Performance Analysis of an Integrated Image Retrieval Technique for Minority Culture Protection and Inheritance

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***Abstract*- It is very significant to know the different minority costumes which are vanishing now a day which is used for minority culture protection and inheritance. To get the exact results for image retrieval there is need of a novel image feature representation method which is used to show the rich information of minority costume image. In this implementation first image is divided into image sub-blocks and then from that image calculate both color histogram as well as edge orientation histogram separately. The final feature used for minority costume image retrieval is fusion or integration of both color histogram and edge orientation histogram. At last improved Canberra distance is calculated for the input query image and retrieved output image. For the performance analysis there is use of self-build minority costume image dataset. MATLAB analysis results show that integrated technique of image retrieval will give outperforming results for characteristics such as color, texture, shape and spatial information, in comparison to existing technique proposed work will give higher and stable retrieval accuracy.**

***Index Terms*- Edge Orientation Histogram, Color Histogram, Minority Culture, Image Sub-blocks, Canberra Distance.**

I. INTRODUCTION

China is a country consisting of fifty six ethnic organizations, and each of them has its very own apparel style with distinct ethnic characteristics, due to the influence of various tradition, traditions, and geographical characteristic. The minority dress is the essential image of the ethnic organization identification and the treasured wealth of the Chinese country. However, with the acceleration of worldwide economic and political integration in China, numerous minority gown cultural traditions were rapidly disappearing. This precipitated human beings to suppose the survival of minority dress underneath the brand new historical situation. For now, the minority costumes are specially blanketed by way of museums statically. Compared with the conventional protection mode of bodily originals in museums, digital safety has longer protection time and promotes minority gown way of life greater effortlessly. Content-based totally image retrieval is a very vital subject matter inside the subject of sample recognition and artificial intelligence. It has been successfully applied to many fields, along with medical diagnosis, textiles enterprise and so forth. The minority costumes of same country have their personal outstanding characters (unified tone, style and patterns.), which cause them to greater fantastic than normal herbal pix in image processing. Therefore, it is of first rate significance to research the visible capabilities of minority costumes. In this paper, the virtual protection of countrywide costume is studied from the attitude of laptop vision.

Although country wide minority clothing picture have complicated visual functions, the principle traits nevertheless are garb color, cloth texture and totem form, which are in accordance with the image feature in computer imaginative and prescient. So we can use conventional feature extraction algorithms to extract the capabilities of minority dress pics. At gift, a massive number of methods on extraction of colour, texture and form functions had been put forward and have already obtained suitable effects in lots of fields. Color is the most dominant and distinguishing visible characteristic. The existing colour feature extraction strategies encompass shade histogram [1],

color moment [2], shade coherence vector [3] and color correlogram [4]. In the current version of the MPEG-7 Final Committee Draft, numerous coloration descriptors have been accepted inclusive of wide variety of histogram descriptors [5]. Texture is used to specify the roughness or coarseness of item surface and defined as a sample with some form of regularity. Many researchers have recommend diverse algorithms for texture evaluation, which include the well-known grey degree co-occurrence matrix (GLCM) [6], nearby binary patterns (LBP) [7], neighborhood directional styles (LDP) [8], and so on. With the continuously expanding of the utility field, new concept, like the theory of wavelet, is brought. And in 1996, Tai Sing Lee [9] used Gabor filters to extract texture capabilities. Shape is the most critical function of the object. The conventional form descriptors are the second invariants [10], the Fourier remodel coefficients [11] and the histogram of orientated gradients (HOG) [12].

The minority gown photo has very complicated visual features, which make it more difficult to be expressed through single feature extraction set of rules. So our purpose is to design a characteristic extraction set of rules based on multi-features to express the statistics of minority photograph comprehensively. A lot of photograph feature extraction algorithms based on multi-capabilities have been proposed in recent years. In 2010, Guang-Hai Liu affords a singular image function illustration approach, referred to as multi-texton histogram, for photo retrieval. It integrates the advantages of co-occurrence matrix and histogram by way of representing the attribute of co-occurrence matrix the use of histogram. Micro-shape descriptor proposed by way of GuangHai Liu in 2011 is constructed primarily based at the underlying colors in micro-structures with comparable edge orientation. It effectively integrates shade, texture, form and colour layout information as an entire for photo retrieval. Guang-Hai Liu additionally proposed colour distinction histogram in 2013, which depend the perceptually uniform coloration distinction among factors underneath distinctive backgrounds in regards to colors and aspect orientations in L*a*b* coloration area. The photo characteristic extraction algorithms stated above have all done excessive retrieval accuracy inside the Corel photograph database.

