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Content based image retrieval using HMMD

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Abstract— Content based image retrieval is the process which follows the searching of similar images from the database, based on visual content. The RGB color model algorithm used in the present work is not sufficient for better color description. Therefore in this paper HMMD (Hue Min Max Difference)color space, is can be used in order to efficiently describe the colors in an image. The hue has the same and minimum among the R, G, and B values, respectively. The diff component is defined as the difference between max and min. Only three of the four components are sufficient to describe the HMMD space.In the CBIR core experiments for image retrieval, it is observed that the HMMD color space is very effective and compared favorably with the HSV color space.

Keywords: **Content based; Image retrieval; Visual content.**

1.INTRODUCTION

Content-based image retrieval (CBIR) has Become a outstanding analysis topic as a result of the proliferation of video and image know ledge in digital type. The enlarged information measure convenience to acess the net within the close to future can enable the user to go looking for and browse through video and image database placed at remote sites. Therefore, fast and improved retrieval of pictures from agiant database is a vital downside that must be self-addressed. High retrieval potency and fewer machine quality area unit requires characteristics of CBIR system. In typical image database,pictures area unit text-annotated and image retrieval relies on keyword looking out. The transmission primarily based application became standard due to the rapid advancement of internet technology and therefore the digital devices. As a result, the capacity of digital image libraries obtained through different categories of sources like: social networking sites, multimedia, multimedia camera, multimedia mobiles, internet etc. So there requirement for proper searching techniques to retrieve meaningful image data from that large volume of digital image libraries. Image retrieval techniques are used to maintain and retrieve the image in the database. Mainly the shape features are classified in to two types: boundary descriptors and region descriptors. Further they are classified as (a) Structural and (b) global. The global boundary descriptors include various Fourier descriptors, signatures and wavelet descriptors. CBIR performs retrieval process based on the visual content of the image data. The straight forward image to image searching mechanism is not considered in CBIR. Such approach is not the practically feasible to implement it in any real time applications because image data are comparatively huge in size. So in CBIR, we require suitable feature extraction techniques form the image data so that meaningful and relevant images can be retrieved based on those extracted image features. A number of CBIR techniques were developed based on considering the significant feature like colour, texture and shape. Colour feature is widely used in CBIR techniques since it is one of the most prominent low level features and it is also invariant to rotation, scaling, and other spatial transformations on the images. In general the histogram matching based CBIR techniques is relatively simple and faster. To retrieve image, it is essential to separate objects and background, since the objects are the key contents and the background usually weakens the retrieval accuracy. The fundamental difference between content-based and text-based retrieval systems is that the human interaction is an indispensable part of the latter system. While the features automatically extracted using computer vision techniques are mostly low-level features (colour, texture, shape, spatial layout, etc.)

There are three fundamental components in these systems:
(1) Low-level image feature extraction,
(2) Similarity measure,
(3) 'Semantic gap' reduction.

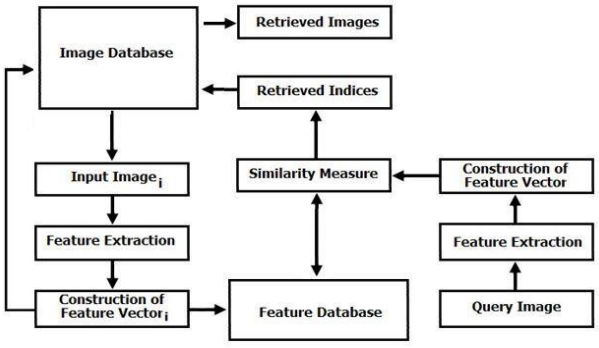

Fig.1.Content-based image retrieval system.

2.LITRATURE SURVEY

Varish and pal, [1] proposed a method, Content based image retrieval (CBIR),which is the process of searching similar images from an image database based on the visual contents of the input query image. In CBIR, color is considered as one of the prominent features of the image data, so in this paper, the authors have presented a CBIR technique using color based feature. Since a color image, consists of three basic color components, i.e. red, green and blue, so in this work, we have given the same importance on all three color components during image retrieving process. In the presented CBIR technique, initially we have constructed three probability histograms for each color component and subsequently the histograms are divided into several numbers of significant bins and from each bin, we have computed several statistical values like standard deviation, skewness and kurtosis. The computed statistical values are used as extracted features of the image data. The processing cost of the presented CBIR technique is significantly low. The technique has been tested on standard image databases and satisfactory results have been achieved.

