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Content Based Image Retrieval Based on Color, Texture and Shape Feature

Dr.V.B.Pagi1, Shrutidevi Patil[2], Basavaraj Patil[3]

[1]*Department of Computer Science and Engineering, Basaveshwar Engineering College, Bagalkot, Karnataka, India*
[2]*Department of Computer Science and Engineering, Basaveshwar Engineering College, Bagalkot, Karnataka, India*
[3]*Department of Information Science and Engineering, SDM Institute of Technology, Ujire, Karnataka, India*

Abstract - ***Content Based Image Retrieval (CBIR) is an emergent and evolving trend in image processing. CBIR is utilized to search and retrieve the query image from extensively variety of database. Many Elements and algorithm can be utilized for efficient image retrieval. The way toward recovering relevant images is generally gone before by extricating some segregating highlights that can best describes the database images. In this paper, we propose a CBIR strategy by separating both color, Texture and shape include vectors utilizing the color histogram, color correlogram ,color moments, Discrete Wavelet Transform (DWT) and the Gobar wavelet transform. At query time texture vectors are thought about utilizing a likeness measure which is the Manhattan distance and the most comparable image is retrieved. These low level elements essentially constitute color, texture and shape features.***

Keywords - ***soccer video; color histogram; color moment ; color auto correlogram ,GLCM features, Discrete Wavelet Transform***

I.INTRODUCTION

Image processing is an enhanced form of signal processing and it will take input might be photograph, video or frame as a results and we will get output as image of constraints related to image. An image retrieval system allows the user to browse, search and retrieve the images. In modern age the rapid development of internet, private network and multimedia technologies, numerous digital images are uploaded every day. The most challenging task is to store and manage large number of images effectively and efficiently. The organization of huge image database for a variety of application has now become more feasible. Even the databases of satellite and medical images have been attracting more and more users in various specialized fields

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Traditional image retrieval takes textual information of image from text-based database system. It lacks due to it retrieve pictorial information along with keyword associated with it. It is very monotonous and time consuming. It fails to bond semantic gap between the retrieval system and user need. CBIR is another approach to image retrieval approach in order to overcome traditional text-based image retrieval process. It is very powerful tool in order to increase accuracy or retrieval process. It is search the needed images using pictorial signals. It uses various methodology and techniques for retrieval of images. Here the contents are visually of images like as, shape and color and region are broadly explored for index image content. Content based image retrieval (CBIR) be utilized as a part of various applications areas such as medicine, satellite and security etc. due to its availability, the key feature is to retrieve images more precisely and it is creates and maintain storage as well as high retrieval speed.

CBIR is very important research region because due to day by day increasing retrieval of images and videos in database and in the future CBIR will become access internet to search and browsing images by database located at remote site. To retrieve images we can use low level features. CBIR is for the most part used to contrast the query picture and database picture and discover the comparability between pictures. CBIR system works with all the images. Image can be extensively ordered into feature local and global features. Local feature easily recognition object features. And

global feature recognize text associated with the image. The other module is the relevant feedback it helps to be more accurate in penetrating the relevant images by taking the feedback of the user.

It helps to access and arrange the digital images from a large collection of databases by using the image features. The aims are to neglect the textual descriptions. User can access data easily.. The query image content is got by content based images retrieval .

II.LITERATURE SURVEY

There are various methods that are available is CIRB based on color, texture and shape feature. Image retrieval is essential to reduce the amount of time to find or search specific image information from the repository. A review is prominent and repetitive work given in this desertion report.

A new novel method introduced that in[1],content based on the image retrieval algorithm mainly uses color models. Image retrieval algorithm is depends upon the on CCM (color co-occurrence matrix).Each pixels of CCM is formed using the HSV of the pixel. Later we can relate with CCM of the images. It is a real-time application, we can execute in high-level languages. The efficiency can be increased by using several feature, similarity can be computed to find more accuracy. Retrieval algorithm consume less time also increases user interaction with implementation of retrieval algorithm decreases the computation time by increasing user interaction. Images are retrieved on the basis of both pixel information and color feature through which accuracy can be increased for efficient retrieval more methods and algorithms.

This method used various feature extraction technique and query image. In[2],We can retrieve images based on query image edge and color detection, histogram methods are used for proper image retrieval. Image segmentation is used in order to improve more accuracy hence it will become prosperous approach by using computational method and various mat lab function. Canny's edge detection technique and color value extraction techniques are used to get more accuracy. Also used Euclidian distance to find similarity matching by result analysis we can conclude outcome is mainly depends on image class.

