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Colour and Texture Based Image Retrieval

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Abstract: Due to the development and improvement in in technology & internet ,with high speed for the last few years and the availability of a large digital image collection, efficient image retrieval systems are required and efficient cbir system serve that need. In this, we will give a query image to the system and system will search for the similar image as that of the given query image and retrieval the image which is most similar to that of the query image. For this, we will extract the features of query image based on its colour and texture and compare with the feature of the database images stored in dataset . In this paper we present content-based image retrieval system that uses colour and texture as visual features to describe the content of an image region For colour feature extraction, we use combination of algorithms such as HSV-Histogram, Color Correlogram, Color Moment. For texture feature extraction, We have used Gabor filter and Wavelet Moment method. In addition to this a combination of colour and texture based retrieval is also included to improve the accuracy of the result.

Keywords: HSV, Color Correlogram, Gabor filter, Color moments,etc.

I.Introduction

In this Digital world, there is lot of data are store in the form of image, due to this there is a collection of large image database in our system.So whenever we need a specific data or specific image, it is difficult to search on the basis of just text .Text based Image Retrieval (TBIR) will not give good result and is not much efficient. The commonly use TBIR is Google Images. But in real time, its not a efficient technique . For finding the alternative way of searching and overcoming the limitations imposed by TBIR systems more intuitive and user friendly Content Based Image Retrieval systems (CBIR) were developed. "Content-based" means that the search system which will analyze the actual contents of the image. Content Based Image Retrieval is the process of retrieving the desired query image from a huge number of databases based on the contents of the image. Colour, texture, shape and local features are some of the general features used for retrieving a particular image from the database images . Content Based Image Retrieval systems works with all the images and the search is based on comparison of features with the query image. Biomedicine, Military, Education, Web image classification ,ecommerce online platforms and searching are some of the areas where the CBIR technique features its importance. Some of the examples for the current CBIR are Viper which is Visual Information Processing for Enhanced Retrieval, QBIC which is Query by Image Content and Visual seek which is a web tool for searching images and videos. CBIR mainly decreases the heavy workload and overcomes the problem of heavy subjectivity. [1]Content-based image retrieval (CBIR)is also named as query by image content (QBIC) and content-based visual information retrieval (CBVIR) is the application of computer vision to the image retrieval the problem of searching for digital images in large databases is solved by this cbir system. CONTENT-BASED image retrieval (CBIR) has received much importance in research field in the last decade , which is drived by the need of efficiently handling the immensely growing amount of multimedia data and traffic with efficient need of target based search system. Many CBIR systems have been developed, including QBIC, PicHunter , MARS , NeTra. In a typical CBIR system, low-levelimage features like color, texture, and shape are automatically extracted for image descriptions . To search for desirable images, a user presents an image as query of similarity, and the system returns a set of similar images based on the extracted features from the huge database of image.Such systems are effective for many practical & industrial CBIR applications. In this paper we are going to use two features of the image which is colour and texture. The first part is computed by color histogram HSV along with

color autocorrelogram & color moments to retrieved the color parameters of the image. And the second part is used for texture retrieval using GABOR wavelet transform.The extracted features from all algorithm are stored in a single array and compared with the dataset available and loaded to the system and we compute the similarity between them and thus we display the result in descending order from the image database.

Image Retrieval

Our proposed CBIR system can be divided into several component as follow:

1)Color Feature Extraction

2)Texture Feature Extraction

3)Similarity measure and Feature combination

1)Color Feature Extraction

In colour feature extraction, we are using three algorithms HSV-Histogram, ColorAutocorrelegram, Color Moment to extract the features of the image.