In view of many picture function extraction algorithms based on multi-functions have been efficaciously applied in picture retrieval, this paper presents a comprehensive feature descriptor to specific the wealthy visible capabilities provided in minority dress picture. This descriptor is represented with the aid of powerful fusion of shade histogram and facet orientation histogram. It's implied in experimental results that the photograph representation strategies used in our technique are an effective manner of integrating low-level features into a whole.

Histogram has many different sorts like histogram rotation, histogram distribution, histogram transferring, and histogram equalization. Histogram equalization plays vital function in many virtual processing packages and furthermore whilst the important in a virtual photo is on the close evaluation values by using histogram equalization technique we are able to increase the tiers of world evaluation of many exclusive pix which has the essential data at the close assessment values. By using the histogram equalization intensities of pixels associated with digital image may be dispensed in higher way to visualize better via human visible gadget. The important gain of the digital picture histogram equalization is that it equalizes the all values of pixels so that the pixels with low intensities can get the better visual appearance this is accomplished by means of spreading the better values to the low pixel values via the use of the histogram equalization method.

II.LITERATURE REVIEW

CBIR has come lengthy manner earlier than 1990 and little or no papers have been posted at that point, but the range of papers posted in view that 1997 is growing. There are many CBIR algorithms because the result of these researches and maximum of these algorithms method image into several layers of responsibilities. Those layers of responsibilities encompass extracting the multidimensional capabilities of an image question and examine it with pictures inside the database are perform after the machine populate database with photographs. Populating database with extracted information from the snap shots and indexed as it should be will have an effect on the overall performance of retrieval. The

facts consist of shade, shape, texture and the rest of image function.

Features that maximum approach focuses on are shade, shape and texture. For color, a widespread development over the RGB-coloration space use of opponent coloration illustration makes use of the opponent coloration axes (R-G, 2B-R-G, R+G+B) is one way to symbolize shade of an photo.

There is also a way referred to as Color Predominance Method which scans the photo and replaces each pixel colour with the brand new RGB coloration listing, gave an instance indexing the use of texture in which an photo is listed via a vector (w1, w2, w3, w4, w5, w6) representing the predicted percentage of texture in which it is the proportion of pixels classified with texture they're introducing indexing the usage of Intermediate Features.

However, a histogram with huge range of containers will not best boom the computational value, but will also be in appropriate for constructing green indexes for photo statistics base. The traditional shade histogram with quadratic form (QF) distance as similarity degree and the bushy coloration histogram with Euclidean Distance nearly comparable of their performance. But they couldn't reply properly to shifted or translated pix. In order to triumph over this problem invariant color histogram technique is used makes which use of gradients in one-of-a-kind channels that weight that weight the affect of a pixel at the histogram to cancel out the changes brought on by means of deformations. When a circled photograph is given as the question, the authentic picture is retrieved because the closest healthy.

Color and Local Spatial Feature Histograms (CLSFH) has fewer characteristic indexes and can capture more coloration-spatial information in an image. At the equal time, as the four histograms used by CLSFH are calculated globally on the photo, the two nearby spatial statistic moment histograms and color histogram are insensitive to picture rotation, translation and scaling, the nearby directional distinction unit histogram is insensitive to image translation and scaling. In CLSFH, the non-uniform quantized HSV coloration model is used, the mean, the same old deviation of 5x5 neighbor of every pixel are calculated, and are used to generate the Local Mean Histogram, the Local Standard Deviation Histogram; the Directional Difference Unit of three X3 neighbor of every pixel is defined and computed, and is used to generate the Local Directional Difference Unit Histogram. The 3 histograms and color histogram are used as feature indexes to retrieve colour image. So CLSFH is powerful for images, specifically for snap shots with rather everyday texture and structure function.

