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A SURVEY ON CONTENT BASED IMAGE RETRIEVAL USING BDIP, BVLC AND DCD

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Abstract: Content based image retrieval is the task of retrieve the images from the large collection of database on the basis of their own visual content. This paper provides the survey of technical achievements in the research area of image retrieval, especially content based image retrieval (CBIR. Color and texture are commonly used in most of the CBIR system for finding similar images from the database to a given query image. In the implemented system color and texture are used as basic features to describe all the images. To extract color information, two histograms i.e. hue and saturation of the image are used. And to extract texture information image quantization and wavelet decomposition is applied to each image blocks. CBIR or Content Based Image Retrieval is the retrieval of images based on visual features such as colour and shape. IN this paper we survey on the color and texture feature. This electronic document is a "live" template. The various components of your paper [title, text, heads, etc.] are already defined on the style sheet, as illustrated by the portions given in this document. Do not use special characters, symbols, or math in your title or abstract. The authors must follow the instructions given in the document for the papers to be published. You can use this document as both an instruction set and as a template into which you can type your own text.

INTRODUCTION

CBIR or Content Based Image Retrieval is the retrieval of images based on visual features such as colour and shape. Color is one of the most widely used low-level visual features and is invariant to image size and orientation [**3**]. 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 representation, 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 auto correlogram is a subset of color correlogram, which captures the spatial correlation between identical colors only[**3**].

APPLICATION

a. The advantages of such systems range from simple users searching a particular image on the web.
b. Various types of professionals like police force for picture recognition in crime prevention.
c. Medicine diagnosis
d. Architectural and engineering design
e. Fashion and publishing
f. Geographical information and remote sensing systems
g. Home entertainment

GENERIC DESCRIPTION OF A STANDARD IMAGE RETRIEVAL SYSTEM

There are three fundamental bases for content based image retrieval, i.e. visual feature extraction, multidimensional indexing, and retrieval system design.

a. Feature extraction and indexing of image database according to the chosen visual features, which from the perceptual feature space, for example color, shape, texture or any combination of above.
b. Feature extraction of query image.
c. Matching the query image to the most similar images in the database according to some image-image similarity measure. This forms the search part of CBIR systems.
d. User interface and feedback which governs the display of the outcomes, their ranking, the type of user interaction with possibility of refining the search through some automatic or manual preferences scheme etcThe CBIR focuses on Image 'features' to enable the query and have been the recent focus of studies of image databases. The features further can be classified as low-level and high-level features. The focus is to build a universal CBIR system using low level features. Users can query example images based on these features. By similarity comparison the target image from the image repository is retrieved. Meanwhile, the next important phase today is focused on clustering techniques. Clustering algorithms can offer superior organization of multidimensional data for effective retrieval. Clustering algorithms allow a

nearest neighbour search to be efficiently performed [**4**].

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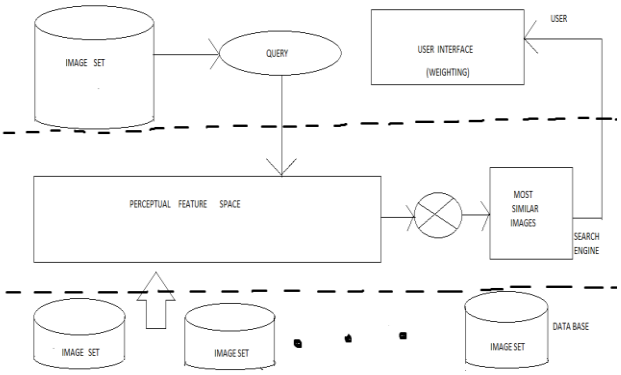

Figure 1. Content based image retrival

Color-based retrieval:

The color feature has widely been used in CBIR systems, because of its easy and fast computation . Color is also an intuitive feature and plays an important role in image matching. The extraction of color features from digital images depends on an understanding of the theory of color and the representation of color in digital images. The color histogram is one of the most commonly used color feature representation in image retrieval[11].Out of the many feature extraction techniques, color is considered as the most dominant anddistinguishing visual feature. Generally, it adopt histograms to describe it. A color histogram describes the global color distribution in an image and is more frequently used technique for content-based image retrieval (Wang and Qin, 2009) because of its efficiency and effectiveness.Color histograms method has the advantages of speediness, low demand of memory space and not sensitive with the image's change of the size and rotation, it wins extensive attention consequently[4]The Dominant Color Descriptor allows specification of a small number of dominant color values as well as their statistical properties like distribution and variance. Its purpose is to provide an effective, compact and intuitive representation of colors present in a region or image [5].. Dominant color descriptor specifies a set of dominant colors in an image [Cieplinski, 2000]. It is good to represent colorfeatures where a small number of colors are enough to characterize the color information. The extractionalgorithm quantizes the pixel color values into a set of dominant colors. The matching is done by calculating thedistances between dominant color sets based on the difference between corresponding colors in any two sets ofdominants[6].