Singha and Hemachandran, [2] discussed on the topic, Content Based Image Retrieval using Color and Texture," This paper presents the content based image retrieval, using features like texture and color, called WBCHIR (Wavelet Based Color Histogram Image Retrieval).The texture and color features are extracted through wavelet transformation and color histogram and the combination of these features is robust to scaling and translation of objects in an image. The proposed system has a promising and faster retrieval method on a WANG image database containing 1000 general-purpose color images. The performance has been evaluated by comparing with the existing systems in the literature.

Singha *et.al.* [3] proposed study on image retrieval technique based on the combination of Haar wavelet transformation using lifting scheme and the colour histogram (CH) called lifting wavelet-based colour histogram. The colour feature is described by the CH, which is translation and rotation invariant. The Haar wavelet transformation is used to extract the texture features and the local characteristics of an image, to increase the accuracy of the retrieval system. The lifting scheme reduces the processing time to retrieve images. The experimental results indicate that the proposed technique outperforms the other schemes, in terms of the average precision, the average recall and the total average precision/recall.

Singh and Rajput[4] proposed a new CBIR system is proposed which will provide accurate results as compare to previous developed systems. Soft system will be used in this system. Based Image recovery system which evaluates the similarity of each image in its data accumulate to a query image in terms of various visual features and return the image with desired range of similarity. To develop and put into practice an efficient feature extraction NN and SVM to extract features according to data set using Auto calculate the feature weight by neural network. The precision and recall graph in gui according to the retrieved contents of the images from the datasets. To Apply back propagation or feed forward algorithm for neural network classification. To calculate cross relationship and apply weakening model for feature matching.

Kushwah and Agrawal [5] discussed that the content-based image retrieval (CBIR) is a new but widely adopted method for finding images from vast and annotated image databases. As the network and development of multimedia technologies are becoming more popular, users are not satisfied with the traditional information retrieval techniques. So nowadays the content based image retrieval (CBIR) are becoming a source of exact and fast retrieval. In recent years, a variety of techniques have been developed to improve the performance of CBIR. An image retrieval system that takes the input query image and retrieves the similar images according to the spatial coordinates and which uses the k means clustering algorithm for its segmentation.

Patel and Yerpude [6] proposed the algorithm, which is evaluated with two parameters precision and recall on the images of Wang database.Since, with the advancement of Internet and Multimedia social networking technologies, the evolutionary usage of such multimedia contents like images ,video, audio etc are increased. The efficient management and retrieval of such data are required.Therefore to carry out management & retrieval we a technique. This paper present a novel technique for efficient retrieval of images from a large image database called Content Based Image Retrieval(CBIR) system. Since from last two decades several key techniques have been proposed, But most of them suffers from efficient retrieval accuracy whenever performance was measured with respect to time. This paper introduces a method that uses color edge and histogram of an image with haar wavelet transform for efficient retrieval of similar images from a image database along with query image.

Mohamadzadeh and Farsi [7] suggested that the aim of image retrieval systems is to automatically assess, retrieve and represent relative images-based user demand. However, the accuracy and speed of image retrieval are

still an interesting topic of many researches. In this study, a new method based on sparse representation and iterative discrete wavelet transform has been proposed. To evaluate the applicability of the proposed feature-based sparse representation for image retrieval technique, the precision at percent recall and average normalised modified retrieval rank are used as quantitative metrics to compare different methods. The experimental results show that the proposed method provides better performance in comparison with other methods.

Murala *et.al.* [8] discussed a new algorithm using directional local extreme patterns meant for content-based image retrieval application is proposed. The standard local binary pattern (LBP) encodes the relationship between reference pixel and its surrounding neighbors by comparing gray-level values. The proposed method differs from the existing LBP in a manner that it extracts the directional edge information based on local extrema in 0◦, 45◦, 90◦, and 135◦ directions in an image. Performance is compared with LBP, block-based LBP (BLK_LBP), center-symmetric local binary pattern(CS-LBP), local edge patterns for segmentation (LEPSEG),local edge patterns for image retrieval (LEPINV), and other existing transform domain methods by conducting four experiments on benchmark databases viz. Corel (DB1) and Bro-datz (DB2) databases. The results after being investigated show a significant improvement in terms of their evaluation measures as compared with other existing methods on respective databases.

Yue *et.al.* [9] presents a method to extract color and texture features of an image quickly for content-based image retrieval (CBIR). First, HSV color space is quantified rationally.Color histogram and texture features based on a co-occurrence matrix are extracted to form feature vectors. Then the characteristics of the global color histogram, local color histogram and texture features are compared and analyzed for CBIR. Based on these works, a CBIR system is designed using color and texture fused features by constructing weights of feature vectors. The relevant retrieval experiments show that the fused features retrieval brings better visual feeling than the single feature retrieval, which means better retrieval results.

3.Various Data techniques in image retrieval.

