A Survey Paper on Image Retrieval Based on Colour Feature

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Abstract: Image retrieval is an important part of image processing for browsing and searching images from a large database of digital images. Nowadays content based image retrieval has been an active research area in image processing. Color is one of the important high level features of content based images. In this paper, a unique and efficient method is designed to extract the color pixel feature by the LAB color space for image retrieval which includes the method of resizing the image and then convert those images into LAB color space. The comparison then takes place between query image feature and database images which finally retrieves the information (images) based on color feature. This method will demonstrate a faster, efficient and promising image retrieval method. The performance can be measured by recall and precision values.

Keywords: *LAB color space, CBIR, color pixel feature , precision and recall.*

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I. INTRODUCTION

In current generation internet has taken an important place in our life so as the collection of images that are added every second and the image accessible by the users are also growing exponentially and images or information cannot accessed properly if it is not organized so there is a need of efficient, fast searching and browsing tools required by users from various fields like remote sensing, medical, architecture, fashion, crime prevention, weather forecasting, data mining, management of earth resources, media, press publishing so on.Image retrieval is a process that organized and stored the desirable information according to a certain manner and need of users. Text based image retrieval was one of the method previously used, because the main problem with text based image retrieval is manual annotation, inaccuracy and the grown storage capacity of database with GB and TB, so the TBIR has not found an efficient image retrieval technique. Nowadays content based image retrieval has been a popular research field. It includes the color texture shape and all visual content. Among all these feature color is an important feature in CBIR which is independent of size, orientation and complexity.

So the basic goal of this paper is to retrieve images through LAB color space based on color feature. For which resize the image then convert the image into LAB color space and then compare the query image feature and the database image and then retrieve the desired information.

II. LITERATURE REVIEW

- Author proposed scheme based on both features of color and texture to combine a HSV color model and edge histogram descriptor in mpeg7. [4]
- Author proposed the texture and colour feature are extracted by wavelet transformation and colour histogram.[8]
- Author proposed method of colour histogram and colour moment based on division of the image into three equal non overlapping horizontal region.[9]
- Author proposed method based on color and texture features of image sub blocks with one to one matching.[11]

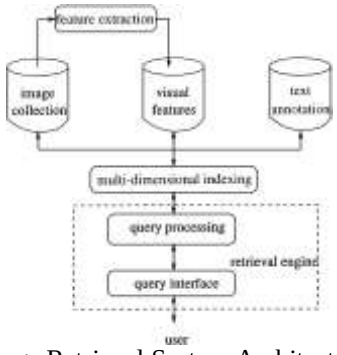

Fig1 An Image Retrieval System Architecture [2]

A. EXTRACTION FEATURES FOR IMAGE RETRIEVAL

Features may include both the text based (keywords, annotations) and the visual feature (color , texture , shape , face) and for any given feature there exist multiple representation which characterize the feature from different perspective.

- Color : it is most widely used feature and relatively robust to background complication.
- Texture: this refers to visual patterns that have properties of homogeneity that do not result from presence of only a single color or intensity. It contains important information about the structural arrangement of surfaces and their relationship to surrounding environment.
- Shape : the basic requirement of shape representation is to be invariant to translation , rotation and scaling.
- Segmentation : it is very important to image retrieval. Segmentation algorithm can extract boundaries from a large no of images without occupying human time and effort

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B. TECHNIQUES FOR IMAGE RETRIEVAL

On the basis of various research papers there is some methods which is used for image retrieval.

i. HSV Colour Space And Edge Histogram Descriptor : hue, saturation and value provides the perception representation according to human visual feature. The HSV model provide a colour space in terms of three constituent components: hue the colour type range from 0 to 360, saturation the vibrancy of the colour ranges from 0 to 100%, value the brightness of the colour. The formula that transforms RGB to HSV is defined below [1] :

$H= (\cos)^{-1}\ ½[(R-G)+(R-B)]/\ [(R-G)^2+(R-B)(G-B)]^{1/2}$
$S=1-3/R+G+B(\min(R,G,B))$
$V=1/3(R+G+B)$

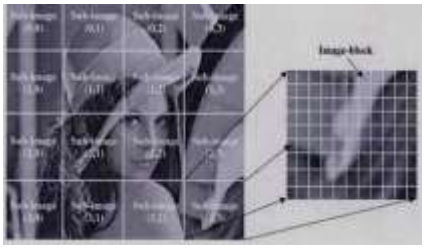

Fig2 Defination Of Sub Image And Image Block

ii. Edge Histogram Descriptor : [1]this includes the process of portioning the whole image into sub images and the edges in all sub images are categorized into five types, four directional edges vertical, horizontal, 135degree, 45 degree and one non directional. Now generate the histogram of each sub image then edge histogram descriptor captures the spatial distribution of edges.