A. HSV-Histogram

As there are many color space to represent thehe image in digital form, the most common colour space for or digital image is RGB colour space model. But RGBB colour space is not perceptually uniform. In HSV colour space, image is represent in the combination of Hue(0-360),Saturation(0-1),Value(0-1). Hue represents dominant color, Saturation represents relative purity of color,Value represent intensity of color.HSV colour space is suitable to human visual perception.In order to retrieve the colour feature we convert the image fromRGB color space to HSV colour , After that we separate the HSV plane.Then Quantization is applied to HSV colour space. Quantization is the process of reducing the number of color space by putting the similar color in same bin.Due to this quantization ,computation and comparision time is reduce In our colour ,we use !2 bin quantization:8 bin for hue,2 bin for saturation,2bin for value.As we have quantize the color space ,now this should be represented into color discriptors.According to the number of pixels that have color in each color range. A Color histogram of an input image is defined as a following vector

$H= \{H[0], H[1], \ldots H[i], \ldots, H[N]\}$.(1.1)

Where i denotes the color bin in the color histogram. N denotes the total number of bins used in color histogram and H[i] denotes the total number of pixel of color I in an image.

B. Color Auto correlogram

As the above color histogram method is invarariant to rotation of the image on the view axis. Color correlogram gives the information about the features of colors. It includes spatial color correlations, which describes the global distribution of local spatial correlation of colors and is very easy to compute.

For each image ,the RGB color space is computed .We make a color quantization of each image using 64 colors (4 levels for each channel), followed by an image indexing where a fixed color Map is used. The autocorrelogram of the indexed image is calculated and stored in a feature vector data base. For the HSV color space, we map the original image into the HSV color space. A color quantization is done using 75 colors . Such like 5 levels for H channel, 3 levels for S channel and 5 levels for V channel. Then, the image is indexed and the autocorrelogram is calculated and stored in a feature vector data base and same process is Applied for query image .

C. Color Moments

Colour moments are one of the measures that can be used differentiate images based on their features of color. Once calculated, these moments provide a measurement of color similarity between images. The values of similarity measures which are metrics in our code can then be compared to the values of images indexed in a database for tasks like content-based image retrieval. Probability distributions are characterized by a number of unique. Moments Like here Normal distributions are different-iated by their mean and variance. It, therefore, follows up that if the color in an image follows a certain probability distribute on, the moments of that distribution can then be used as featu-res measures to identify image based on color and further used for retrieval purpose and enhances our retrieval efficiency.

2)Texture Feature Extraction

An image can be considered as a mosaic of textures and texture features associated with the regions can be used to index the image data[11].To extract texture feature in an efficient manner and to it most effective way we are using Gabor Filter(or Gabor wavelet) method.

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A.Gabor Wavelet

$$\sigma_{y,m,n} = \frac{1}{2\pi\tan\left(\frac{\pi}{2N}\right)\sqrt{\frac{U^2h}{2in2} - \left(\frac{1}{2\pi\sigma_{x,m,n}}\right)^2}} \quad (2.10)$$

For a given image I(x, y) with size $P \times Q$, its discrete Gabor wavelet transform is given by a convolution:

$$G_{mn}(x,y) = \sum\sum I(x-s,y-t)*\psi_{mn}(s,t) \quad (2.2)$$

where, *s* and *t* are the filter mask size variables, and ψ^*_{mn} is the complex conjugate of ψ_{mn} which is a part of following mother wavelet generated dilation and rotation.

$$\Psi(x,y) = (1/2\pi\,\sigma_x\,\sigma_y)\exp[-0.5\{(x^2/\sigma_x^2)+(y^2/\sigma_y^2)\}]*\exp(j2\pi Wx) \quad (2.3)$$

where *W* is called the modulation frequency. The self-similar Gabor wavelets are obtained through the generating function:

$$\psi_{mn}(x,y) = a^{-m}\psi(\bar{x},\bar{y}) \quad (2.4)$$

where *m* and *n* specify the *scale* and *orientation* of the wavelet respectively, with *m* = 0, 1, …*M*-1, *n* = 0, 1, …, *N-1*, and

$$\bar{x} = a^{-m}(x\cos\theta + y\sin\theta) \quad (2.5)$$

$$\bar{y} = a^{-m}(-x\sin\theta + y\cos\theta) \quad (2.6)$$

where $a > 1$ and $\theta = n\pi/N$.

