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AN EFFICIENT METHOD OF RETRIEVING MEDICAL IMAGES USING RGB PROJECTION ALGORITHM

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ABSTRACT

Medical image retrieval based on user query is a challenging task. A number of methods exist which use text or content of related image for retrieval. In case of content based retrieval, the various features of an image such as color, shape and text from an user perspective are analyzed and those features are searched through the process of segmentation. This type of search may not be suitable for medical images because the accurate difference between images can not be identified with the normal human eye. In this paper, we propose a method, a combination of the Statistical Region Merging (SRM), Discrete Cosine Transform (DCT) and RGB projection to deal with the similarity between images, the related images of query image are retrieved with similarity percentage and displayed from view. The experimental analysis of this paper shows the accuracy of the proposed method is good compared to other existing features extraction methods.

KEYWORDS: **CBIR, DCT, RGB projection, SRM and Image Retrieval.**

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INTRODUCTION

The existing approaches of image retrieval are generally classified into three categories, namely, (a) Traditional text based retrieval techniques (b) Content based retrieval techniques (c) clustering and feature extraction techniques. Text based and Content Based Image Retrieval (CBIR) of images are commonly used among several methods. In text based, text descriptions which are manually annotated by the user while in content based, the features such as color, texture, shape, etc. are used as the key factors for retrieval through clustering and extraction scheme. CBIR is also referred as Query by Image Content. CBIR is a commonly used technique for searching the images based on the content of an image. Size, Color, Resolution, Shape, Texture and Keywords are the parameters used in CBIR. These parameters are stored in the database while searching for an image. The other method of using CBIR is assigning keyword for the images; it uses two techniques such as clustering and feature extraction. But the CBIR has the limitation that the keywords are annotated words and it depends on human perception. So, the accuracy of the result may not be assured. These methods consume much time and do not produce good accuracy. Many applications have been developed using CBIR to retrieve images [6] [7] [8]. The objects of interest are extracted based on the features using dual multiscale gray level morphological open and close reconstructions. In which gray-level variation the mesh is built for images of large scale database [1]. An interactive mechanism [2] to map the visual features of human perception to deal with color distributions, image bitmap, standard deviation and the mean value of objects of interest proposed for finding objects. Images are retrieved based on the identification of objects. A shape based retrieval framework called co-transduction dealt in [3] for object retrieval. To support medical image processing, the hardware enabled system proposed in [4]. A novel and robust method to mitigate the similarity processing of images [5] proposed to detect related objects and compute their semantic information. To retrieve relevant medical images from a database, the wavelet based optimization system is applied for better accuracy, the parameters are tuned by the optimization procedure [9]. The related objects on images are segmented in less computation time with good accuracy, using optimized clustering and thresholding methods [11].

MATERIALS AND METHODS

In the proposed work, the features of images are extracted using SRM and DCT. The similarity value is calculated by obtaining vertical and horizontal size of an image using RGB projection algorithms and detects the boundary of the query image. The related images are checked against the shape of query image and displayed for view as per the similarity. Figure 1 shows the overview of proposed system

(1) Algorithm of proposed method

Step 1: A collection of medical images is stored in the database.

Step 2: Apply Statistical Region Merging (SRM) algorithm to all the images and the extracted boundaries are stored in the feature database.

Step3: Apply Discrete Cosine Transformation (DCT) and obtain coefficient matrix of all images.

Step4: Determine the Similarity between the images using RGB projection algorithm for the images found in step2 and step3.

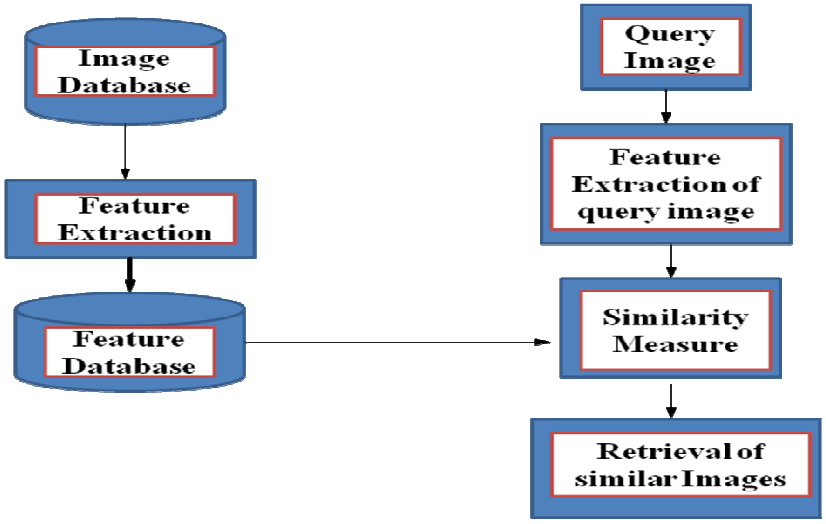

Figure 1
The architecture of proposed work

The image database stores different medical images such as CT, MRI, X-ray etc and the feature database contains the RGB value of each image for the respective query image. Feature extraction stores the DCT co-efficient value of each block of an image. Initially the images are divided into 3x3 blocks for the process and the values of the block are evaluated with respect to the shape of an image, then the resultant values are grouped based on merging criteria. The output image of SRM is a gray scale image and intensity of each pixel varies from 0 to 255. The process is termed as color mapping since it finds the average of different color shades. The sample matrices in given in Table 1, 2 and 3.

a	b	c
d	e	f
g	h	i

z	y	x
w	v	u
t	s	r

a*z	b*y	x*c
d*w	e*v	f*u
g*t	h*s	i*r

Figure 2
SRM Matrix, DCT co-efficient values obtained using DCT algorithm, RGB Projection Matrix

The values a,b,c,d,e,f,g,h and i varies from 0-255.
In the proposed work the DCT assigns a co-efficient value to each pixel of a block. The algorithm of DCT is given below.
Step 1: Divide the image into 3x3 blocks.
Step 2: Obtain co-efficient value of each block.
Step 3: Stored the coefficients in the database.
The elements r, s, t, u, v, w, x, y, z in figure 2 are the DCT co-efficient values obtained using DCT algorithm.

