A Riview Paper on Content Based Image Retrieval Technique Using Color and Texture Feature

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Abstract — *There is a great need for developing an efficient technique for finding the images. In order to find an image, image has to be represented with certain features. Color, texture and shape are three important visual features of an image. I will implement an efficient image retrieval technique which uses dynamic dominant color, texture and shape features of an image. As a first step, an image is uniformly divided into 8 coarse partitions. The centroid of each partition is selected as its dominant color after the above coarse partition. By using Gray Level Co-occurrence Matrix (GLCM), texture of an image is obtained. Color and texture features are normalized. Using Gradient Vector Flow fields, shape information is captured in terms of edge images computed. To record the shape features, invariant moments are then used. A robust feature set for image retrieval is provided by using the combination of the color and texture features of an image in conjunction with the shape features.*

Keywords — *DCD ,CBIR,GLCM,GVFF.*

I. INTRODUCTION

(Size 10 & Normal) Due to the proliferation of video and image data in digital form, Content-based image retrieval (CBIR) has become a prominent research topic. Therefore an important problem that needs to be addressed is fast retrieval of images from large databases. To find images that are perceptually similar to a query image, image retrieval systems attempt to search through a database. CBIR can greatly enhance the accuracy of the information being returned and is an important alternative and complement to traditional text-based image searching. For describing image content, color, texture and shape features have been used. Color is one of the most widely used low-level visual features and is invariant to image size and orientation. There are color histogram, color correlogram, and dominant color descriptor (DCD) as conventional color features used in CBIR. Without any other information, many objects in an image can be distinguished solely by their textures. Texture may describe the structural arrangement of a region and the relationship of the surrounding regions and may also consist of some basic primitives. Texture features using gray-level co-occurrence matrix (GLCM) used in my approach. Shape feature has been extensively used for retrieval systems. We will implement CBIR system that is based on Dominant color and GLCM texture and shape. We use dominant colors, Gray-level co-occurrence matrix and Gradient vector flow field in the concrete selection of color, texture and shape description.

II. REVIEW OF LITERATURE:

In [1] the tuning parameter for all the methods based on Bag of Visual Words is the size of the dictionary/code book, number of bins in the distribution. Due to the clustering process in the code book construction over a very large number of visual features, the number of over a very large number of visual features, the number of images considered in the proposed work. In [2] the purpose of image mining techniques is discovering meaningful correlations and formulations from previously collected image data. Image clustering and finding the minimum distance among the images provides better image .In[3] A novel approach for image retrieval by combining color, texture and shape features has been presented. The simulation results showed that our method did well on precision ratio, when the scenes of query images are complex, the low visual features are insufficient to represent them. In [4] Web image search reranking approach introduces an online image search reranking approach that explores multiple modalities in an exceedingly graph-based learning theme. A information consists of various forms of pictures has enforced on the system completely different options like bar chart, color mean, Color structure descriptor texture is taken into thought for extracting similar pictures from the information. In [5] Content could be color, shape, texture or any piece of information, which we obtain from the image itself.. The concept of retrieving images based on their content is called as CBIR. The process of CBIR consists of three stages as follows

i. Image acquisition.ii. Feature Extraction.iii. Similarity Matching. Content Based Image Retrieval (CBIR) is different from the traditional database and text based image retrieval system. In [6] paper proposes feature extraction using low level features (color, shape and texture) while SVM classifier is to handle the noisy positive examples. Results based on this approach are found encouraging in terms of color, shape and texture image classification accuracy. After the features are selected, an SVM classifier is trained to distinguish between relevant and irrelevant images accordingly. In [7] Search engine is one of the most important elements. In this paper cover the state-of-the-art techniques in CBIR according to the aims of retrieval and matching techniques. The issue we address is the analysis of search engines reducing the 'semantic gap'. The matching methods are compared in terms of their usefulness for different user's aims. Compare our search engine with Google's and the SIFT method.

In [8] uses the visual contents of a picture like global features-color feature, shape feature, texture feature, and local features-spatial domain present to signify and index the image. CBIR method combines global and local features. In this paper worked on Haar Discrete Wavelet Transform (HDWT) for decaying an image into horizontal, vertical and diagonal region and Gray Level Co occurrence Matrix (GLCM) for feature extraction. Support Vector Machine (SVM) used, different calculations to improve the exactness and execution of recovery. In [9] images resize according to the region of interest for the faster retrieval of images. Deleting and removing complicated background will speed up further image processing. Very strong discriminative power feature makes an essential component in image and video retrieval. Therefore, it is very important to find an effective method to compute the directionality of an image, and tamura uses statistical measure to calculate statistical feature. And thus we extract texture features and shape and fused these feature vectors of tamura and shape combinations for better result. In[10] Content Based Image Retrieval(CBIR) is a kind of Image Retrieval technique that could figure out images like sketch similar to querying images from image database. In Content Based Image Retrieval (CBIR) image can be retrieved by query known as Query by Image Content and also known as content Based Visual Information (CBVI) which is the application of Computer Vision techniques for the problem of searching digital images from large image database known as image retrieval problem. [11]Content Based Image Retrieval (CBIR) has become a prominent research topic. This motivates the extensive research into image retrieval systems. From historical perspective, one shall notice that the earlier image retrieval systems are rather text-based

search since the images are required to be annotated and indexed accordingly.

