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NOVEL CONTENT –BASED IMAGE RETRIEVAL TECHNIQUES FOR MEDICAL DATABASE

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ABSTRACT

Content based image retrieval (CBIR) become a challenging problem due to large size of the image database because difficulty in recognizing images, difficulty in devising a query and evaluating results in terms of semantic gap, computational load to manage large data files and overall retrieval time. To solve this problems Feature extraction is initial and important step in the design of content based image retrieval system. Feature extraction means extracting unique and valuable information from the image, this features are termed as signature of image. In CBIR system, feature extraction of the image in the database is done offline therefore it does not contribute significantly in computational complexity. Generally Human eyes tend to differentiate images based on color, therefore mostly color features are used in CBIR. When image contain just an object , Color moment is mostly used to represent color features especially. Regularity, directionality, smoothness and coarseness are some of the texture properties perceived by human eye. Gabor filter and wavelet transform for texture feature extraction has proved to be very effective in describing visual content via multi-resolution analysis. The paper mainly gives result of CBIR using combination color moment for color feature and Gabor wav late for texture feature. Also paper gives retrieval of images from medical database.

Keywords – CBIR, color moment, Gabor wavelet

1. INTRODUCTION

The content based image retrieval system mainly design for solving the various problem like analysis of low level image feature, multidimensional indexing and data visualization. The color and texture feature are important part of the CBIR system. Color feature is the most significant one in searching collections of color images of arbitrary subject matter. Similar to color feature the texture feature is also important for the image retrieval. The texture gives us information on the structural arrangement of surface and object on the image. Texture Characterized by the basic primitives whose spatial distribution creates.

2. LITERATURE SURVEY

Many of the existing CBIR systems extract features from the whole image rather than certain regions in it, which referred as Global features. Histogram search algorithms [3] characterize an image by its histogram. Various distances have been used to define the similarity of two color histogram representations. Euclidean distance and its variations are the most commonly used among all of them. The information about object location, shape and texture is discarded,this is main drawback of a global histogram representation . Color histogram search is sensitive because intensity variations, color distortions and cropping. To overcome the drawback of histogram search the color layout approach introduced. In color layout indexing [3], images are partitioned into blocks and the average color of each block is stored,it make the color layout is essentially a low resolution representation of original image. A recent system, WBIIS [4], uses significant Daubechies' wavelet coefficients instead of averaging. The coarseness of a color layout representation can be tuned By adjusting block sizes or the levels of wavelet transforms. So, we can view a color layout representation as an opposite extreme of a histogram. The color layout representation at proper resolutions naturally retains shape, location, and texture information. However, with pixel representation, information such as shape is preserved in the color layout representation. In this system the retrieval system cannot perceive it directly. Color layout search is sensitive to a set of local properties described as shifting, cropping, scaling, and rotation [1]. Image retrieval using color features gives disappointing results, because in many cases, images of similar colors do not have similar content. This is due to the fact that global color features fails to capture color distributions or textures within the image. To overcome this D. Zhang [5]

proposed a method combining both color and texture features to improve retrieval performance. By computing both the color and texture features from the images, the database images are indexed using combination of both features. During the retrieval process, given a query image, images in the database are firstly ranked using color features. Then, in a second step, a number of top ranked images are selected and reranked according to their texture features. Two alternatives are provided to the user, one is the retrieval based on color features, and the other is retrieval based on combined features. After the failure of color based retrieval, the user starts to use the other alternative which is the combined retrieval. Since the texture features are extracted globally the image; they are not an accurate description of the image in some cases, which sometimes degrades the system performance.
Some remarkable observations in the review of related works are as follows:

- Gabor filters are a most commonly used acclaimed natural and excellent tool in texture feature extraction and also in classification and segmentation ;therefore CBIR systems utilize Gabor filters for texture feature extraction. Even use of RBIR systems increased the retrieval accuracy, they require high complex computations to calculate similarity, since these systems need to consider each region in the database images, resulting in high retrieval response time. Thus, we need a solution to reduce the number of database regions included in the similarity computation.
- The existing CBIR systems use global features or region based features for representation of image content. Each type of these features can be significant in representing images with certain semantics. For example, global features are useful for retrieving textured images that have no specific regions in accordance to the user, such as natural scenes used as backgrounds.

3. COLOR TEXTURE USING COLOR MOMENT

Color moment is used for color representation. The color moment working is based on probability distribution of indivisible color. The QBIC system is deshign using the color moment. Color moment implemented in three ways that is, the first order (mean) the second order (variance) the third order (skewness).

$$\mu i = 1/N \sum_{j=1}^{N} fij$$

$$\sigma i = \left(\frac{1}{N}\sum_{j=1}^{N}(fij - \mu i)^2\right)^{1/2}$$

$$Si = \left(1/N \sum_{j=1}^{N}(fij - \mu i)^3\right)^{1/3}$$

4. TEXTURE FEATURE USING GABOR WAVELET

Gabor filters transform is a good multiresolution approach which represents the texture of an image. It is an effective way using multiple orientations and scales. The 2-D Gabor function can be specified by the frequency of the sinusoid *W* and the standard deviation σx and σy, Gabor filters are a group of wavelets. For a given image $I(x, y)$ with size M×N, its discrete Gabor wavelet transform is given by the following formula.

$$g(x,y) = \frac{1}{\sigma_x \sigma_y} \exp\left(-\frac{1}{2}\left(\frac{x^2}{\sigma^2{}_x} + \frac{y^2}{\sigma^2{}_y}\right) + 2\pi j W_x\right.$$

Where *W* is called as modulation frequency.
Gabor transformation is applied on the image with different orientation at different scale, the following array of magnitudes can be obtained:

$$E(m,n) = \sum_x \sum_y G_{mn}(x,y)$$

Where m = 0, 1… M-1; n = 0, 1… N-1, magnitudes represent the different energy content at different scale and orientation of the image. In order to identify the homogenous texture, mean and standard deviation of the magnitude of the transformed coefficients are used to represent the homogenous texture feature of the region.