Content Based Image Retrieval (CBIR) systems based on shape the use of invariant image moments, like Moment Invariants (MI) and Zernike Moments (ZM) are to be had. MI and ZM are top at representing the form functions of an photo. However, non-orthogonality of MI and terrible reconstruction of ZM restrict their software in CBIR. Faster and correct CBIR algorithms are required for actual time programs. This can be performed by means of using a classifier which includes Support Vector Machine (SVM), SVM is a supervised getting to know approach used for picture type. It perspectives the given photo database as two sets of vectors in an ' n ' dimensional space and constructs a keeping apart hyper aircraft that maximizes the margin between the images relevant to query and the snap shots non relevant to the query. A CBIR machine the use of ELM functions and ELM features with SVM as classifier.

2.1 Histogram:

A histogram is a graphical illustration of the range of pixels in an photo. In a more simple manner to provide an explanation for, a histogram is a bar graph, whose X-axis represents the tonal scale (black at the left and white at the proper), and Y-axis represents the quantity of pixels in a photo in a certain region of the tonal scale. For example, the graph of a luminance histogram shows the wide variety of pixels for each brightness stage (from black to white), and whilst there are greater pixels, the height at the certain luminance degree is better.

What is a color histogram?

A color histogram of a photo represents the distribution of the composition of colors within the picture. It indicates one of a kind styles of colorations seemed and the range of pixels in every form of the colors appeared. The relation among a color histogram and a luminance histogram is that a coloration histogram may be additionally expressed as "Three Color Histograms", each of which indicates the brightness distribution of every man or woman Red/Green/Blue color channel.

Edge orientation histogram:

The primary concept on this step is to construct a histogram with the instructions of the gradients of the rims (borders or contours). It is viable to detect edges in an image but it on this we're hobby within the detection of the angles. This is feasible trough Sobel operators. The next 5 operators ought to provide an idea of the strength of the gradient in five precise directions (Fig 1.).

-1 -2 -1	-1 0 +1	2 2 -1	-1 2 2	-1 0 1
0 0 0	-2 0 +2	2 -1 -1	-1 -1 2	0 0 0
+1 +2 +1	-1 0 +1	-1 -1 -1	-1 -1 -1	1 0 -1
(a)	(b)	(c)	(d)	(e)

Fig. 1 The sobel masks for 5 orientations: vertical, horizontal, diagonals and non-directional

The convolution in opposition to every of this masks produces a matrix of the same length of the original photo indicating the gradient (strength) of the brink in any specific path. It is feasible to rely the max gradient in the very last 5 matrix and use that to complete a histogram (Fig 2.)

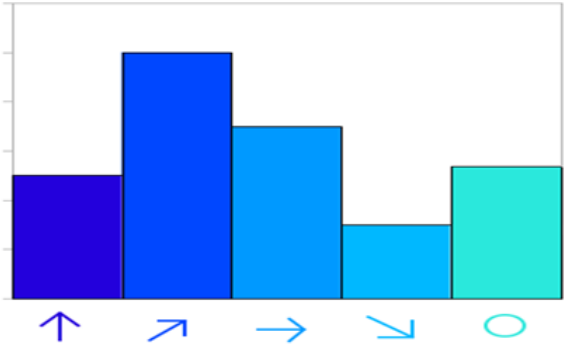

Fig 2: Edge Orientation Histogram

In phrases of averting the amount of non vital gradients that could probably be brought via this technique and choice is to simply recall the rims detected by using a very strong approach because the canny edge detector. This detector returns a matrix of the equal length of the picture with a 1 if there may be an part and zero if there isn't an edge. Basically it returns the contours of the objects in the image. If you just do not forget the 1's we're just counting the most said gradients.

Fig. 1 indicates picture retrieval gadget by content. Large photograph database could be available from that database required photo may be retrieved. As proven in fig. Input is given as photograph to content based picture retrieval block. Using picture database we will get retrieved pics.

