Effective Face Detection Over Random Motion, Blur and Pose

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Abstract*— Face identification is the process of identifying one or more people in images. Algorithms for face identification typically extract facial features and compare them to a database to find the best match. Face identification is an important part of many biometric, security, and surveillance systems. The existing methods for face identifying methods cannot deal with non-uniform poses and illumination, blur conditions which are arising from tilts and rotations. So a method is proposed for face identification across blur and different variations in poses and illumination. Pictures of valid users is stored in training data set. So, the variations of poses, illumination, blur will be authenticated if the user is valid. The process is done by algorithms like local binary pattern, viola Jones, Support Vector Machine. Thus the valid user will be found out.

Indexed Terms*— Face identification, LBP, SVM

I. INTRODUCTION

Face identification is the process of identifying people in images by analyzing and comparing. Algorithms for face identification typically extract facial features and compare them to a database to find the perfect match. Face identification is an important part of many biometric, security, and surveillance systems, as well as image and video indexing systems. Face identification leverages computer vision to extract discriminative information from facial images, and pattern recognition or machine learning techniques to model the appearance of faces and to classify them. We can use computer vision techniques to perform feature extraction to encode the discriminative information required for face recognition as a compact feature vector using techniques and algorithms. Facial identification is a way of identifying or confirming an individual's identity using their face. Facial identification is a category of the technology is mostly used for security and law enforcement, though there is increasing interest in other areas of use. Generally, there are spoofing attacks on valid users so our project is about anti spoofing, means valid user only is to be authenticated Invalid user will not be authenticated so this is anti –spoofing. Face identification is used for security purpose in banks and colleges for authentication.

II. VIOLA JONES ALGORITHM

The Viola-Jones algorithm is an face identification framework that allows the detection of image features Viola-Jones is a powerful and its application has proven to be a notable in real-time face detection. Here before detecting an object the image is converted into grayscale. Haar-features are digital image features used in face identification. All human faces share some similar properties of the human face like the eye's region is darker than its neigh bour pixels, and the nose region is brighter than the eye region. hen an image sub region enters the cascade, it is evaluated by the first stage. If that stage evaluates the sub region as positive, then it thinks it's a face, the output of the stage is approved When a sub region gets a maybe, it is sent to the next stage of the cascade and the process continues as such till we reach the last stage. If all classifiers approve the image, it is finally classified as a human face and is presented to the user as a identification. So the viola jones is used for face detection from it feature extraction takes place.

III. FLOW CHART

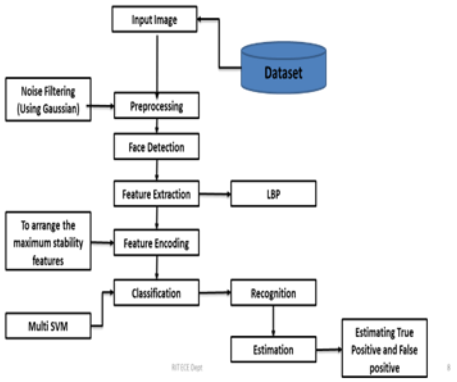


Fig 1: Flow chart

IV. LOCAL BINARY PATTERN

Upload an image from the database and convert it into a grayscale image. Divide the image into multiple blocks. Compare the neighbor pixel values with the central pixels. If the Neighbor pixel value is greater than center pixel value then Assign 1 If the Neighbor pixel value is less than the central pixel value then assigns 0. Generate a binary number starting from pixel one to 8. Convert the generated binary number into a decimal number. Apply Addition and multiply operation on the pixel values and store it in a variable. Selection of facial features from the query image Here the face image is converted in grayscale and histogram values is applied and after this it is given to the classification the LBP code for each pixel is calculated and the histogram of LBP codes is made as the LBP feature A histogram is a graphical representation that organizes a group of information points into user-specified ranges.

V. MATH FOR LOCAL BINARY PATTERN

$$\sum_{n=0}^{7} s(i_n - i_c)2^n$$

$i_c = 2$

$s(i_0 - i_c)2^n$

$n = 0, 1, 2, 3, 4, 5, 6, 7$

Fig 2 : Values computing

$$s(i_0 - i_c)2^n = s(5-2)2^0$$
$$= S(3)(1)$$
$$= S(3)$$
$$s(z) = \begin{cases} 1, & z \geq 0 \\ 0, & z < 0. \end{cases} \quad \boxed{\begin{matrix} 3>0 \\ 1 \end{matrix}}$$

Fig 3 : computing the value at n=0

$$s(i_1 - i_c)2^1 = s(12-2)2^1$$
$$= S(10)(2)$$
$$= S(20)$$
$$s(z) = \begin{cases} 1, & z \geq 0 \\ 0, & z < 0. \end{cases} \quad \boxed{\begin{matrix} 20>0 \\ 1 \end{matrix}}$$

Fig 4 : Computing the value at n=1

Like that compute values for each neighbor pixel. And in the end, you will get values as now Convert the binary pattern into a Decimal number. Then the colours generated.

VI. SUPPORT VECTOR MACHINE

It is used for classification process the local binary pattern image is classified with the help of this SVM this is a machine learning algorithm here the training data set the images will be there if the image is valid then it will check in training data set and classify and the message will be occurred as authentication. SVM is really good algorithm for image classification This is also true for image segmentation systems, including those using a modified version SVM that uses the privileged approach.