The retrieval based on texture feature:

The identification of specific textures in an image is achieved primarily by modeling texture as atwo-dimensional gray level variation. Textures are characterized by differences in brightness with high frequencies in the image spectrum. They are useful in distinguishing between areas of images with similar color (such as sky and sea, or water, grass). A variety of methods has been used for measuring texture similarity; the best- established depend on comparing values of what are well known as second-order statistics estimated from query and stored images. Essentially, these estimate the relative brightness of picked pairs of pixels from each image. From these it is possible to measures the image texture such as contrast, coarseness, directionality and regularity or periodicity, directionality and randomness [2]. As its texture features, BDIP and BVLC momentsof the value component image are adopted.

BDIP:

In images, edges represent the regions which involve abrupt change of intensity, and valleys represent the regions which contain local intensity minima. They are very important features in human vision and, especially, valleys are fundamental in the visual perception of object shape [**7**]. BDIP is a texture feature that effectively extracts edges and valleys. Block difference of inverse probabilities, which is one of the proposed texture features, is defined as the difference between the numbers of pixels in a block [**9**].

$$BDIP = M^2 - \frac{\sum_{(i,j)\in B} I(i,j)}{\max_{(i,j)\in B} I(i,j)}$$

Where B denotes a block of size M x M. The larger the variation of intensities there is in a block, the higher the value of BDIP. where$I(i, j)$ denotes the value at a pixel (i, j) in the image I [**9**].

BVLC:

BVLC [7] represents the variation of block-based local correlation coefficients according to four orientations. It is known to measure texture smoothness well. Each local correlation coefficient is defined as local covariance normalized by local variance.

$$\rho(k,l) = \frac{\frac{1}{M^2}\sum_{(k,l)\in O_4} I(i,j)I(i+k,j+l) - \mu_{0,0}\mu_{k,l}}{\sigma_{0,0}\sigma_{k,l}}$$

Where µ0,0 and o¯0,0 represent the local mean value and standard deviation of the block with size MxM. The (k,l) term denotes four orientations (90º, 0º, 45º, 45º). As a result, µk,l ¯and 0k,lrepressent the mean value and standard deviation of the shifted block, respectively. The larger BVLC value indicated that the ingredients in the block are rough.

ADVANTAGES AND SCOPES OF CONTENT BASED IMAGE RETRIVAL

Medical Diagnosis- CBIR of medical images is a useful tool, and could provide physicians with assistance in the form of a display of relevant past cases with proven pathology, along with the associated clinical, diagnostic, and other information. The appearance of a wound or lesion provides important clues that can help with the diagnosis, determination of severity, and the prognosis of healing.

Quantification of the color distribution of skin lesions by image processing techniques may help in the analysis of the dynamics of the pathological processes as well as the progress of healing.

Crime Prevention- Automatic face recognition system, used by police forces .The police use the visual information to identify people or to record the scenes of crime for evidence; over the course of time, these photographic records become a valuable archive .in many countries, it is common practice to photograph everyone who is arrested and to take their fingerprints .the photograph will be filled with the main record for the person concerned, which in a manual system is a paper-based file. In a computer-based system, the photograph will be digitised and linked to the corresponding textual records. Untill convicted, access to photographic information is restricted and, if accused is acquitted, all photographs and fingerprints are deleted. Other uses of images in law enforcement include face recognition, DNA matching, shoe sole impressions and surveillance systems. Finger prints or retina scanning for access privileges.

RELATED WORK

Young Deok Chun, Nam Chul Kim [7] proposed a content-based image retrieval method based on an efficient combination of multi resolution color and texture features. As its color features, color auto correlograms of the hue and saturation component images in HSV colorspace are used. As its texture features, BDIP and BVLC moments of the value component image are adopted. The color and texture features are extracted in multi resolution wavelet domain and combined. The dimension of the combined feature vector is determined at a point where the retrieval accuracy becomes saturated. Experimental results show that the proposed method yields higher retrieval accuracy than some conventional methods even though its feature vector dimension is not higher than those of the latter for six test DBs. Especially, it demonstrates more excellent retrieval accuracy for queries and target images of various resolutions.

