ROW MEAN AND COLUMN MEAN BASED CBIR SYSTEM FOR GRAY SCALE IMAGE

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Abstract

CBIR is a technique which is used to index and search the relevant images from the large image database as per the user requirement. For this the CBIR system relies on the visual contents of the image .Since the intensity distribution of pixels in similar or relevant images are approximately similar therefore this characteristics can be utilized to design an efficient CBIR system.This paper present a unique CBIR system which utilizes the average intensity of the pixels present in the grayscale image.

1.Introduction

The increasing amount of digital content In the form of audio video and images in the web and other digital media has lead us to device some application to search effectively for relevant information in existing and increasing database of image ,audio and video content.CBIR is one such kind of system in which images can be indexed effectively by summarizing their visual feature.A visual feature is a characteristic property of an image that can be used to represent the whole image approximately with reduced dimension so that the searching and browsing images in image data base can become easy with less storage space and computational power.Such features can be globally for whole image or locally for some part of the image or object. Texture, shape and color are commonly used feature in any image retrieval system.

Since every image has unique color ,texture and shape information therefore images can be retirives using these information.In the past image retrieval; system based on color [1] [2], shape[2][3][4], texture[5] has been proposed. J. Berens, G. D. Finlayson and G. Qiu [6] presented color histogram based retrieval system in compressed transform domain.

Image retrieval system based on color histogram[7][8] and by computing color average[9][10] were also presentedimage retrieval system based on discrete cosine transform [11] [12] and wavelet transform were also proposed in the past.

In some images shape or shape of a region are also very important features.image segmentation and edge detection can be used to describe the shape related information in an image and hence can be used [13]for image retrieval purposes.This paper present a image retrieval system which is based on Row sum , column sum. Since the intensity of the pixel in an image carry very vital information about the content of the image, therefore these information can be used to design a very efficient image retrieval system .

2.Proposed CBIR system

2.1 Image database creation

proposed system architecture is given in the figure-1.in order to reduce the computational complexity for indexing and retrieval process, gray level image of size 256*256 has been taken.As shown in figure the first step for making data base is to take each gray scale image, resize it to 256*256 and then extract the rows, column and diagonal of image in separate matrix and then computing the row mean,column mean, diagonal mean and store it in a data base which has three field for each image i.e. DM,RM,CM for diagonal mean,row mean and column mean respectively.gray scale images of different field taken

personally and from internet is used to make a database for this proposed system.

M=No. of rows

N=No. of Column

$$CM(j) = \frac{1}{N}\sum_{i=1}^{M} I(i,j) \quad \text{……..(1)}$$

$$RM(i) = \frac{1}{M}\sum_{j=1}^{N} I(i,j) \quad \text{……..(2)}$$

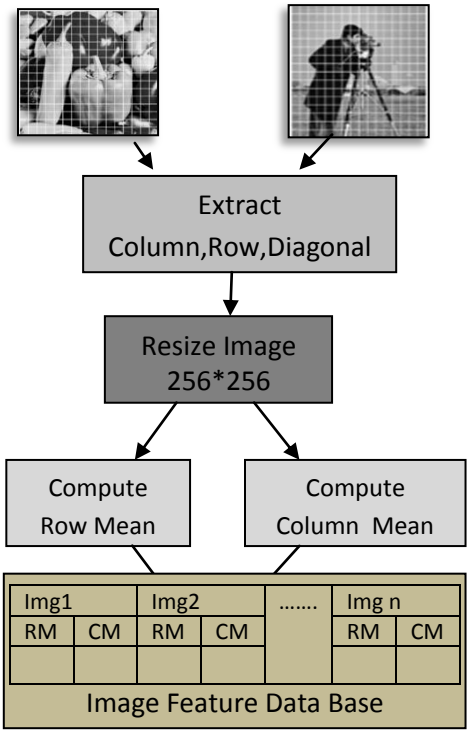

Figure.1 Block diagram of database Creation

2.2Image Retrieval System-

Image retrieval system for proposed CBIR is shown in figure 2. First of all the query image is inputed to the retrieval system which resize it to 256*256 and then after extracting the rows,column, diagonal of the image,it compute the Diagonal Mean, Row mean, Column Mean and then compare this DM,RM and CM of Query image to the DM,RM and CM of the Images stored already in the image database and compute the similarity measurement, image or images which has similarity coefficient less than predefined threshold T are the similar images.