Author study on retrieval using DWT and SOM by taking some features efficiently retrieve related images. In[3],For this process instead of comparing whole images compared with only captured images. For extracting color and texture feature author DWT and SOM artificial neural network using Euclidian distance most similar images are retrieved. Images also retrieved related images from cluster dataset using SOM technique.

In this paper phong shading methods are used for feature extraction method, In[4],color, texture and edge density methods are considered for to extraction method to get the relatively relation between query images and data images. "Phong interpolation" is referred as "interpolation method" and also as "per-pixel lighting "author concluded that this method is more effective and also enhance the performance of retrieval on CBIR process.

Author used integrated color-spatial approach to retrieve images. In[5],More retrieval accuracy by using precision .This approach discussed here is noise tolerant in the image it is helpful in dealing with objects with similar images with different size and orientation. We have to follow the steps in order to retrieve images. Choose distractive color, integrated color-spatial information used for feature extraction.

This process author mainly concentrated on low level visual descriptors such as color, shape and texture feature. In [6], here author used various feature extraction techniques such as color moment as a feature vector for color description, gray level co-occurrence can be used as texture feature and some geometric feature used for shape features in order to find similarity between different shapes. Author mainly concentrated on decrease required memory and computational time.

Here author proposed a method on both color and texture features. In [7], used various techniques to get retrieve the images from database. Hence multi wavelet transforms for texture features and color correlogram used for taken out due to these results author experiences more efficiency by combining with color and texture features.

Developed image retrieval techniques based on color and texture .In this paper [8],for retrieving and indexing various color features are used such as color correlogram, color moment value, HSV histogram also used segmentation based fractal texture analysis (SFTA).analysis made that 32 histogram value,64 color correlogram value and 6 color moment values and 48 texture features are takeout from query and database images. Here sum classifier is used for finding same detail between query and database images.

Author implemented new method it mainly based on feedback and it consists of "progressive learning capability and different methods for feature extraction techniques In [9], Bayesian classifier is used for learning approach, feedback is different for both positive and negative approach for various strategies positive feedback is based on Gaussian distribution while negative approached are used for ranking based on retrieval. It can give update using principle component analysis(PCA).using these results it leads to more retrieval accuracy and dimensionality reduction main goal is to

I. Based on information modify Gaussian parameter in Bayesian feedback.
II. Adjusting dimensionality based on feature subspace author concludes that his proposed method more suitable in increasing speed, memory and accuracy.

It is a new framework based approach extract color and shape features using Lab and HSV color histogram .In [10], Invariant moment is used to distinguish shape feature. Here author did comparison between HSV and Lab color space with gray and RGB approach. The tool used to find experimental result is Bench marked Wang's dataset and it provides more efficiency.

Author describes technical achievements in image retrieval based on genetic algorithm. Discrete wavelet transform and lifting scheme used in Gaussian distribution. In [11], Expectation Maximization algorithm, kulback libeler divergence used as Gaussian parameter. These parameter used to measure similarity and dissimilarity between query image database image. Genetic algorithm is used for result analysis. Haarwavelet decomposition used to find out approximation coefficient. Distance measured based on KL divergence.

Author concentrated mainly concentrated on more accuracy and increasing performance. Color coherence vector (CCV) used to measure accuracy based on color histogram. In[12],Approximate shape feature used to increase the shape of the retrieved image. Author concludes that used with CCV approach increase more accuracy and also retrieve similar images to source image.

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Here author includes color feature and shape feature based on color histogram and edge histogram descriptor compared between RGB and HSV based on performance. In [13], Euclidian distance used to measure similarity. Author concludes HSV color space is yields better performance than RGB color space. Results high precision value and recall finally concluded that HSV color space uses intersection based image retrieval for reducing computational time and retrieval efficiency.

Author used different techniques Legendre moments and support vector machine and also uses moment invariant and Zernike moments as shape features. In [14],Another feature is Legendre approach are compatible, orthogonal and Computational faster and mainly concentrated on gray scale images finally author concluded that Within less time more retrieval process using MI and ZM .support vector machine is used as classifier. Stacked Euler vector (SERVE) Modified Moment Invariant algorithm is used.

This approaches retrieved images based on color and texture feature. Images can be portioned based on region of interest (ROI). In [15], extracting color feature color moment is used. Discrete wavelet transform .WAN dataset is used. ROI and Euclidean is used measure the distance compare with query image and retrieved image and finally calculate the precision and recall.

III.PROPOSED SCHEME FOR CBIR

Procedure of the proposed system

A. Query image- Identifying which type of images is required for retrieving images in database could be with many approach and much of the time utilized inquiry strategies are "classification perusing, question by idea, inquiry by portray and inquiry by illustration. "Class perusing was perused by grouping. For this reason database pictures are grouped into various classes in view of pictorial substance. "For this purpose database images are classified into different categories based on pictorial content. Query by concept is to retrieve images abstract explanation associated with images in the database.