III. METHODOLOGY:

To describe image from the different aspects for more detailed information in order to obtain better search results and to express more image information, the dominant color, texture and shape features combined. The proposed method is based on dominant color, texture and shape features of image.

1. Color Feature Representation:Color is one of the most dominant and distinguishable low-level visual features in describing image. To retrieve images, such as QBIC system and Visual SEEK many CBIR systems employ color. DCD contains two main components: representative colors and the percentage of each color. DCD describe the color distribution in an image or a region of interesting and can provide an effective, compact, and intuitive salient color representation.

2. Extraction of dominant color of an image: The procedure to extract dominant color of an image is as follows:The selection of color space is not a critical issue for DCD extraction. Therefore, the RGB color space is used for simplicity and without loss of generality. The RGB color space is uniformly divided into 8 coarse partitions. If there are several colors located on the same partitioned block, they are assumed to be similar. After the above coarse partition, the centroid of each partition is selected as its quantized color.**3. Extraction of texture of an image**:A texture representation for image retrieval based on GLCM is used. Texture features are extracted from the statistics of this above matrix mentioned.**4.Extraction of shape of an image**: Shape information is captured in terms of the edge image of the gray scale equivalent of every image in the database. Used gradient vector flow (GVF) fields to obtain the edge image. Gradient vector flow (GVF) is a static external force used in active contour method.
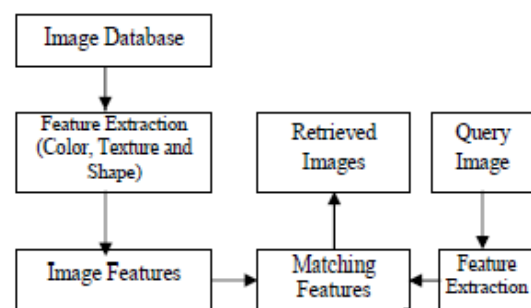
III.1 DESIGN FLOW OF CBIR:

Fig.1 Block diagram of CBIR

III.2 Importance of CBIR:

• Understanding image user's needs and information-seeking behaviour.The need to find a desired image from a collection.

• Characterize image queries into three levels of abstraction: primitive features such as color or shape, logical features such as the identity of objects and abstract attributes such as the significance of the scenes depicted.

• Develop a technique which captures color and texture descriptors of an image, and has a shape descriptor in terms of invariant moments computed on the edge image.

• Identification of suitable ways of describing image content.To divide an Image into two very basic categories of color and gray scale and used different features vector for similarity comparison and retrieval.

• Providing usable human interfaces to CBIR systems

• Create such a user friendly platform for the system design a Graphic User Interface where user can actually select the method which they want to be used for the image retrieval and an option of using different method for required result.

• Users needing to retrieve images from a collection come from a variety of domains, including crime prevention, medicine, architecture, fashion and publishing

• Though attempts are being made to categorize users' behavior in the hope that this will enable needs to be better met in the future.

• Attempts are also going on integrating the search for all kind of images and combining all above mentioned feature vectors for comparison and retrieval so as to achieve the best possible efficiency.
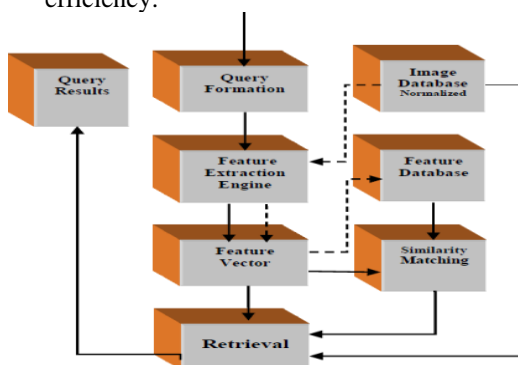

Fig.2 Flow of Content based image retrieval

Content Based Image Retrieval (CBIR) :CBIR is different from the traditional database and text based image retrieval system. Content Based Image Retrieval (CBIR) is a technique which uses visual contents (features) to search images from large scale image database according to users request in the form of a query image.CBIR further classified on the basis of features,which is used to retrieve the image from image database. Content could be color, shape, texture or any piece of information, which is needed to obtain from the image itself. Using content as a parameter for retrieval greatly increases the accuracy of the search and thus content based image retrieval techniques are now in favor. The concept of retrieving images based on their content is called as CBIR. The process of CBIR consists of three stages as follows,

i. Image acquisition.

ii. Feature Extraction.
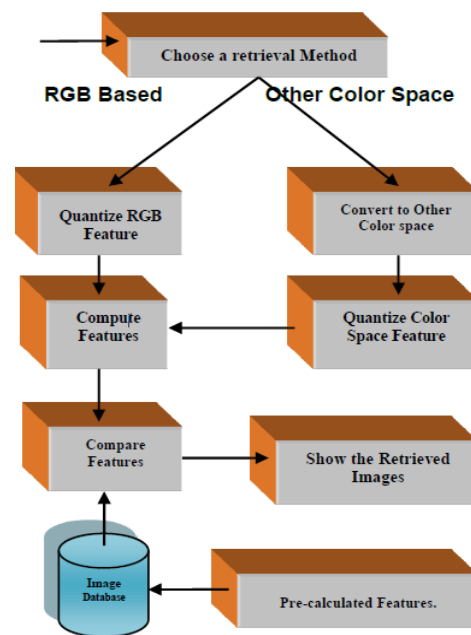
iii. Similarity Matching.

