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Effective and Efficient Image Retrieval System

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Abstract:

Face recognition is one of the major issues in biometric technology. It identifies and/or verifies a person by using a 2D/3D physical characteristics of the face images[4]. Several techniques have been proposed for solving a major problem in face recognition such as fisher face, elastic bunch graph matching and support vector machine. However there are still many challenge problems in face recognition system such as facial expressions, pose variations occlusion and illumination change[3][1]. Those variations dramatically degrade the performance of face recognition system. It is essential to build an efficient system for face recognition. We introduce a novel face representation method for face recognition integrated with URFB called Local Line Binary Pattern (LLBP)[10][6][7] summarizes the local spatial structure of an image by thresholding the local window with binary weight and introduce the decimal number as a texture presentation .Moreover it consumes less computational cost. The basic idea of LLBP is to first obtain the binary code both along the horizontal and vertical directions separately and its magnitude, which characterizes the change in image intensity such as edges and corners, is then computed along with the unified relevance feedback(URFB)[5][8] shows the advantage over traditional retrieval mechanisms. To seamlessly combine texture feature based retrieval system, a query concept-dependent fusion strategy is automatically learned[9]. Experimental results on ORL data base consisting of 400 images show that the proposed framework is widely scalable, and effective for recognition, classification and retrieval.[2]

Keywords: Binary Code, LLBP, ORL database, Texture

1.Introduction

Many existing face retrieval systems require as input the image or sketch of the target face. Hence synthesis of the target face image must be first accomplished to initiate the retrieval process. However the most natural way in which people describe a face is by semantically describing facial features.

Presently, not many automated systems exist which can directly take advantage of the verbal/semantic description of a face in searching face databases. Such a system helps in easily using the user descriptions of a face in retrieving a smaller subset of candidate face images from a large database of images. variation in the face images. Nevertheless, the three most significant principal components not only contain illumination variations

but also some useful information, therefore, the system was also degraded as well. Wang et. al. proposed a Self Quotient Image (SQI) by using only single image.

The SQI was obtained by using the weighted Gaussian function as a smoothing kernel function. The Total Variation Quotient Image (TVQI) and Logarithmic Quotient Image (LTV) have been proposed by which the face image was decomposed into a small scale (texture) and large scale (cartoon) images. The normalized image was obtained by dividing the original image with the large scale one. The TVQI and LTV has a very high computational complexity due to the second order cone programming as their kernel function.

However these methods are suitable only for illumination variation but not for other variations. Whereas the face representation based method has more robustness. It is not insensitive to illumination variation but insensitive to facial expression as well, such as Local Binary Pattern (LBP) and its extension .it was originally designed for texture description.

The LBP operator assigns a label to every pixel of an image by thresholding the 3x3-neighborhood of each surrounding pixel with the center pixel value and a decimal representation is then obtained from the binary sequence (8 bits). The LBP image is subsequently divided into *R* nonoverlapping regions of same size and the local histogram over each regions are then calculated. finally the concatenated histogram can be obtained as a face descriptor.

Face Retrieval refers to retrieval of face images based on not the raw image content but the semantics of the facial features like description of the nose or chin of a person.For instance ”A round faced person with blonde hair and mustache” is a verbal semantic description of a face. It must be noted that there exist many mug-shot retrieval systems that retrieve face images based on users choice of similar faces from a pool of face images. While these systems do retrieve faces based on semantic descriptions, they do not directly deal with semantically describing the face or retrieving faces according to semantic contents.

A classic example of semantic face retrieval system is to automatically build a sketch or synthetic image of the target face based on the semantic description of the face and then performing an image match of the composed image with those in the database.

However in such systems the retrieval process is time consuming. The proposed work here involves automatically tagging faces in the database with semantic descriptions and subsequently retrieving faces that match verbal queries such as ”blonde haired”, ”mustache”,and ”spectacles” .

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II.Proposed System Model

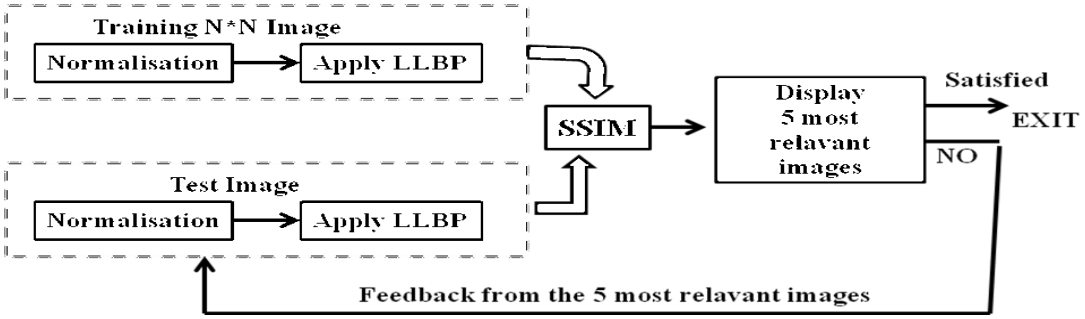


Fig:1 Proposed System model

Both the Test Image and the Training Image are to be compared in order to find the most relevant image from the database. ORL database is choosen where it consists of atmost 4000 images.Before comparing the images (test and training images),feature vector has to be generated for each and every image.These vectors are differnent for different images based on texture properties. The feature vector of the training and testing image is compared with respect to the eucledian distance.If the eucledian distance is equal to zero then the most relavant image has been found from the ORL database.If the similarity measure i.e.eucledian distance is less than zero,then relevant images with respect to the test image has been found.But it is not of the exact training image in the database.If the distance measure is greater than zero,then irrelevant image has been found which is not present in the ORL database. If the image is non-relavant then it means that the given test image doesn't exist in the database.Hence the output is an irrelevant image.