B. Input images-User wishes to give image as input to the database. input may be image, video or anything.

C. Feature extraction techniques-i) Color feature:

Various color models are used for color feature extraction. Here we used RGB color model in our proposed method in order to evaluate efficiency and retrieval accuracy. For image identification color plays important role. Color feature invariant to rotation, translation and scaling.

ii)Color moment

The mean, standard deviation and difference are added as shading minutes. Below condition communicates the mean, change and standard deviation of a picture comprises of size m*n

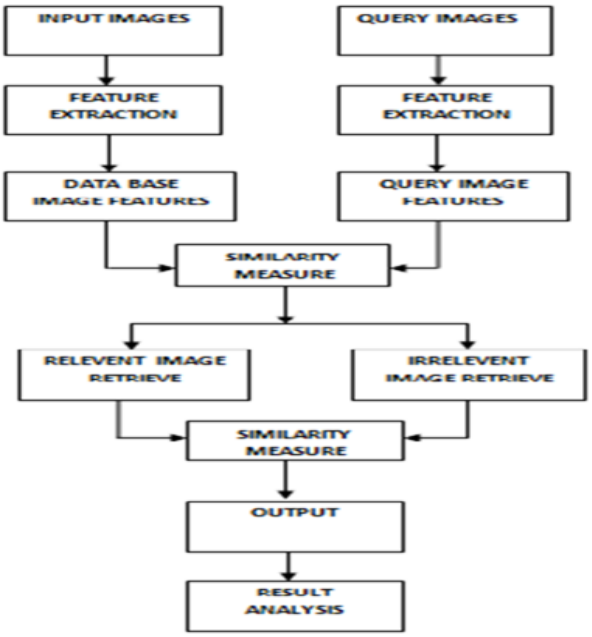

Fig.3.1 block diagram for proposed method

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i) Color feature:

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$$mean = \sum_{i=1}^{n} \sum_{j=1}^{m} x_{ij} / mn \qquad (1)$$

$$\text{var}iance = \frac{1}{mn} \sum_{i=1}^{n} \sum_{j=1}^{m} (X_{ij} - mean)^2 \qquad (2)$$

$stddev = \sqrt{\text{var}iance}$, where X_{ij} is the Pixel value of the i^{th} row and j^{th} column.

iii) Color Histogram

It is the dispersing number of pixel of an each picture. Component of picture in histogram lay on number of bits in every pixel of a picture. For i.e. consider a pixel profundity of n bits, the pixel esteem would move toward becoming 0 to 2n.

$$mean = \sum_{i=o}^{255} i * h(i) / \sum_{i=o}^{255} h(i)$$

$$\text{var}iance = \sqrt{\frac{\sum_{i=o}^{255} h(i) * (i - mean)^2}{\sum_{i=o}^{255} h(i)}}$$

iv) Color Co-occurrence Matrix (CCM)-

It states that at a given offset the distribution of co-occurring value in an image. Value of image is nothing but gray scale value of define pixel in an image.

Mainly co-occurrence matrix used for analyzing texture features in order to perform retrieval process, firstly query image have to select and hue, saturation and value of the pixel are taken and find our co-occurrence have to find out using formula.

$$\text{Colour co-occurrence matrix} = 9H + 3S + V \quad \ldots (4)$$

(v) Color autocorrelogram-

The correlogram is characterized as takes after. Let[D] characterized as an arrangement of D settled separation {d1… d} the correlogram of the picture I is characterized for level pair (gi ,gj) at a separation d.

$$\gamma_{g_i,g_j}^{(d)}(\mathbf{I}) \equiv \Pr_{p_1 \in \mathbf{I}_{g_i}, p_2 \in \mathbf{I}} \left[p_2 \in \mathbf{I}_{g_j} \middle| |p_1 - p_2| = d \right]$$

Likelihood of pixel p1 at level gi and a pixel p2 at a separation d in a pixel at certain separation from given pixel, autocorrelogram at various level given by

$$\alpha_g^{(d)}(\mathbf{I}) = \gamma_{g,g}^{(d)}(\mathbf{I})$$

P_1 and p_2 are likelihood of pixel p_1 and p_2; d far from each other with same level GI .L1 standard technique is utilized for measuring separation between histogram, autocorrelogram and correlogram.

(vi)Texture feature-

Texture feature is visual property of uniformity and it consists of same color or intensity and texture also retrieve images to medical field.