The variables in the above equations are defined as follows:

$$a = \frac{Uh^{\frac{1}{M-1}}}{Ui} \quad (2.7)$$

$$W_{m,n} = a^m U_i \quad (2.8)$$

$$\sigma_{x,m,n} = \frac{(a+1)\sqrt{2in2}}{2\pi a^m(a-1)Ui} \quad (2.9)$$

After applying Gabor filters on the image with different orientation at different scale, we obtain an array of magnitudes:

$$E(m,n) = \sum\sum |G_m(x,y)|$$

$$m = 0,1,...,M-1; n = 0,1,.....,N-1. \quad (2.11)$$

These magnitudes represent the energy content at different scale and orientation of the image. The objective of texture-based retrieval is to find images or regions with similar texture. It is assumed that we are interested in images or regions that have homogenous texture, therefore the following mean (μ) and standard deviation (σ) of the transformed coefficients are used to represent the homogenous texture feature of the region:

$$\mu_{mn} = \frac{E(m,n)}{P \times Q} \quad (2.12)$$

$$\sigma_{mn} = \frac{\sqrt{\sum\sum(|Gm(x,y)| - \mu_m)}}{P \times Q} \quad (2.13)$$

Hence a feature vector **f** (for texture representation) is created using mean and standard deviation

$$f = (\mu_{00},\sigma_{00},\mu_{01},\sigma_{01},.....,\mu_{45},\sigma_{45}) \quad (2.14)$$

The texture similarity measurement of a query image *Q* and a target image *T* in the database is defined by:

$$D(Q,I) = \sum\sum d_{mn}(Q,I) \quad (1.9)$$

Where $d_{mn} = \sqrt{(\mu_{mn}^Q - \mu_{mn}^T)^2 + (\sigma_{mn}^Q - \sigma_{mn}^T)^2}$ (2.15)

If fgQ=($\mu_{00},\sigma_{00},\mu_{01},\sigma_{01},.....,\mu_{45},\sigma_{45}$) represents feature vector (**f**) of query image and fgT=(μ0 $\mu_{00},\sigma_{00},\mu_{01},\sigma_{01},.....,\mu_{45},\sigma_{45}$)represents feature vector (**f**)of database image, then distance between them is given by the Euclidean distance formula:

$$\Delta d = \sqrt{\sum_{i=1}^{n}(|f_g^q - f_g^r|)^2} \quad (2.16)$$

Where *n* is the number of features, i= 1,2...,n. Both images are the same for Δd=0 and the small value of Δd shows the relevant image to the query image.

3).Similarity measure and Feature combination

We used the relative L1 Manhattan distance measure, and alternatively the L2 (Euclidean) distance to measure the distance between feature vectors. Feature vectors (FV) with least distances to the FV of the image being searched are the ones corresponding to the images with most similarities to the image being searched. This distances are used as similarity metrics for our resultant output and results are displayed according to the distance measurement output

Euclidean: Take the square root of the sum of the squares of the differences of the coordinates. For example, if x=(a,b)x=(a,b) and y=(c,d)y=(c,d), the Euclidean distance between xx and yy is

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Euclidean $=\sqrt{(a-c)2+(b-d)2}$ **(3.1)**

Manhattan: Take the sum of the absolute values of the differences of the coordinates.

For example, if x=(a,b)x=(a,b) and y=(c,d)y=(c,d), the Manhattan distance between xx and yy is

Manhattan =|a-c|+|b-d| (3.2)