Content based totally image retrieval is very antique approach. In this paper we summarized a few techniques of picture retrieval this are Low Level Image Features, Relevant Feedback (Human Interaction), Semantic-based picture retrieval, Extraction of Color, Texture Feature Extraction, Wavelet-Based CBIR, Web Based Image Retrieval.

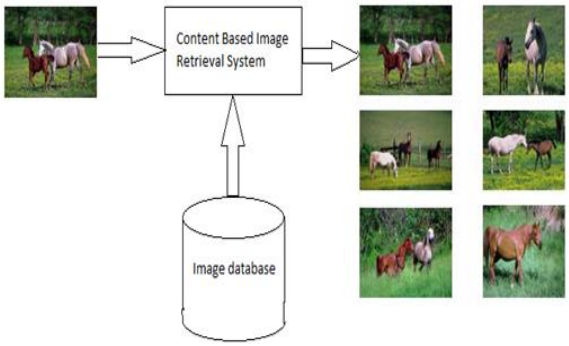

Fig 3: Image Retrieval system by content

III. PROPOSED METHOD

Feature Extraction of Minority Costume Image

A. Calculation of Color Histogram

Color is an important visual attribute for both human perception and computer vision and it is widely used in image retrieval. The color histogram is one of the most direct and the most effective color feature representation [21]. It has advantages of transform invariant, rotate invariant and scale invariant and has been widely used in image retrieval. But it lacks spatial information. This paper incorporates spatial information to it by combining the color histograms for several sub-blocks defined in the minority clothing image. An appropriate color space and quantization must be specified along with the histogram representation. In this paper, three color spaces (RGB, HSV and CIE L*a*b*) with different quantification number are used to test the performance of our Method. The experimental results in Tables 1-3 demonstrate that the RGB color space with 8×4×4=128 quantification number is the best choice in our framework. For an image with a size of M×N, we set the color quantification number to L and denote the image by the equationC x y xN y M ( ) , [0,) [0,) ( ) ∈ ∈ . The value range of C x y ( ) , is [0,) L . We divide the image to n blocks. The color values of each block is denoted by C x y i n i(,),([0,

)) ∈ , then the color histogram of each block is defined as:

H_(c_i (x,y))=⟦num⟧_j,(j=0,1,….,L-1) (1)

where numj is the number of pixels in a sub-block whose color value is quantified to j.

B. Calculation of Edge Orientation Histogram

In the system of theory on computer vision, edge detection of image plays an important role. This paper construct a feature descriptor namely edge orientation histogram, which can be seen as a texture feature and also a shape feature. The classic edge detection operator are Sobel, Roberts, Prewitt and Canny. Sobel is one of the most popular operator [22], which is named after Irwin Sobel and Gary Feldman. The Sobel operator is based on convolving the image with a small, separable, and integer valued filter in the horizontal and vertical directions and is therefore relatively inexpensive in terms of computations. The operator uses two 3×3 kernels which are convolved with the original image to calculate approximations of the derivatives - one for horizontal changes, and one for vertical. If we define R, G, B as the unit vectors along the R, G, B axes in RGB color space, the computations are as follows:

g_Rx=[■(-1&0&1@-2&0&2@-1&0&1)]×R,g_Gx=[■(-1&0&1@-2&0&2@-1&0&1)]×G,g_Bx=[■(-1&0&1@-2&0&2@-1&0&1)]×B (2)

g_Ry=[■(1&2&1@0&0&0@-1&-2&-1)]×R,g_Gy=[■(1&2&1@0&0&0@-1&-2&-1)]×G,g_By=[■(1&2&1@0&0&0@-1&-2&-1)]×B (3)

gxx , g yy and gxy are defined as dot products of the vectors mentioned above:

g_xx=g_Rx^2+g_Gx^2+g_Bx^2 (4)

g_yy=g_Ry^2+g_Gy^2+g_By^2 (5)

g_xy=g_Rx×g_Ry+g_Gx×g_Gy+g_Bx×g_By (6)

Using the above notations, it can be seen that the maximum gradient orientation of point (,) x y is

φ(x,y)=1/2 arctan((2g_xy)/(g_xx-g_yy)) (7)