(vii)Gray Level Co-occurrence Matrix(GLCM)- It is a two dimensional histogram in which GLCM method consist relation between each pixel based on gray level. GLCM feature analyze images based on various approaches. Joint probability approach is used to measure pixel distance Intensity is calculated in GLCM by occurrence of each pixel with other pixel at certain distance. GLCM strategy comprise connection between every pixel in view of dark level. GLCM highlight investigate pictures in remove measured by d and introduction by Ɵ.A co-event lattice is recognized by relative frequencies, for example, P(I,J,D, Ɵ).a co-event framework is characterized by separate d, edge Ɵ and dark scale I and j.

(viii)GoberFilter (GF): Gobar filter is used to extract texture feature of an image.Gobar filter are consists set of wavelet with particular frequency and direction.

$$G(x,y)=(1/2\pi\sigma x\sigma y)\exp[-1/2(x^2/\sigma_x{}^2+y^2/\sigma_y{}^2)+2\pi jWx]$$

$$G(u,v)=\exp\{-1/2[(u-W)^2/\sigma_u{}^2+v^2/\sigma_v{}^2]$$

(ix) DWT Characteristics extraction- Discrete Wavelet Transform can be used to extract proper characteristics from the input images.

IV.RESULTS

In proposed system various feature extraction techniques are used based on color, texture and shape feature and here for testing and training we took 1000 images contains 10 classes and for training we took 20 images for each class for texture feature various features are used such as Entropy, Energy, homogeneity ,dissimilarity, Maximum probability, Inverse difference moment normalization.

For training we used 20*10=200 images taken.1000 images consists 10 classes of image dataset is used .each class consists of 100 images hence 10 class consists of 1000 images .out of that 20 are used for training set.system accuracy is calculated as:

Class no	Class name	Feature base don color	Features based on texture	Features based on shape
1	African	85.15%	85.15%	85.0%
2	river	86%	86.00%	91.5%
3	temple	90%	90.0%	95.0%
4	bus	93.5%	93.5%	95.0%
5	elephant	82.5%	82.5%	95.0%
6	rose	97.5%	97.5%	100%
7	mountain	100%	80.0%	90.0%
8	dinosaur	100%	100%	100%
9	Horse	98.35%	98.35%	97.55
10	food	78.75%	95.0%	85.0%

TABLE 4.1 ACCURACY

CALCULATED FOR 10 DIFFERENT CLASSES

We plotted accuracy graph of Color based on similarity measure Feature can be extracted using gobar wavelet transform. this is commonly used tool. After training image we can test the image using different features. first go with pre-processing. In pre-processing we convert image from RGB to gray level in order to extract features.

