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Face Recognition Using Hybrid Local Descriptors with Automated Detection

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Abstract: *Recognizing object classes in real-world images are a highly eminence targets in Computer vision. Conceptually, this is challenging due to large appearance variations of object instances belonging to the same class.The paper illustrate an automated system based on face recognition using discriminative robust local binary pattern and local directional pattern descriptors. The proposed system incorporates face detection, Features extraction and matching. The viola jones algorithm is used to detect the faces from the vision toolbox. In feature extraction stage, the discriminative robust local binary pattern (DRLBP) is worn intended for contrastive face texture and edge shape .A DRLDP technique measures the edge respond values in all eight directions at every pixel point and induces a code from the respective strength magnitude.The simulated results will be shown that used methodologies have better discriminatory power and recognition accuracy compared with prior approaches.*

Keywords: *Face recognition, feature extraction, Viola jones, DRLBP, DRLDP*

1. INTRODUCTION

To identify the faces the histogram equalization of image needs to be done. Generally the face recognition process is hierarchy of 3 steps. They are the Face detection, feature extraction and to end with the face recognition .The identification and verification are the further applications of the recognition process.

Face Recognition on the other hand is a step beyond face detection within a hierarchy of a face recognition task. It involved using a learning algorithm that can be taught to recognize face based on a training phase during which known features of each identifiable object is given with an indication of their origin.

The face detection is done using viola jones algorithm in which the face is detected from the input window. The feature extraction is done by using two methods which are strong enough to the changes in the distinct lighting circumstances.

The aim is to reduce the effect of color variation, either by computing invariant features or by transforming the input image such that the effects of the color are removed. In the existing literatures addressing the photometric variations of the images, histograms in specially designed color spaces are computed. These color spaces have the property of photometric invariance to some extent. But the existing methods for achieving color constancy are based on several assumptions about the statistics of color distribution, surfaces and its reflectance properties. Hence, a histogram representation in such a weakly corrected color space will not be robust enough to achieve invariance. Red Green Blue (RGB) colors were used alongside the height feature histogram and transformed normalized RGB colors plus the height feature histogram techniques to identify faces using histogram matching.

Finding Face by Color the advantage is simple way in to color images, by use the archetypal skin color to locate face sectors. The drawback is do not work along the entire kind of skin colors, and is not incredibly strong nether unstable illumination conditions. Color gives a compassionate agreeable however useful process which is strong under revolutions in deepness and biased barriers.

2. Related Work

DRLBP pacifies the drawbacks of LBP in certain areas .In use of two different sets of edge-texture features, i.e. Discriminative Robust LBP (DRLBP) and Discriminative Robust Ternary Patterns (DRLTP), was proposed for face recognition. . Appearance-based techniques relay on image information for faces classification. Similarly, appearance-based methods rely on visual or thoughtful ideology to extract features for faces classification. Colour, shape and texture are common ways in which an appearance can be studied. Texture contains structural arrangement of a surface and its relation with the environments' information the other hand, is the perceptual property of red, green, blue etc perceived by humans/machines. colour and texture features were captured in the wavelet domain on the YCbCr colour space and using histogram of both features to capture the signature

3. Proposed Methodology

The following is the block diagram representation of the Face Recognition technique.

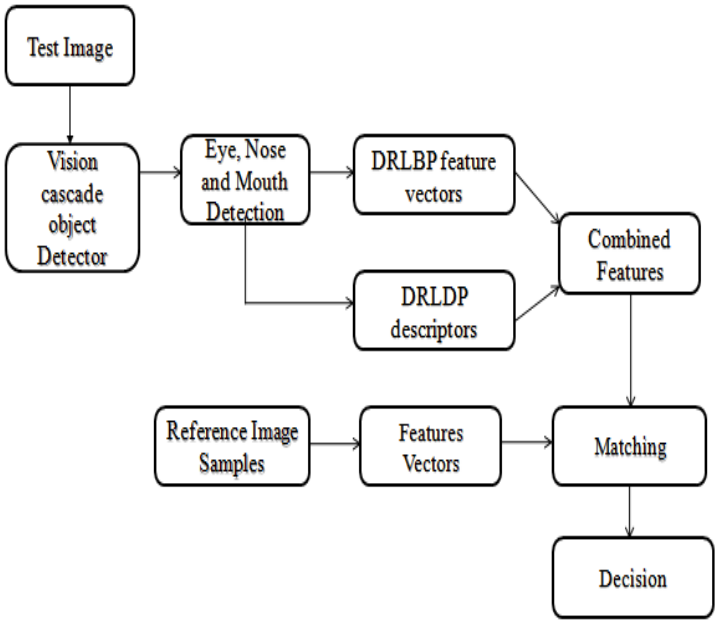


Fig 1.Block diagram representation of FR

3.1 Face Detection:

Face detection is a process which the region of interest is extracted from the face with uniform size and normalized intensity. The attributes that are observable are obtained from the face area such that any variations in face can be identified. The viola-jones algorithm is used for the Matlab vision toolbox to detect the face from the input window. It extracts the boundaries of the face by croping required area such that additional texture analysis is done.