III.Feature Vector Generation

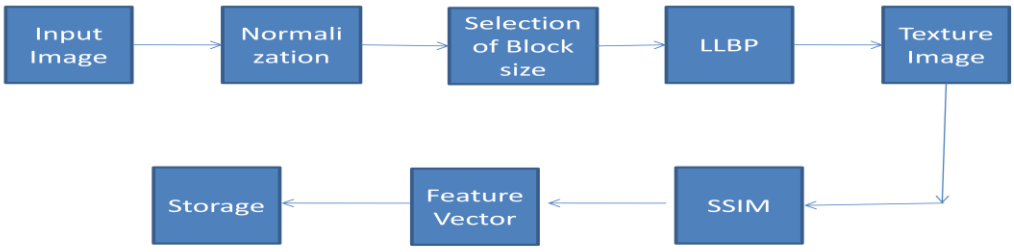


Fig:2. Generation Of Feature Vector for the Sub image

Normalization is the first step to be done while generating the feature vector .The given input image is normalized in order to decrease the high contrast intensity values. Each image has to be segmented or to be subdivided in order to apply Local Binary Pattern(LBP).Hence an individual image M*N has been divided into m*n (block size).For each sub block an LLBP operator is applied, since LLBP is an high constrast image. Texture values will differ from image to image.

In this manner feature vector has been generated for both the test and training images.

IV. Implementation of the proposed Algorithm

Local Line Binary Pattern

- The motivation of Local Line Binary Pattern (LLBP) is from Local Binary Pattern (LBP) due to it summarizes the local spacial structure (micro-structure) of an image by thresholding the local window with binary weight and introduce the decimal number as a texture presentation.

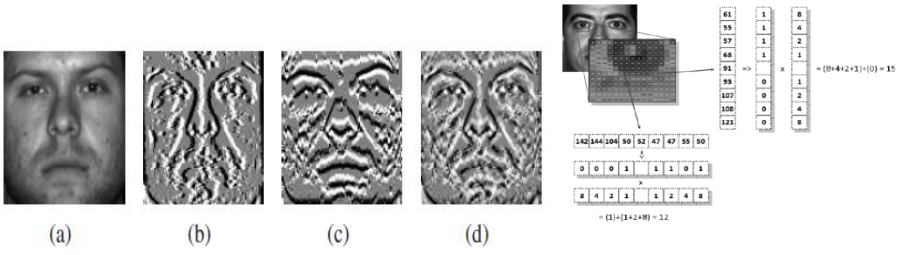
LLBP is similar to the original LBP but the difference are as follows:

1) Its neighbourhood shape is a straight line with length *N pixel, unlike in LBP which is a square shape.*

2) the distribution of binary weight is started from the left and right adjacent pixel of center pixel (20) to the end of left and right side

The algorithm of LLBP, it first obtains the line binary code along with horizontal and vertical direction seperately and its magnitude, which characterizes the change in image intensity such as edges and corners, is then computed.

Figure3and 4 .Example of face image processed by LLBP operator with line length 9 pixels: (a) is original image, (b) and (c) are LLBP along with horizontal and vertical direction, and (d) s its magnitude



This algorithm proposes a novel face representation method, called Local Line Binary Pattern (LLBP), for robust face recognition under facial expression and illumination variation.

The main difference between LLBP and original LBP are as follows:

1) The LLBP operator has a straight line shape, this will greatly assist LLBP operator in capturing the change in image intensity.

2) the image pattern at left and right side of the center pixel of the line are mirror because of the distribution of binary weight at left and right side are equal, Thus, the number of pattern can be reduced. The experimental results prove the effectiveness of the proposed method, the comparative results of original LBP

and other LBP based methods conducted on Yale facedatabase B are shown that the LLBP is more discriminative than other methods even in extreme illumination condition. The FERET database are also shown that the LLBP operator outperformes the original LBP, SLBP, and ILBP.

Algorithm Steps

Training :

1. Read N number of images for training of the system which are taken from ORL face database, The images are 119x72 in dimensions and are intensity value (gray level)images

2.Apply LLBP (Local line binary pattern) for each of the image

3.The magnitude (horizontal and vertical)features of these images are extracted and stored in the databse

Testing:

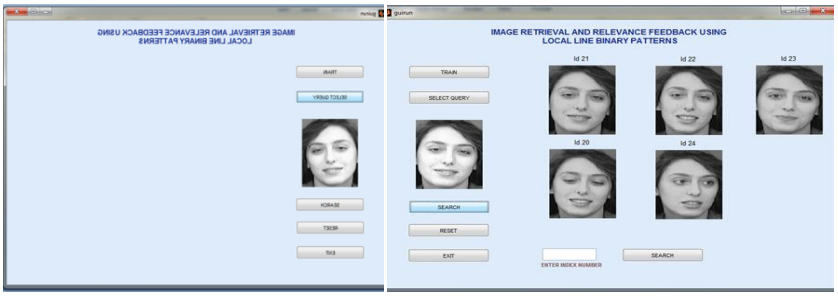
4. A query image is chosen by the user,for the above feature are also calculated

5. A similarity index is been calculated between the trained and testing image feature vector

6. which ever the images having the high similarity index are been considered as the retrieved images for the relevance feedback

7 out of the retrieved images the user selects his choice to acquire the most relevant images

V. Results&Discussions



The first figure listed above was the query selected to search in the database. The second figure represents the results after the applying the proposed algorithm.It is shown that the search results are satisfactory compared to the previous search algorithms.

VI.Conclusion

A novel face recognition and retrieval method for face recognition has been proposed and improved performance the retrieval rate by using Local Line Binary Pattern(LLBP) integrated with unified relevance.

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