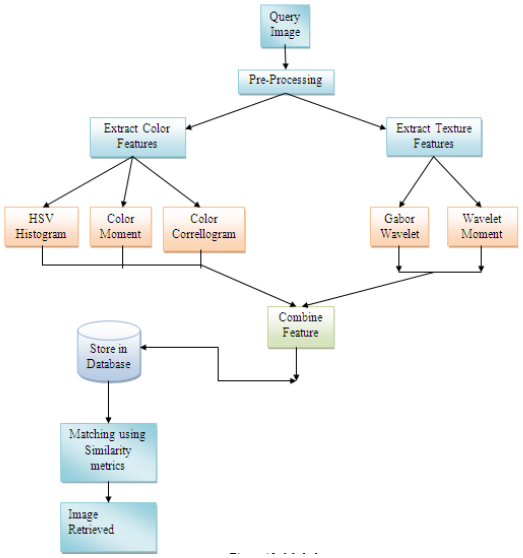

Figure 1: FLOWCHART DESCRIBING METHODOLOGY OF PROJECT

II.RESULTS

For evaluation of the proposed method, it has been implemented using Matlab R2012 a and set of Image database with 500 images of clothes.In our system png &jpeg, both types of images are used for testing the proposed CBIR system.we have grouped 100 images in each category The dataset of each image is calculated and store in the database feature vector form. The database consists of 5 different classes of clothes such as red clothes, yellow clothes, green clothes, black clothes, white clothes.A query image is provided by the user, then similar images from the database are selected and displayed.The result is obtained by distance comparisons from the query feature vector and the dataset of images where the array of features is stored and compared with the feature vector of the image to obtain the result. The proposed system employing color and texture feature extraction methods yields better performance as compared to other CBIR feature extraction method.Our main achievement is that when the user gives a query image from the system then our system retrieve the similar as that of the query from the database. For the performance of our system, we have calculated PRECISION and RECALL value. On the basis of Precision and Recall, for calculating for various set of images, we get the average efficiency of 70%.

Table1.Precision and recall values obtained

SR.NO	TYPE OF DATASET IN DATABASE	PRECISION	RECALL
1	RED CLOTHES	0.65	0.8
2	YELLOW CLOTHES	0.68	0.85
3	GREEN CLOTHES	0.80	0.72
4	BLACK CLOTHES	0.81	0.84
5	WHITE CLOTHES	0.76	0.75

Obtained result:

Step 1:Load the dataset in the project.

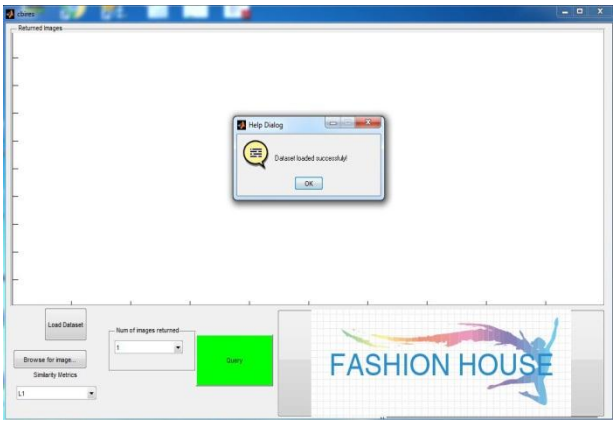

Figure 2. load dataset

Step 2:Browse the image for query input

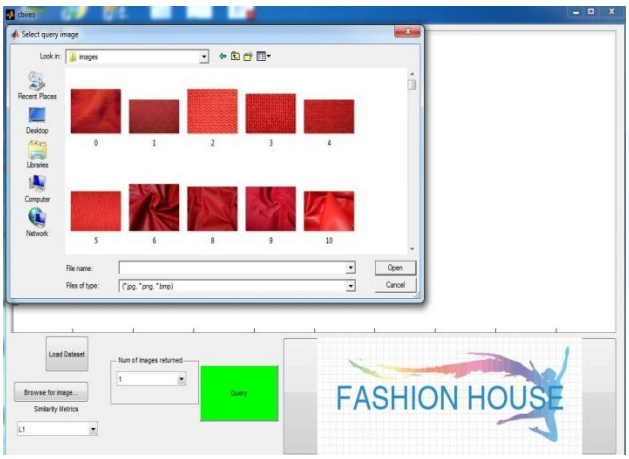

Figure 3.load query image

Step 3: click on query button to start the process & also select the no. Of output required.