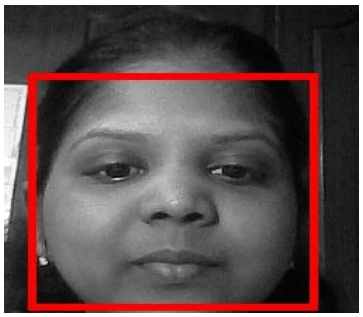


Fig 2 Face detection Using Viola Jones algorithm

3.2 Feature Extraction:

Feature extraction gives the resultant values intentional to be useful. It can be referred to the segmentation process in which the redundant information is reduced by gathering the details which has information. Making possible that appropriate learning and simplified procedure, and in a few cases helpful to improved human understandings.

Distinctive countenances have not the same shapes and colors. The components like iris, eye brose, and lips are in various hues. The RLPB is all the more effective instrument to portray shading surfaces. Yet, neglect to recognize edge or shape data within the face image. The uneven light and frail complexity nearby examples and also solid neighborhood design can't be segregated by RLBP on the grounds that it utilizes just surface data. Subsequently in this technique edge and surface data coordinated to hold nearby structure that RLBP confound and named as discriminative hearty neighborhood parallel example (DRLBP).

$$\text{DRLBP}=\sum_{i=1}^{i=9} w(x,y) \times RLBP \quad \textbf{(1)}$$

Where w(x, y) is calculated by gradient operator by finding square root of magnitude inx direction and magnitude in y direction.

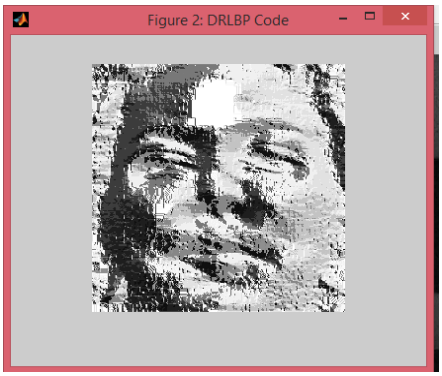


Fig 3 DRLBP code

The LDP Code is derived by,

$$DRLDP_k=\sum_{i=0}^{7} b_i(m_i-m_k)\times 2^i \quad \textbf{(2)}$$

$$b_i(x)=\begin{cases}1, x \geq 0\\ 0, x < 0\end{cases} \quad \textbf{(3)}$$

Where m_i – neighbouring pixels and m_k – k^{th} most significant directional response .Unlike LBP, LDP is used to recognize the eye, nose and mouth detection.

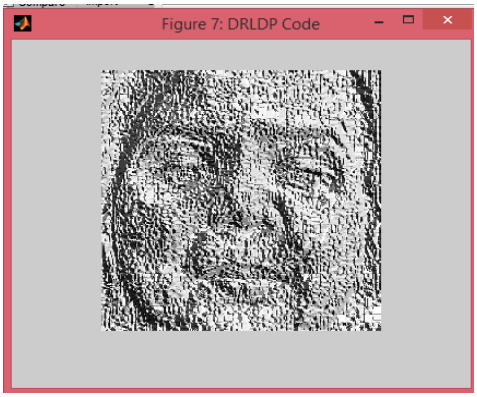
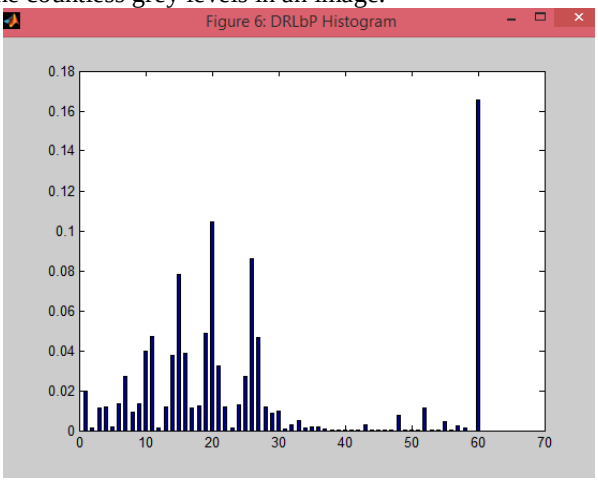