And the gradient magnitude at (x, y) in the direction of ϕ(,) x y given by

G(x,y)={1/2 [(g_xx+g_yy)+(g_xx-g_yy) cos⁡〖(2φ+2g_xy sin⁡2φ 〗]}^(1⁄2) (8)

Because tan( ) tan( ) α α π = ± , if ϕ0 is a solution to Eq. (7), the ϕ0 ±π / 2 will be a solution, too. Furthermore, G G ϕ ϕ = +π ; therefore, G x y (,) has to be computed only for values of ϕ in the half-open interval [0,) π . Because Eq. (7) provides two values 90° apart, this equation associates a pair of orthogonal directions with each point (,) x y :

G_1 (x,y)={1/2 [(g_xx+g_yy)+(g_xx-g_yy) cos⁡〖(2φ+2g_xy sin⁡2φ 〗]}^(1⁄2) (9)

G_2 (x,y)={1/2 [(g_xx+g_yy)+(g_xx-g_yy) cos⁡〖(2(φ_0+π⁄2)+2g_xy sin⁡2(φ_0+π⁄2) 〗]}^(1⁄2) (10)

In practical applications, the maximum of the gradient direction ϕ(,) x y as follows:

φ(x,y)={■(φ_(0) ifmax(G_1,G_2)=G_2 (x,y)@φ_0+π⁄2 if max(G_1,G_2)=G_2 (x,y))┤ (11)

To facilitate implementation, we project it into the interval [0,2] π . After the edge orientation ϕ(,) x y of each pixel has been computed, the orientations are uniformly quantized into m bins, where m = 12,18, 24,30,36 . Data in Tables 1-3 show that the 30 bins used in the RGB color space are more suitable for our framework. Indeed, the orientations are quantized into 30 bins, each corresponding to angle intervals of 12° . We use histogram of edge orientation to represent the feature of minority costume image. Because histogram is a statistical feature, which is lack of the spatial position information of the image. Therefore, in this paper, before the extraction of edge orientation histogram feature, we divide the minority costume image with a size of M×N into n sub-blocks first. The edge orientation values of each block is denoted by ϕi(,),([0,)) x y i n ∈ , then the edge orientation histogram of each block is defined as

H_(φ_i (x,y)) (j)=⟦num⟧_j,(j=0,1,….,m-1) (12)

where numj is the number of pixels in a sub-block whose orientation value is quantified to j.

C. Comprehensive feature representation

The comprehensive feature extraction algorithm proposed in this paper can be represented as follows:

Step1: Divide the minority costume image with a size of M×N into n sub-blocks, the experimental results in Table 4 demonstrate that our method gets the best results when n=2×2.

Step2: Calculate the color histogram of every sub-block and then linearly combine them as H =[H ,H ,...,H] C x y C x y C x y C x y (,) (,) (,) (,) 1 2 n

step3: Calculate the edge orientation histogram of each sub-block and then linearly combine them as follows:

H_φ(x,y) =[H_(φ_1 (x,y)),H_(φ_2 (x,y)),….H_(φ_n (x,y))] (13)

Step4: Linearly Combine all the histograms mentioned in step2 and step3 as H=[H ,H],([0,)) C x y x y i i (,) (,) ϕ i n ∈ .

Similarity Measurement

The retrieval results can be returned by computing a similarity measure of feature vector between query image and every image in the dataset.

This paper improve the Canberra distance as a new distance metric by introducing a parameter λ , which make it more appropriate for our method.

D(Q,T)=λ∑_(i=1)^CSA▒ (|H_i (Q)|-H_i (T))/(1+H_i (Q)+H_i (T))+(1-λ) ∑_(j=1)^CSB▒ ⟦(|H_i (Q)|-H_i (T))/(1+H_i (Q)+H_i (T)) (14) ⟧

Where, Hi(Q) is the ith feature of query image Q, Hi(T) is the i th feature of target image T in dataset.