5. IMPLEMENTATION DETAILS

In this section, the proposed image retrieval algorithms have been described: the method is an image retrieval using color and texture feature. The color feature is extracted using color moment and texture feature are extracted using gabor filter and wavelet transform. Features are calculated for all images of database and placed in database. Total 15 features for each image are calculated, 6 color feature and remaining texture feature. when user puts query images features are calculated of query image and compared with the feature value placed in the

database. By taking the similarity measures the images matched are retrieved by system. With query image we need to give the tolerance that how much percentage matched image should be retrieved. Precision measures the ability of the system to retrieve only the models that are relevant. They are defined as

Precision (P) = Number of relevant images retrieved / Total number of images retrieved

Recall (R) = Number of relevant images retrieved / Total number of relevant images

6. RETRIEVAL EXPERIMENTS AND RESULTS

The proposed method is applied on a general-purpose set of medical database containing 400 images of the body part photo database which includes 200 images of irises & 200 of brain , in JPEG format of size 384 × 256.The objective of the paper is to design a CBIR system that is simple and easy to use, easy to handle large medical Image data base, and
fastest to retrieve images using low-level features such as color and texture features, representing the semantics of the image. In this proposed method, the retrival and search is usually based on similarity
Rather than the exact match. It has been observed through the average precision. The experiments were carried out on a 100 image database using the methods given in Sections 5 and result are evaluated on the basis of the average precision, average recall values and total average precision and recall . The proposed algorithms were tested on the image data bases used by different authors. In order to understand the efficiency of the proposed methods. The average precision verses recall . A typical query result of the proposed image retrieval technique, using is shown in Figures, with the similarity between query image and images in the database in increasing order. The experiments were carried out on a Core i3, 2.4 GHz processor with 2GB RAM using MATLAB 7.10. The accuracy of current system is 82%, precision is 72% and recall is 80%.

Figure 1 & 2 are showing output of proposed system made by combination of color moment for color feature and gabor wavelate for texture feature .the first output we get by giving query image of brain. The second output is retina image retrival from database by giving retina query image .

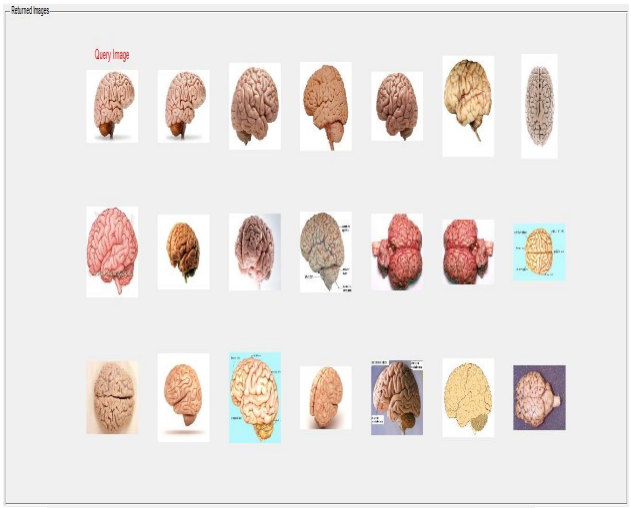

Figure 1. Output retrieved by query image of brain

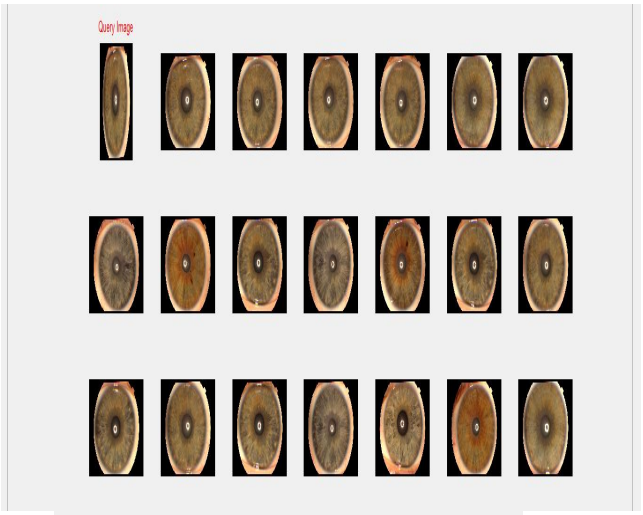

Figure 2. Output retrieved by query image of iris

7. CONCLUSIONS

In this paper, an image retrieval method using both color feature and texture features has been proposed. Experiment results show, our method outperforms the common color feature retrieval significantly. We have used the color moment features to improve conventional histogram features. A Gabor wavelet is used for calculate the texture feature. Retrieval has also been presented in the paper. We also plan to use more queries implanted on different databases to test the retrieval performance.

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