Fig.3 Flow of Colour based image retrieval

Flow of Color Based Image Retrieval System:Several image formats uses RGB color model. It is three dimensional in structure, which contains red, green and blue planes as axes.Values from these three axes creates vector,which is three co-ordinate representation of color.Start of the cube represents black color having vector with three co-ordinates values as (0, 0 and 0) and diagonally opposite side point represents white color with co-ordinates values as (1, 1 and 1).Each image added to the collection is analyzed to compute color histogram. It shows the proportion of pixel of each color within image.The color histogram for each image is then stored in the database. At search time of image,the user can either specify the desired proportion of each color or submit an example image from which a color histogram is calculated.The matching process then retrieves those images whose color histogram matches most closely with query.

Classification of color Content based image retrieval:Color based image retrieval systems are classified on the basis of type of approach used for

the extraction purpose of colors from the image. 1) Color histogram: Colorhistogram is main method for image representation2) Global color histogram (GCH):Global color histogram consider whole image for the creation of the histogram3) Local color histogram (LCH):Local color histogram divides image into blocks of fixed size and takes color histogram of each block. It is consist of more information about image but computationally expensive. i. Histogram of individual image:

An image histogram is a type of histogram that acts as a graphical representation of the tonal distribution in a digital image
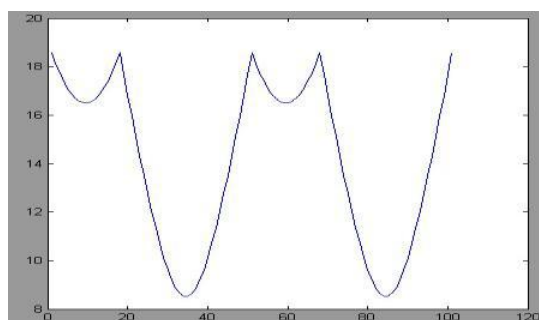

Fig .4 Histogram plot

ii. GLCM (Gray level co-occurrence matrix):
A statistical method of examining texture that considers the spatial relationship of pixels is the gray-level co-occurrence matrix (GLCM),
iii. Color Dominant: Dominant color region in an image can be represented as a connected fragment of homogeneous color pixels which is perceived by human vision
Color, texture and shape features have been used for describing image content. Color is one of the most widely used low-level visual features and is invariant to image size and orientation. As conventional color features used in CBIR, there are color histogram, color correlogram, and dominant color descriptor (DCD). Color histogram is the most commonly used color presentation, but it does not include any spatial information. Color correlogram describes the probability of finding color pairs at a fixed pixel distance and provides spatial information. Therefore color correlogram yields better retrieval accuracy in comparison to color histogram. Color autocorrelogram is a subset of color correlogram, which captures the spatial correlation between identical colors only. Since it provides significant computational benefits over color correlogram, it is more suitable for image retrieval. Texture is also an important visual feature that refers to innate surface properties of an object and their relationship to the surrounding environment. Many objects in an image can be distinguished solely by their textures without any other information. Texture may consist of some basic primitives, and may also describe the structural arrangement of a region and the relationship of the

surrounding regions. In our approach we have used the texture features using gray-level co-occurrence matrix (GLCM). Shape feature has been extensively used for retrieval systems. Shape signatures are computed from blurred images and global invariant moments are computed as shape features.

IV. CONCLUSIONS

Color is usually represented by the color histogram, color correlogram, color coherence vector, and color moment under a certain color space. Texture can be represented by Tamura feature, World decomposition, SAR model, Gabor and Wavelet transformation. Shape can be represented by moment invariants, turning angles, Fourier descriptors, circularity, eccentricity, and major axis orientation and radon transform. An image will be uniformly divided into 8 coarse partitions. The centroid of each partition will be selected as its dominant color. Texture of an image will be obtained by using Gray Level Co-occurrence Matrix (GLCM). Shape information will be captured in terms of edge images computed. The combination of the color and texture features of an image in conjunction with the shape features will provide a robust feature set for image retrieval. The similarity between query and target image is measured from two types of characteristic features which includes dominant color and texture features. Two types of characteristics of images represent different aspects of property. So during the use of efficient similarity measure, when necessary the appropriate weights to combine them may also be considered. To get efficient method to find the distances between visual features, efficient indexing of visual feature vectors is important for image retrieval. To set up an indexing scheme, dimension reduction is usually performed first to reduce the dimensionality of the visual feature vector

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