Content-based image retrieval (CBIR) has become a outstanding analysis topic as a result of the proliferation of video and image knowledge in digital type. The enlarged information measure convenience to access the net within the close to future can enable the users to go looking for and browse through the video and the image databases placed at remote sites.

3.1 Color Based Feature:

Since a color image, consists of three basic color components, i.e. red, green and blue, so in this work, we have given the same importance on all three color components during image retrieving process. In the presented CBIR technique, initially we have constructed three probability histograms for each color component and subsequently the histograms are divided into several numbers of significant bins and from each bin, we have computed several statistical values like standard deviation, skewness and kurtosis. The computed statistical values are used as extracted features of the image data. The processing cost of the presented CBIR technique is significantly low. The technique has been tested on standard image databases and satisfactory results have been achieved.

$$p(r_i) = \frac{no.\,of\ pixels\ in\ r_i}{weight \times height} \qquad (1)$$

Where $p(r_i)$ represents the relative frequency or probability of r. -th intensity value and the range of intensity value is $[0, l-1]$

$$Bin_i = \sum_{j=LB}^{UB} P(r_j) \leq \frac{1}{n} \qquad (2)$$

Compute for each color component, the standard deviation, skewness and kurtosis from Bin,c ViE [0, n -1]where 'C' represents R, G and B color components respectively.

3.2 Haar Discrete Wavelet Transforms

Discrete wavelet transformation (DWT) is used to transform an image from spatial domain into frequency domain. The wavelet transform represents a function as a superposition of a family
of basis functions called wavelets Wavelets provide multire ssolution capability and good energy compaction. Wavelets are robust with respect to color intensity shifts and can capture both texture and shape information efficiently. The wavelet
transforms can be computed linearly with time and thus allowing for very fast algorithms.DWT decomposes a signal into a set of Basis Functions and Wavelet Functions.The wavelet transform computation of a two-dimensional image is also a multi-resolution approach, which applies recursive filtering and sub-sampling. At each level (scale), the image is decomposed into four frequency sub-bands, LL, LH, HL, and HH .where L denotes low frequency and H denotes high frequency.

Histogram intersection distance:

$$d_{ID} = \frac{\sum_{i=1}^{i=n} min[Q[i], D[i]]}{[ID[i]]} \qquad (3)$$

Smith and Chang extended the idea, by modifying the denominator of the original definition,to include the case when the cardinalities of the two histograms are different and expressed as:

$$d_{ID} \frac{\sum_{I=1}^{I=n} min[Q[i], D[i]]}{min[|Q[i]|, D[i]]} \qquad (4)$$

and |Q| and |D| represents the magnitude of the histogram for query image and a representative
image in the Database.

3.3 Lifting Wavelet-Based Colour Histogram:

The colour feature is described by the color histogram, which is translation and rotation invariant. The Haar wavelet transformation is used to extract the texture features and the local characteristics of an image, to increase the accuracy of the retrieval system. The lifting scheme reduces the processing time to retrieve images.To develop and put into practice an efficient feature extraction NN and SVM to extract features according to data set using Auto calculate the feature weight by neural network. The precision and recall graph in gui according to the retrieved contents of the images from the datasets. To Apply back propagation or feed forward algorithm for neural network classification. To calculate cross relationship and apply weakening model for feature matching.

Feature similarity matching formulae:

$$d_{id1} = \sum_{1}^{n} min[Q[i].D[i]] \frac{1}{D[i]} \qquad (5)$$

$$d_{id2} = \frac{\sum_{i=1}^{n} min[Q[i], D[i]]}{min[\sum_{i=0}^{n} Q[i].\sum_{i=0}^{n} D[i]]} \qquad (6)$$

where Q ¼ {Q1, Q2, . . . , Qn} and D ¼ {D1, D2, . . . , Dn} are the query and target feature vectors, respectively

4.COMPARATIVE ANALYTICAL TABLE :

TABLE 1 Compare by Performance

Ref.no.	Technique	Purpose	Conclusions
[1]	Color Based Fea ture	Image retrieval on visual contents.	100% precision value.
[2]	Haar Discrete Wavelet Transform	Max. Coverage, Less time and distance.	Maximum coverage with less energy consumption
[3]	Lifting Wavelet-Based Colour Histogram	Application of weakening model for feature matching	Increase the accuracy and reduces the processing time.

5.ACKNOWLEDGMENT

A large number of content based image retrieval have been proposed in recent past. Still there is lot of work to be done and research is continued. We have stressed on many approaches, like Color Based Feature, Haar Discrete Wavelet Transforms Lifting Wavelet-Based Colour Histogram. Final observations can be drawn on the basis of different techniques of image enhancement. An increasing interest towards image retrieval system made it easy to retrieve images of similar type on basis of parameters required.

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