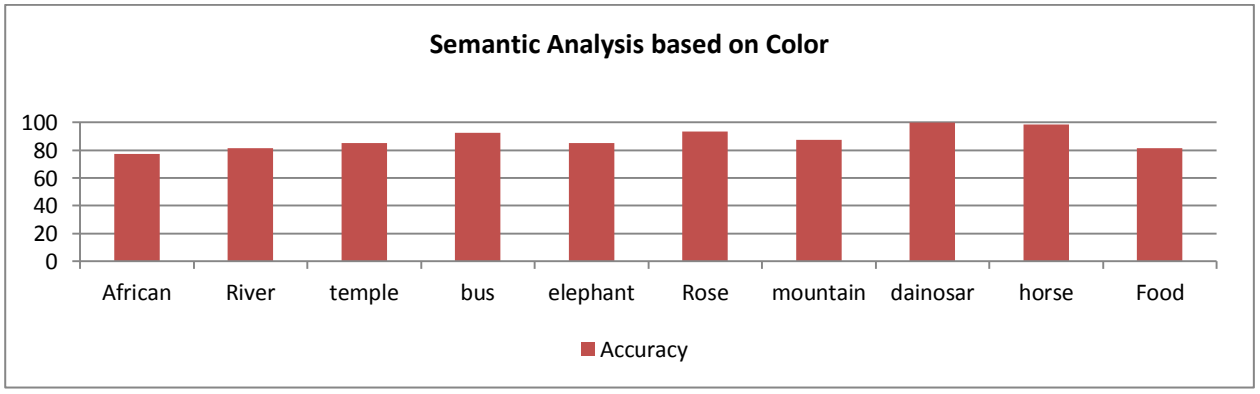

Figure 4.1(a) Graphical representation of color accuracy

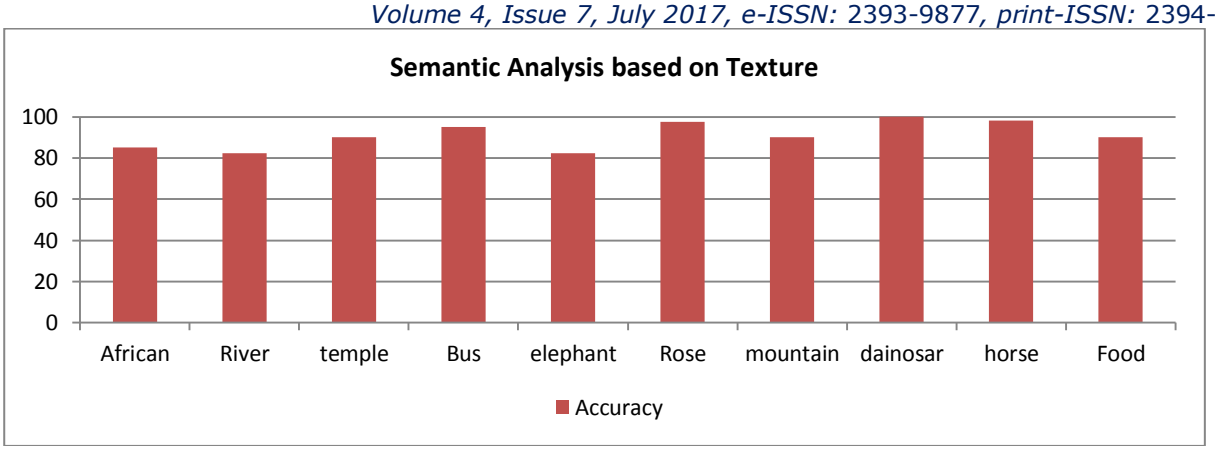

Figure 4.1(b) Graphical representation of texture accuracy

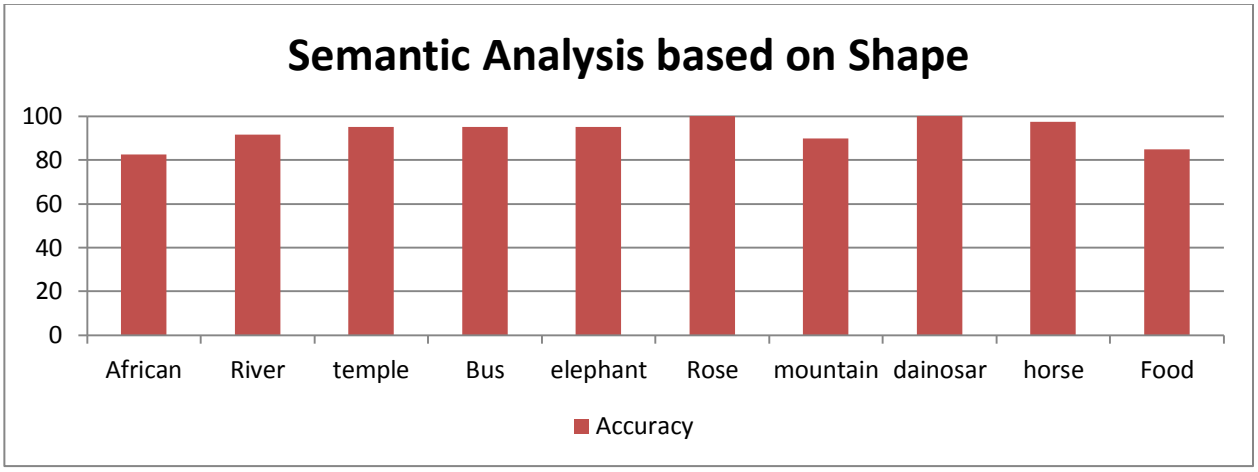

Figure 4.1(b) Graphical representation of shape accuracy

V.CONCLUSION

The hazardous development of image information leads the need of innovative work of Image Retrieval. CBIR is presently critical zone of research in the area of multimedia database. A lot of research work had been undertaken in the previous decades to design efficient image retrieval techniques from database. Here we used different color, texture and shape features for image retrieval in CBIR

In this work the color histogram, color moment, color correlogram, color autocorrelogram ,GLCM, Gobar filter feature extraction strategies are utilized to outline efficient image retrieval. The experiment demonstrates that exclusive color feature or just texture feature or just shape feature are not adequate to describe an images. This is significantly increases the efficiency when shape, color and texture features are joined.

The proposed method uses discrete wavelet transform for feature extraction to retrieve database images. Manhattan distance used to find similarity between query and database image. The experiment is conducted on (10*100=1000) samples, where 20 images used for training among 100 images in each class. Here proposed system get accuracy of 93.00% for image recognition.

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