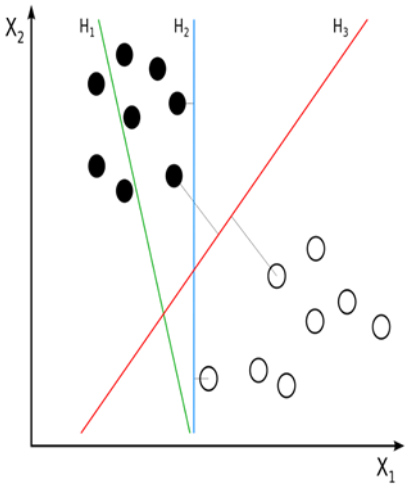


Fig 5 : SVM

VII. PROCESS DESIGN

The input image is taken from the training data set and after taking the image the noise level is added to the image after that here if the image is in large dimension, then the image will be resized into 256*256 image size which is nothing but small size. After that to remove the noise the image filtering is used which is nothing but Gaussian filter, So after that the face region is detected by using viola Jones face detection method and features will be extracted remaining all removed. So, after feature extraction the it is given to local binary pattern the image will get into some patterns here and after that the classification will takes place. So, the execution of process is like be a if the user is valid, it be authenticated or else not authenticated. So, to implement these we use training and testing data set from there we export the images.

Fig 6: Input image

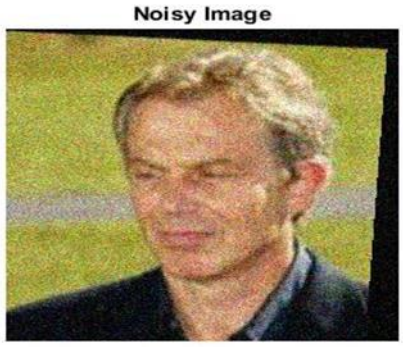


Fig 7: Noisy image

Fig 8: Resize Image

Fig 9: Filtered Image

Fig 9: Extracted Face

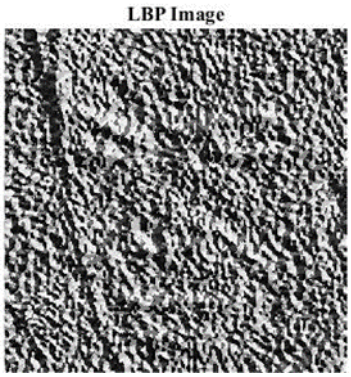
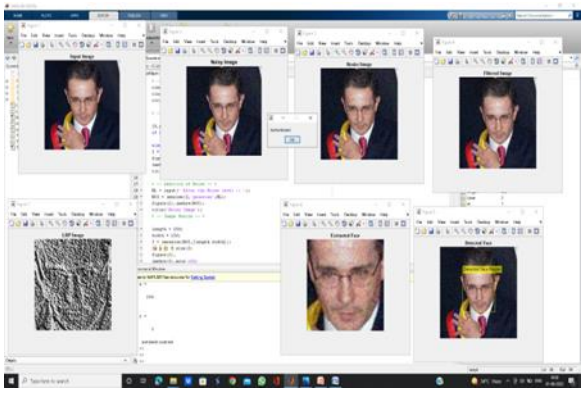


Fig 10: LBP Image

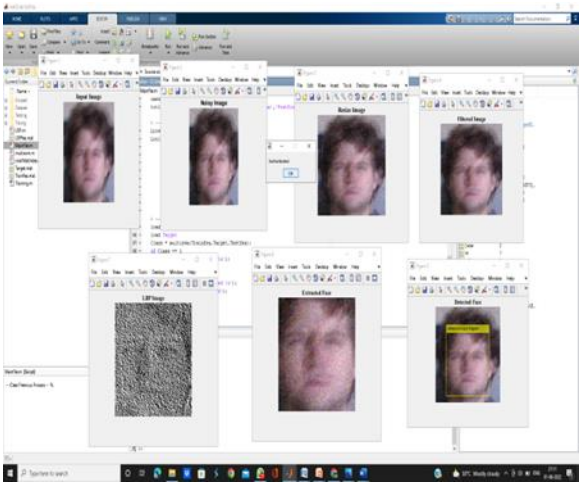
VIII. RESULTS

Results for different variation poses: means here the different poses of a valid user will be verified so any variation poses can be determined if the user is valid.

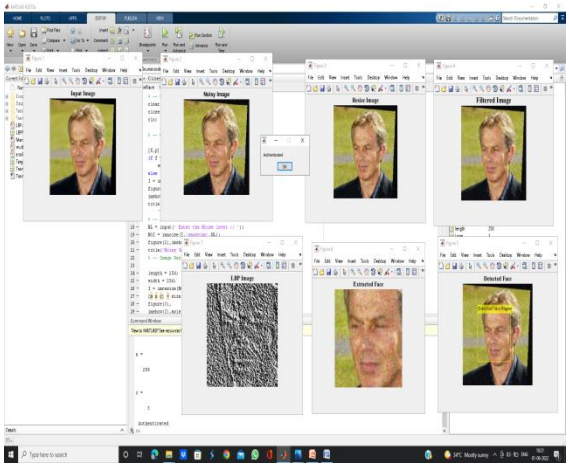
RESULT FOR POSES



RESULTS FOR RANDOM MOTION BLUR



RESULTS FOR ILLUMINATION



IX. CONCLUSION

Finally concluded the proposed methodology to perform face identification under variation of blur and pose and illumination We showed variations of poses and illumination and blur cases In this SVM classification classifies the training data and testing data and produces the closest match output Our experiment results conclude that this method can get better recognition rates

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