Fig3 Retrieved Result Based On Hsv And Edge Histogram

Provide filters for edge detection then compute the intensity value of each sub image if intensity value of the edge exceed a given threshold then the corresponding image block is considered to be an edge block.

iii. Discrete Wavelet Transformation :[2] It is used for transforming an image from spatial domain into frequency domain. Wavelet extract information from signals at different scales by passing the signals through low pass and high pass filter. DCT provides multi resolution capability. Wavelet are robust with respect to colour intensity and can capture both texture and shape information efficiently. DCT decomposes a signal into set of basic function. At each level image decomposes into four frequency sub bands which is LL, HL, LH, HH where H indicates high and L indicates low.

Fig4 Retrieved Image Through Wavelet Transformation

iv. Haar Wavelet : It is used to compute feature signature because it is faster to compute and also have been found to performed well. Haar wavelet enable speed up the wavelet computation phase for thousand of sliding window of varying size in images.

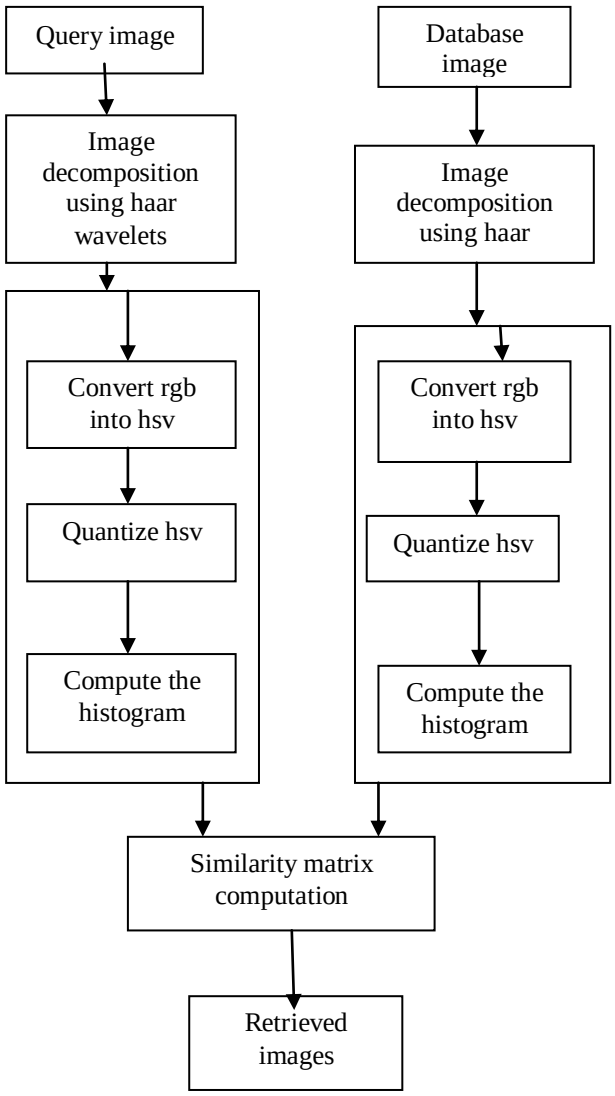

Fig4 Block Diagram For Wavelet Based Colour Histogram

The haar wavelet mother function
$\Psi(t)$= {1, 0<=t<=1/2 or -1, ½<=t<=1 or 0 otherwise}
And its scaling function can be
$\Phi(t)$={1, 0<=t<1 or 0, otherwise}

v. Colour Histogram and Colour Moment : [3] colour histograms are set of bins where each bin represent a particular colour of colour space being used. CH for a given image is defined as a vector.
H= { H[0], H[1], H[2]....H[i]...H[n]}
Where i=colour bin in colour histogram
H[i] = no of pixels of colour in the image
n= total no of bins used in colour histogram

Each pixel in an image will be assigned to a bin of a colour histogram of that image and the value of each bin is the no of pixels that has the same corresponding colour. Now for comparing images CH should be normalized H'

H'= {H'[0],H'[1],H'[2]...H'[i]...H'[n]}
H'[i]= H[i]/p
Where p= total no of pixels of image
In colour moment, moments are invariant of geometric transformation so it is more precise.

vi. Colour Coherent Vector: Each histogram bin is partitioned into two types which are coherent and incoherent. Pixel value of a large informally coloured region falls into coherent type other are incoherent.

vii. High Dimension Indexing: two basic challenge for making content based image retrieval truly scalable for large size of image collection which are high dimensionality and non Euclidean similarity. To solve this problem again two approaches which are follow
Dimension reduction: KLT karhunen loeve transform and column clustering are basic reduction technique. Clustering is used for various things like pattern recognization, speech analysis, information retrieval. It is used to cluster similar objects normally.
Multidimension indexing: the existing popular MDI technique are bucket algorithm, k-d tree, priority k-d tree, quad tree, r tree and its variant.

III. CONCLUSION

Image retrieval through the LAB colour space based on colour feature will demonstrate effective and faster retrieving technique because LAB colour space is good for detecting a particular colour selected by the user and LAB is for producing a colour space that is more perceptually linear than the other colour space means that a change of the same amount in colour value should produce a change of same visual importance. The performance can be calculated by various recall and precision values.

Where recall value= no of relevant documents retrieved/total no of relevant documents

Precision value= no of relevant document retrieved/total no of retrieved documents

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