Fig .4DRLDP code

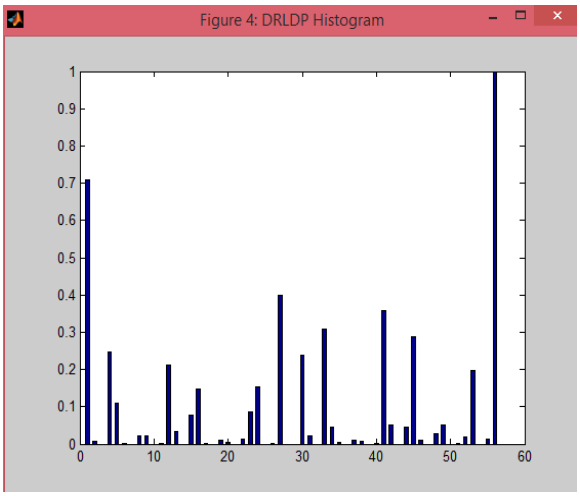
4. Feature Matching

The face features are matched using the neural network. Neural networks are worn for the pattern recognition, texture analysis, and color representation. The extraction of features is very significant step in which the main objective is to locate the informative pixels from the image input that is high dimensional in nature, Extraction is frequently a crucial process of segmentation to be successful.

Usually the histogram consists of number of pixels having various gray levels Histogram is nothing but an image signifies the relative frequency of existence of the countless grey levels in an image.



(a)



(b)

Fig.5 Histogram of (a) DRLBP and (b) DRLDP

5. Experimental Results

By obtaining the parameters like accuracy and precision rate the DRLBP and DRLDP performance is good when compared with the color feature extraction. The obtained parameters are tabulated. The accuracy is defined as how truly the image is recognized.

True positive rate measures the proportion of positives that are correctly identified.

Precision	DRLBP and DRLDP	Color features
Imag1	0.89422	0.59
Img2	0.92304	0.869
Img3	0.9923	0.39

Table.1 Precision of color features and DRLBP, DRLDP features

Accuracy	DRLBP and DRLDP	Color features
Img1	59.589	62.84
Img2	78.092	66.3
Img3	98.887	83.717

Table.2 Accuracy of color features and DRLBP, DRLDP features

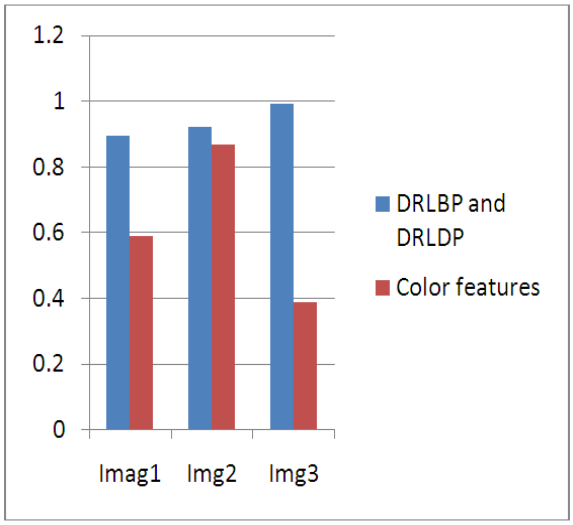


Fig. 6 Comparison for Precision Rate

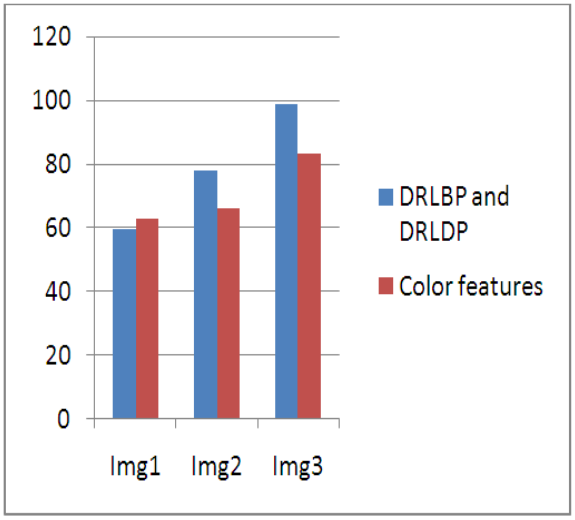


Fig.7 comparison for the Accuracy

6. Conclusion

Therefore the performance of Face Recognition is improved by using the hybrid features than using the COLOR Features. Discriminative Robust Local Binary Pattern (DRLBP) and Discriminative Robust Local Directional pattern (DRLDP) will be obtained for face recognitions even in illumination, noise and lightning for the decision supporting system. Hence a robust method DRLBP rather using color features gives the accurate result in the face recognition and DRLDP for the edge response values in all eight directions at each pixel position and produces a code from the virtual strength amount. The Accuracy and Precision rate of the Recognition is improved by using the Hybrid features than the COLOR Features.

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