IV.EXECUTION RESULTS

Fig 4: Query color image as input

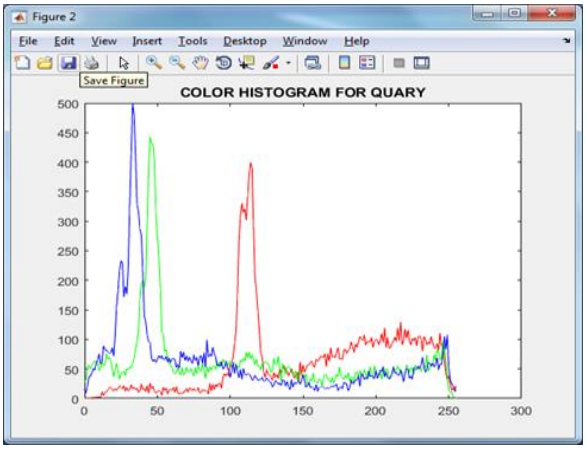

Fig 5: Color Histogram for Query image

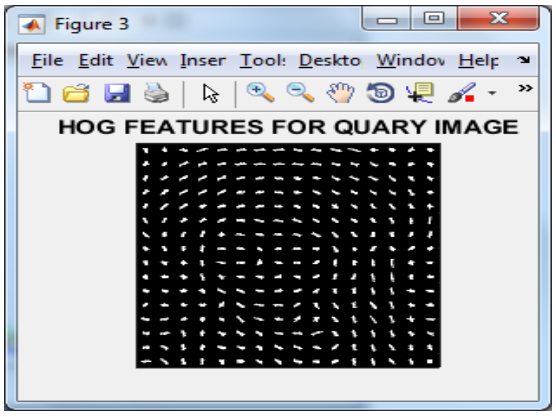

Fig 6: HOG features for Query image

Fig 7: Retrieved Images for Query image

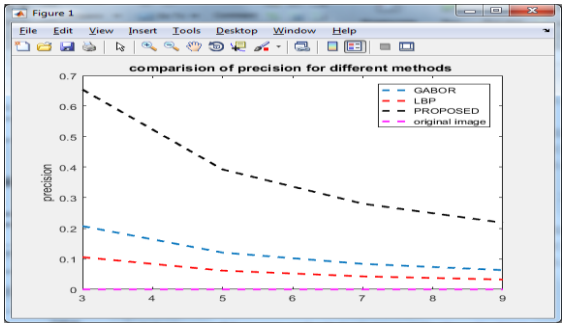

Fig 8: precision comparison of existing and proposed work

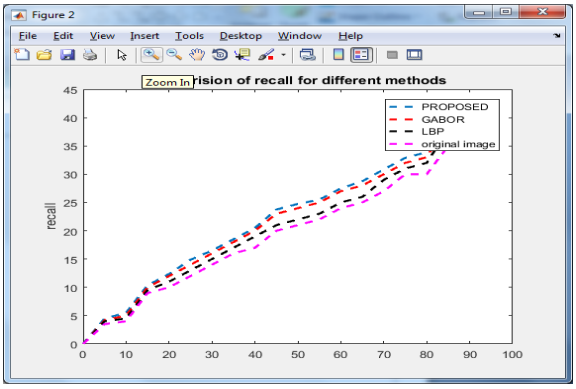

Fig 9: Recall comparison of existing and proposed work

Advantages

1. Run time complexity is less.
2. Objective parameters such as precison, recall are improved with the help of proposed work.
3. As I used Canberra distance results are improved.

Future Scope

1. In future we can use this work in general for CBIR and can prove the enhanced state of art of the proposed technique.
2. Also, I can extend this technique for Video.

V.CONCLUSION

The purpose of this implementation is to gain more accurate results for minority costume image retrieval by integrating two techniques which uses all characteristics such as color, texture, shape as well as spatial information. MATLAB execution result will show us that our method has better retrieval performance as well as strong adaptability. This integrated technique is much better than existing state of art techniques which are separately used for image retrieval such as GLCM, LBP, LDP, Gabor-based feature descriptor, and invariant distance, HOG, MTH, MSD and CDH.With the help of subjective as well as objective quality analysis we can show that the proposed work outperforms in accuracy and is best state-of-art technique.

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