, with its surrounding pixels. Denote the neighbours with intensity value less than or equal to the centre pixel by 1 and the rest by 0. After you read these 0/1 values under the 3×3 window in a clockwise order, you will have a binary pattern like 11100010 that is local to a particular area of the picture. When you finish doing this on the whole image, you will have a list of local binary patterns.

Dataset is a collection of images with face ids, recorded under natural conditions, which is varying illumination and complex background. The eye positions have been set manually (and are included in the set) for calculating the accuracy of a face detector. A formula is presented to normalize the decision of a match or mismatch. Our designed algorithms are implemented of self-collected images of MTech students of Biometric Systems class. The images was taken my simple camera with similar light conditions and same background color in closed room (Fig 1).

Fig 1: Various images of Prashanth from our dataset

Local Binary Patterns methodology has its roots in 2D texture analysis. The basic idea of Local Binary Patterns is to summarize the local structure in an image by comparing each pixel with its neighbourhood. Take a pixel as centre and

threshold its neighbours against. If the intensity of the centre pixel is greater-equal its neighbour, then denote it with 1 and 0 if not. You'll end up with a binary number for each pixel, just like 11100010. So with 8 surrounding pixels you'll end up with 2^8 possible combinations, called Local Binary Patterns or sometimes referred to as LBP codes. The first LBP (Fig 2) operator described in literature actually used a fixed 3 x 3 neighborhood just like this:

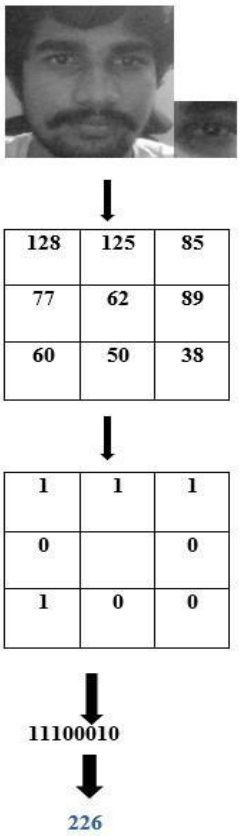

Fig 2: LBP Example.

3.1 Algorithm for DatasetCreator

Step 1: Start
Step 2: Import OpenCV
Step 3: Call the statement import numpy as np, to make the code easier to read.
Step 4: Assign faceDetect variable to haarcascade frontalface classifier which is imported form OpenCV modules
Step 5: Assign eyeDetect variable to haarcascade eye classifier which is imported form OpenCV modules
Step 6: Declare cam to create a VideoCapture object and set its argument to 0 to access the built in camera
Step 7: Declare id for input of user id
Step 8: Initialize the sampleNum_face to 0
Step 9: Initialize the sampleNum_eye to 0
Step 10: While true Read the image from the camera
Step 11: Declare the gray variable to assign the converted color image to gray image.
Step 12: Declare the faces variable to detect the multiple faces at the same time.
Step 13: For each variable x,y,w,h in faces Increment the sampleNum_face
Step 14: Write the image data in dataset in the form of User and id number in jpg format as gray scale.
Step 15: Initialize the rectangle box in detection to red color using rgb values.
Step 16: Declare the measurement of the rectangle of gray scale image.
Step 17: Declare the measurement of the rectangle of color image.
Step 18: Declare the eyes variable to detect the multiple eyes at the same time.
Step 19: For each variable ex,ey,ew,eh in eyes Increment the sampleNum_eye
Step 20: Write the image data in dataset in the form of User and id number in jpg format as gray scale.
Step 21: Initialize the rectangle box in detection to red color using rgb values.
Step 22: Initialize the waitKey for 100 milliseconds'
Step 23: Show the image date of faces.
Step 23: Show the image date of eyes.
Step 24: If sampleNum_eye greater than 20 and sampleNum_face greater than 20 Then release the camera