Hyun Joo So, MiHye Kim, and Nam ChulKim[8] propose a texture classification method using local texture features BDIP (block difference of inverse probabilities) and BVLC (block variation of local correlation coefficients) in wavelet domain. BDIP and BVLC are known to be good texture features which are bounded and well normalized to reduce the effect of illumination and catch the own properties of textures effectively. In the method, a target image is first decomposed into wavelet subbands. BDIPs and BVLCs are then computed in wavelet subbands. The means and standard deviations of subband BDIPs and BVLCs and the subband standard deviations are fused into a texture feature vector. Finally, the Bayesian distance between the feature vector of a query image and that of each class is stably measured and it is classified into the class of minimum distance. Experimental results for three test databases (DBs) show the proposed method yields excellent performances.

Mrs Monika Jain, Dr.S.K.Singh[4], proposed that 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) is becoming a source of exact and fast retrieval. In recent years, a variety of techniques have been developed to improve the performance of CBIR. Data clustering is an unsupervised method for extraction hidden pattern from huge data sets. With large data sets, there is possibility of high dimensionality. Having both accuracy and efficiency for high dimensional data sets with enormous number of samples is a challenging arena. In this paper the clustering techniques are discussed and analyzed. Also, we propose a method HDK that uses more than one clustering technique to improve the performance of CBIR.This method makes use of hierarchical and divide and conquer K-Means clustering technique with equivalency and compatible relation concepts to improve the performance of the K-Means for using in high dimensional datasets. It also introduced the feature like color, texture and shape for accurate and effective retrieval system.

Mrs.Saroj Shambharkar, Ms.Shubhangi C. Tirpude[1], proposed CBIR System, where the images gone through various transformations such as the input RGB image converted to gray scale image, wavelet transformation, and processes such as color extraction, Texture extraction and binary tree construction to obtain feature vectors. The image matching process is performed on the basis of these feature vectors and the relevant images are retrieved from the database according to highest rank or score. It is clear in Fig. 8 that the image with matching score 0 is exactly matched with the query image. So we can conclude that the CBIR system retrieves the images and if its score is 0 then it is totally similar with the query image. The last image shown in result having the maximum distance as compared to other of the images is not considered to be closer to query image. This shows that the retrieved image having larger value is less similar and image having small value is more similar and image having 0 matching score is exactly same as query image

K. Naresh Babu, Sake. Pothalaiah, Dr.K Ashok Babu [2], CBIR method has been proposed which uses the combination of dominant color, GLCM texture and Gradient Vector flow field representation of shape. A total of 39 features covering color, texture and shape proved that the proposed method yielded higher average precision and average recall. In addition, the proposed method almost always showed performance gain of average retrieval time over the other methods.

Jens-Rainer Ohm, Leszek Cieplinski, Heon Jun Kim, Santhana Krishnamachari, B. S. Manjunath Dean S.

MessingAkio Yamada [5], retrieval efficiency of this descriptor evaluated using the Common Color Dataset and Queries. These results demonstrate that the color layout descriptor is quite effective in image retrieval in spite of its compact size. The retrieval efficiency is compared with a traditional approach (GRC) wherein the image is partitioned and representative colors for each partition is used to represent the layout feature.

Peter Stanchev, David Green Jr., and BoyanDimitrov[6], proposed that Several visual descriptors exist for representing the physical content of images, for instance color histograms, textures, shapes, regions, etc. Depending on the specific characteristics of a data set, some features can be more effective than others when performing similarity search. For instance, descriptors based on color representation might be effective with a data set containing mainly black and white images. Techniques based on statistical analysis of the data set and queries are useful.

CONCLUSION

The purpose of this survey is to provide an overview of the functionality of content based image retrieval systems. Most systems use color and texture features, few systems use shape feature, and still less use layout features. network and development of multimedia technologies are becoming more popular, users are not satisfied with the traditional information retrieval techniques. so nowadays thecontent based image retrieval are becoming a source of exact and fast retrieval. There are various applications of cbir in field of medicine like dermatology, blood cell detection etc.Thus, field of cbir is very useful for practical reasons.

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