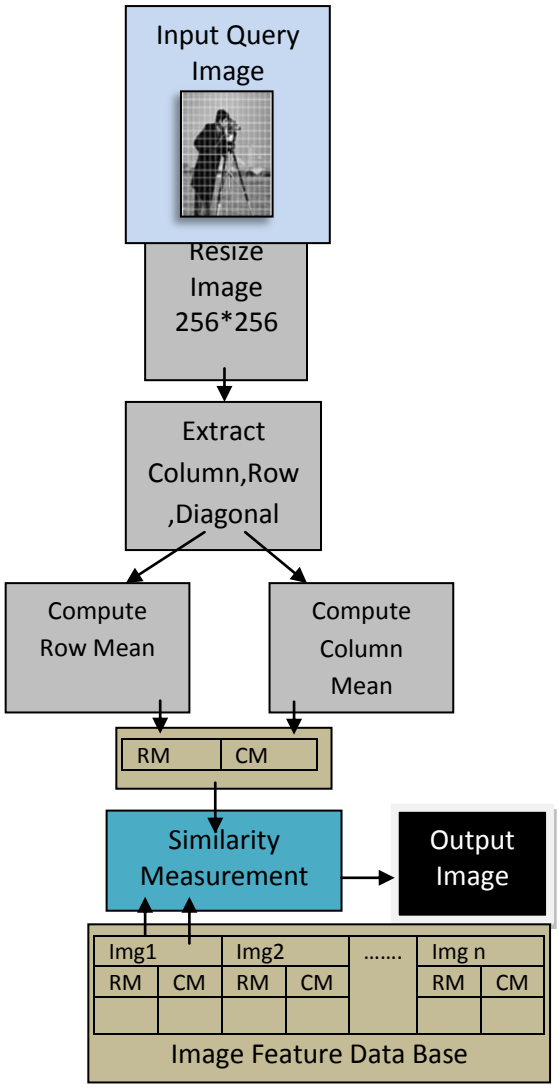

Figure.2 Block Diagram of Proposed CBIR

3.Similarity Measurement-

For similarity measurement ,Euclidean Distance is computed between the query image and Database image using Formula(3)

$$D_{QD} = \sqrt{\sum_{i=1}^{n}(FQI_i - FDI_i)^2} \quad \text{…….(3)}$$

FQI = feature vector of Query Image

FDI = feature vector of Database Image

n=No. of features

4.Threshold Selection-

For this system to work properly,a suitable threshold T selection is very important.By considering Maximum distance between query image and database image, as a reference point,an extensive experimentation is carried out using four different threshold,
First threshold has been chosen as 15% of the maximum ED, second threshold as 25% of maximum ED and third threshold as 35% of maximum ED.
Out of which the threshold of 25% of maximum ED was found giving better result and therefore selected as the defined threshold T for this algorithm.

5.Experimental Result

The proposed image retrieval algorithm is implemented using MATLAB 7.0 on a system with core 2 duo processor and 2GB of RAM.To verify the performance of proposed method, a database of 1000 images taken from coral collection has been used.Data base images has been divided into 8 different categories as shown in table1.

Table 1. Image Category

Group ID	Image category
1	Bus
2	Dinosaur
3	Elephant
4	Tribal
5	Beaches
6	Flower
7	Horse
8	Mountain

All the images are converted to gray scale and stored in JPEG format with size 256X256.Five different images of each category are used for query images. Euclidean Distance has been computed as given by equation 3.All the images for which the distances of query image from the database images are less than predefined threshold T has been considered as a retrieved image.To check the efficiency of our proposed work,two statistical parameter viz. precision and recall as given by equation 4 and 5 has been computed.Precision versus recall curve has been drawn and shown in figure 3 while

$$Precision = \frac{No.\,of\ relevent\ images\ retrieved}{Total\ no.\,of\ images\ retrieved} \ldots\ldots\ldots (4)$$

$$Recall = \frac{No.\,of\ relevent\ images\ retrieved}{Total\ No.\,of\ relevent\ images\ in\ database} \ldots (5)$$

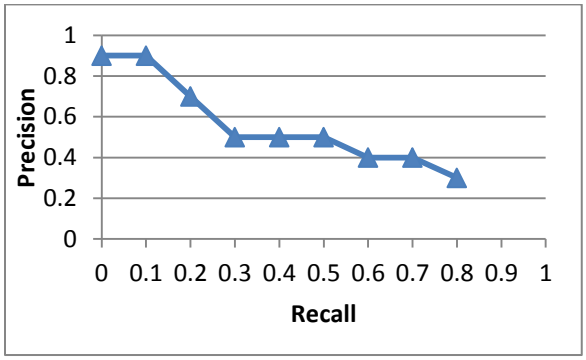

Figure.3 Precision Vs Recall Curve for proposed method

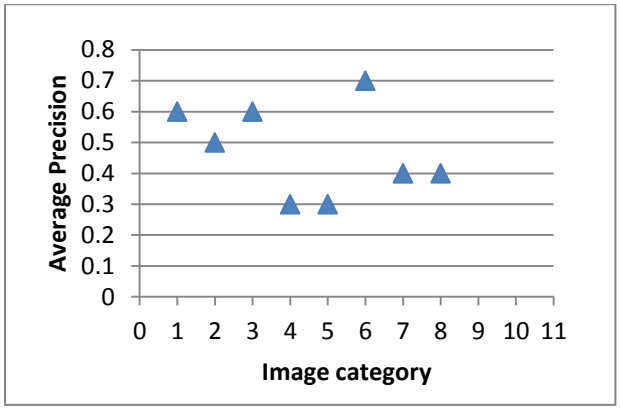

Figure.4 Average Precision Curve for proposed method

Average precision curve is shown in figure 4.