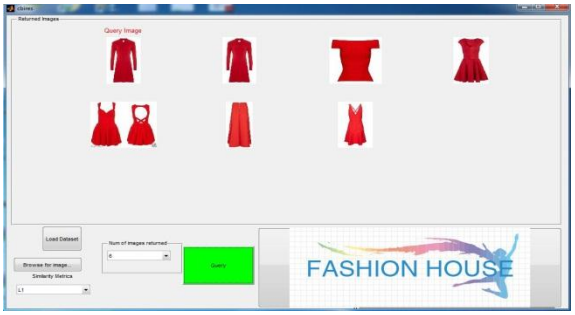

Figure 4. result obtained based on similarity metrics

III.CONCLUSION:

This project presents the practical approach of Content based Image Retrieval using color and texture features. The basic concept of this without having any laborious work of typing keywords, we can use input as an image and can retrieve required images based on color and texture features. It has been found that variation in image feature extraction methodologies can ensure the proficient results and more accurate retrieval of relevant images from the large database. The ultimate goal is to achieve higher retrieval efficiency from large database of images by improving the speed, efficiency and accuracy. The results are far better than TBIR and retrieval serves its purpose

IV.FUTURE SCOPE:

Content-Based Image Retrieval (CBIR) is an active area of research since the past decade. A lot of work is still being done in this area, which includes various applications such as security, medical imaging, audio and video retrieval. The end users of such systems can range from simple users searching a particular image on the web to various types of professional bodies from the government and private organizations, for example, the police force for picture recognition, journalists requesting pictures that match some query event(s), or engineers investigating in system design try to find the right mapping of initial query images.

REFERENCES:

[1]Mr.milind v.lande ,Prof.Praveen bhanodiya,Mr.Pritesh Jain"Efficient content based image retrival using color and texture "International Journal of Scientific & Engineering Research, Volume 4, Issue 6, June-2013

[2]ZHI-CHUN HUANG, PATRICK P. K. CHAN, WING W. Y. NG, DANIEL S. YEUNG,"CONTENT-BASED IMAGE RETRIEVAL USING COLOR MOMENT AND GABOR TEXTURE FEATURE" Proceedings of the Ninth International Conference on Machine Learning and Cybernetics, Qingdao, 11-14 July 2010

[3]S. Mangijao Singh, K. Hemachandran,"Content based Image Retrieval based on the Integration of Color Histogram, Color Moment and Gabor Texture"International Journal of Computer Applications (0975 – 8887) Volume 59– No.17, December 2012

[4]Amina Khatra" Content based Image Retrieval using Texture Contents", International Journal of Scientific Engineering and Research (IJSER), Volume 1 Issue 4, December 2013.

[5] Ashwitha P, Shivakumar G.S," Image Retrieval from Database using Different Image Features" Proceedings of the International Conference , "Computational Systems for Health & Sustainability"17-18, April, 2015 - by R.V.CollegeofEngineering,Bangalore,Karnataka,PIN-560059,INDIA.

[6]Manimala Singhaand K.Hemachandran" Content Based Image Retrieval using Color and Texture" Signal & Image Processing : An International Journal (SIPIJ) Vol.3, No.1, February 2012.

[7] S. Mangijao Singh, Raju Rajkumar, K. Hemachandran," Comparative study on Content based Image Retrievalbased on Gabor Texture Features at DifferentScales ofFrequency and Orientations" International Journal of Computer Applications (0975 – 8887)Volume 78 – No.7, September 2013

[8] Arpit Sameriya, Ms. Bhawana Sharma, "Content-Based Image Retrieval using Color Moments,Wavelet Moments & SVM Classifier" International Journal of Digital Application & Contemporary researchWebsite:www.ijdacr.com (Volume 2, Issue 11, June 2014)

[9]Dengsheng Zhang, Aylwin Wong, Maria Indrawan, Guojun Lu," Content-based Image Retrieval Using Gabor Texture Features" Gippsland School of Computing and Information TechnologyMonashUniversity Churchill, Victoria, 3842, Australia.

[10] S.R. Kodituwakku, S.Selvarajah," Comparison of Color Features for Image Retrieval" S.R. Kodituwakku et al. / Indian Journal of Computer Science and Engineering Vol. 1 No. 3 207-211