Step 25: Function to close all the window

3.2 Algorithm for Trainer
Step 1: Start
Step 2: Import OpenCV and OS
Step 3: Call the statement import numpy as np, to make the code easier to read.
Step 4: PIL to call the images from file
Step 5: Declare recognizer to recognize using LOCAL BINARY PATTERNS HISTOGRAMS (LBPH) face recognizer
Step 6: Set the source path to dataset
Step 7: Assign detector variable to haarcascade frontalface classifier which is imported form OpenCV modules
Step 8: Assign detector_e variable to haarcascade eye classifier which is imported form OpenCV modules
Step 9: Define the get images and labels path
Step 10: Set the path to list the image and use OS to concordant the image For the image f in OS List all the directories
Step 11: Initialize the faceSamples and eyeSamples to array object
Step 12: Initialize the Ids to array object
Step 13: For all the imagePath in th imagePaths
Step 14: used "Image.open(imagePath).convert('L')" is loading the image and converting it to gray scale, then PIL image is convert it to numpy array.
Step 15: converting it to numpy array
Step 16: In Id we split the image path and took the first from the last part (which is "-1" in python) and it is the name of the imagefile
Step 17: Declare the faces variable to detect the multiple faces at the same time.
Step 18: For all variables x,y,w,h in faces
Step 19: Append the images of all face Samples
Step 20: compare all Ids with Id and return the faceSamples.
Step 21: Call that function and feed the data to the recognizer to train
Step 22: Close all the open windows.

4. RESULT ANALYSIS AND COMPARATIVE TESTS

Haarcascade frontal face and eye detection are for tracking faces, eyes, noses, and mouths. They require a frontal, upright view of the subject. With a lot of patience and a powerful computer, you can make your own cascades, trained for various types of objects. In this way, a few methods for abstracting picture detail is helpful in creating stable characterization and following outcomes. The deliberations are called highlights, which are said to be removed from the picture information. There ought to be far less highlights than pixels, however any pixel may impact various highlights. The level of comparability between two pictures can be assessed in light of separations between the pictures relating highlights. These detection of faces and eyes are combined into a single image by using the LBPH algorithm proposed in the frame work.
Based on the evaluation it work fine by utilizing the both features extracted from face and eye using Local Binary Pattern Histogram (LBPH) face recognizer. In this system it also confirms it can't be allow for vulnerability by combining the eye recognition.
Implementation of our results are tested with Smartphone and some screenshots are shown in Fig 3. Based on the evaluation it work fine by utilizing the both features extracted from face and eye using Local Binary Pattern Histogram face recognizer.

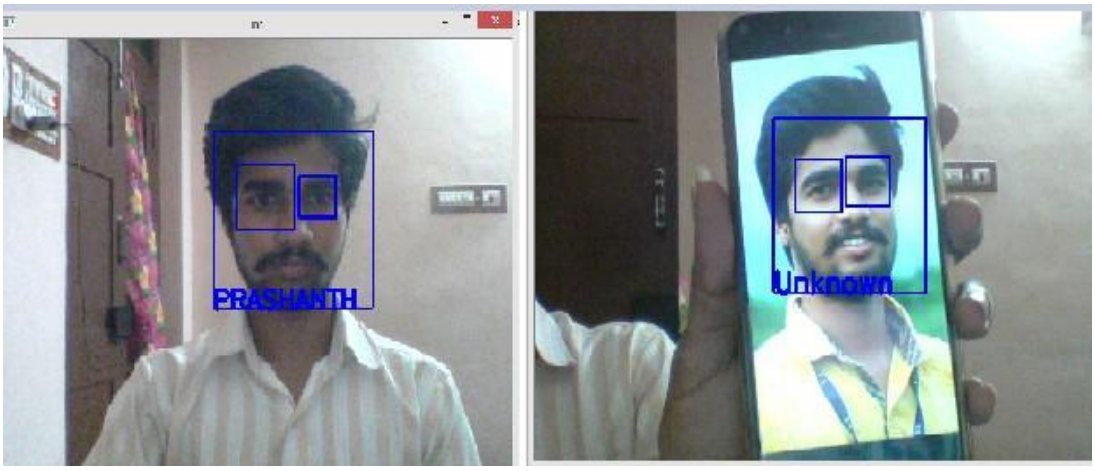

Fig. 3. Screenshots of face recognition system by Smartphone.

In this above image it confirms it can't be allow for vulnerability by combining the eye recognition

5. CONCLUSION

Based on the results of our proposed system and the comparative tests, study of different literature papers, we came to the conclusion, thus extracting both the features from face and eyes which are combined to produce a strong pattern for accurate identification of people and it confirms that it won't allow for vulnerability from the test. This is the method to make an exact and accurate identification of a person. In this work we are able to write novel algorithms for our modules, prepared our own mini-dataset and tested our proposed system on Smartphone. As future steps of our work we will try to propose a working model for images from still and video images which should be able to work for a system and Smartphone with better accuracy. In our work here, we ignored accuracy completely which is very important for euch type of models.

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