Figure 5 GUI of proposed method

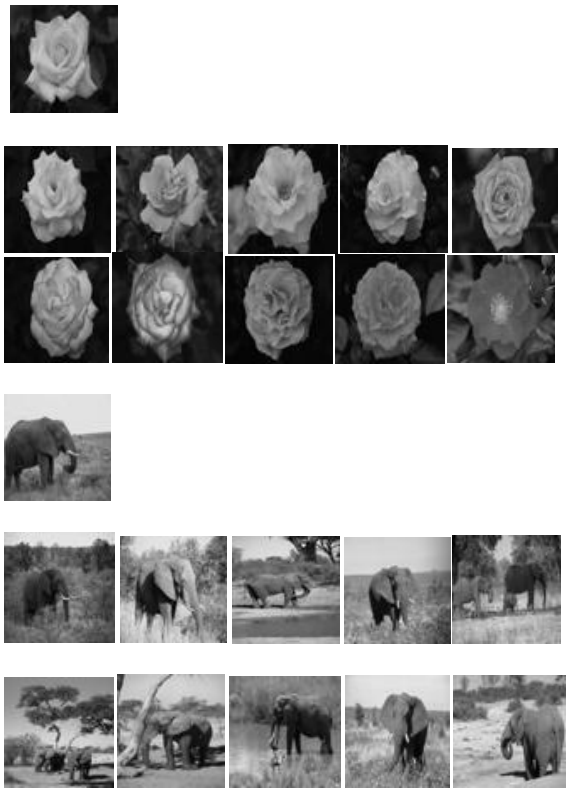

Figure 6 Query image (upper part) and first 10 retrieved **images(lower part).**

6.Conclusion

The performance of image retrieval system can be judged by the efficiency and speed at which it retrived the relevant images from the large database.Since the proposed system uses column sum and row sum for image retrieval which require less computation power and hence it is faster moreover from experimental result it is clear that the proposed system is efficient as well.

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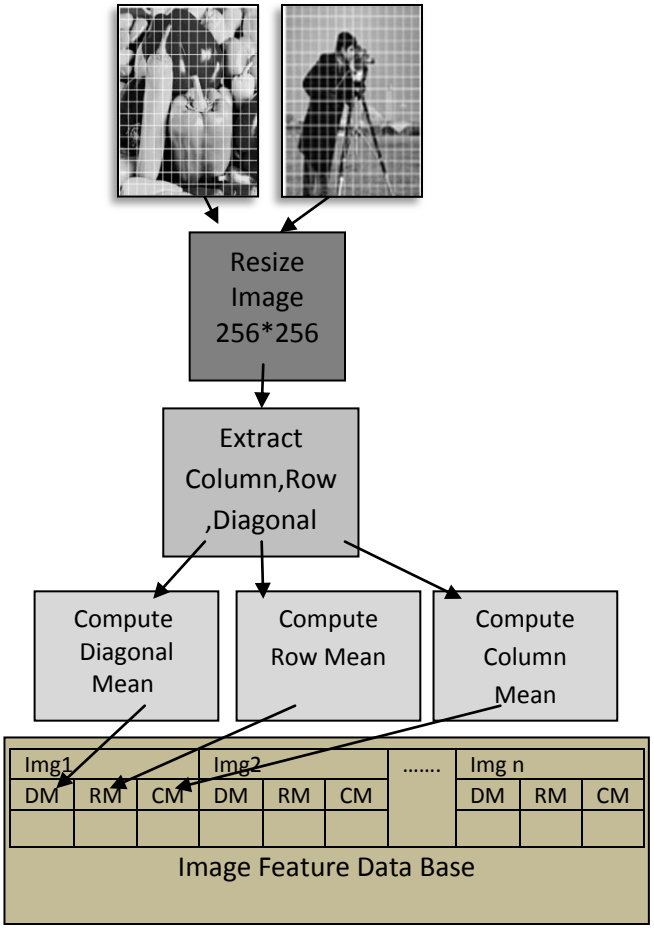
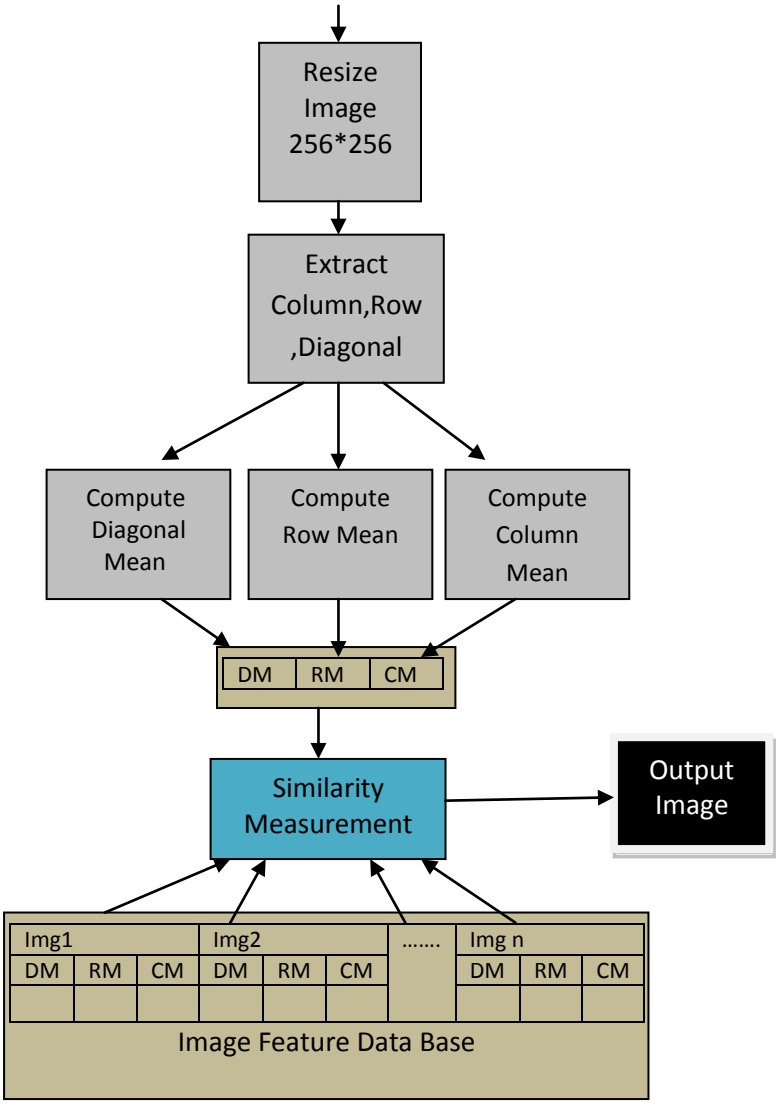
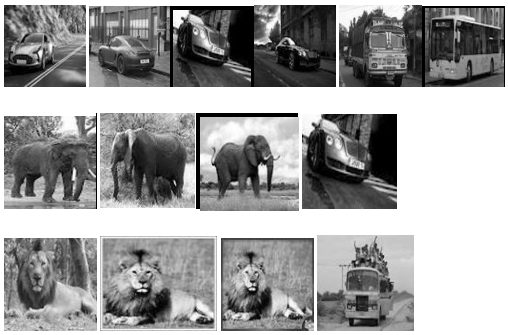




EXPERIMENTAL RESULT-

3. Results and Discussion



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The image database was represented using a set of image

attribute, such as color [3] [4], shape [4] [5] [6], texture [7] and

layout [8] also. Image indexing using compressed transforms was

dealt by J. Berens, G. D. Finlayson and G. Qiu [9]. It uses the

standard transform encoding methods (the Karhunen-Loeve

transform, the discrete cosine transform [10] [11]. The wavelet

transform is treated in [12].

(B)

The images are very rich in the content like color, texture

and shape information present in them [2]. Retrieving

images based on color similarity usually involve comparing color histograms [11,16], color averages [4,19], BTC [20]

and other methods. Texture measures look for visual

patterns in images and how they are spatially defined [14].

The identification of specific textures in an image is

achieved primarily by modeling texture as a two-

dimensional gray level variation, GLCM [10], vector

quantization codebooks [6], image transforms [7]. Shape

does not refer to the shape of an image but to the shape of a

particular region that is being sought out. Shapes are often

determined by first applying segmentation or edge

detection to an image [12]. Other methods use shape filters

to identify given shapes of an image [13,14]. In some case

accurate shape detection will require human intervention

because methods like segmentation are very difficult to

completely automate [15]. Here the paper discusses shape

texture extraction using morphological operations like

erosion, dilation, top hat transform, bottom hat transform.

The block truncation coding (BTC) is applied on the

extracted shape images to obtain feature vectors of those

images which are used for CBIR.

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