(ii) RGB Projection
The RGB projection is the algorithm used to find the similarity between the images in the database and the query image. This process is termed as image comparer. The algorithm checks the average of horizontal rows and vertical columns of Table3 with the images stored in the database. The processes of SRM, DCT and RGB are performed on the images in the database.

RESULTS

The data used for this experiment are the MRI slices of a patient collected from the diagnostic center in Chennai. Each image is of size 1105x650

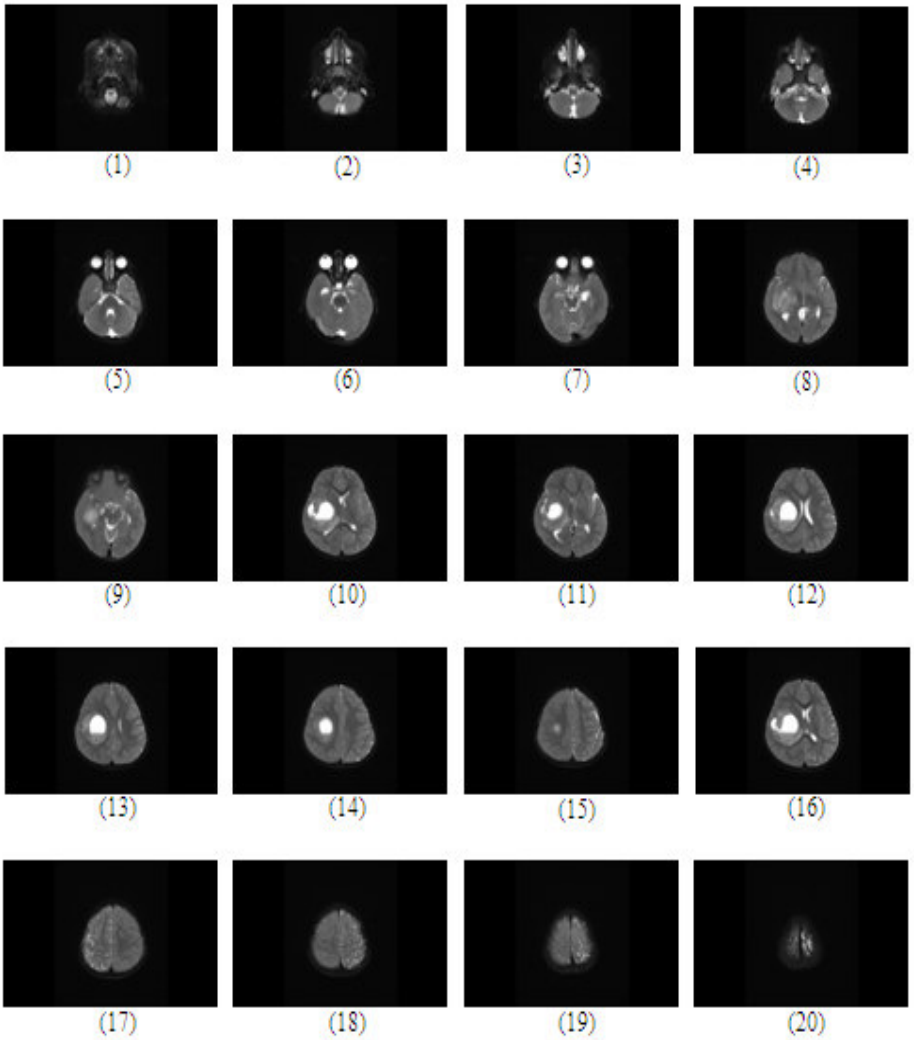

Figure 3
MRI Brain Images. The image shown in the Figure 4 is considered as the input query image.

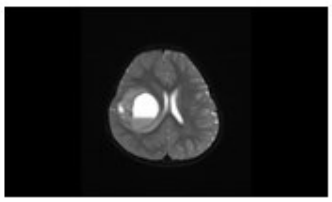

Figure 4 Query Image

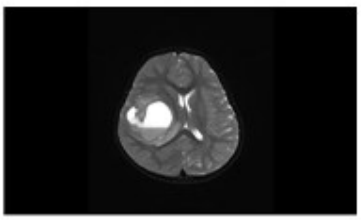

Figure 5 Gray image

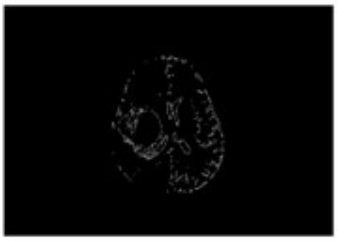

Figure 6 SRM on Figure 4

The gray scale image of figure 4 is shown in figure 5.The Statistical Region Merging (SRM) is executed on the image shown in Figure 5 and the resultant image is given in Figure 6. The figure 7 is the snapshot of retrieval process. The graphs show the DCT and SRM value for the query image and the test image in database.

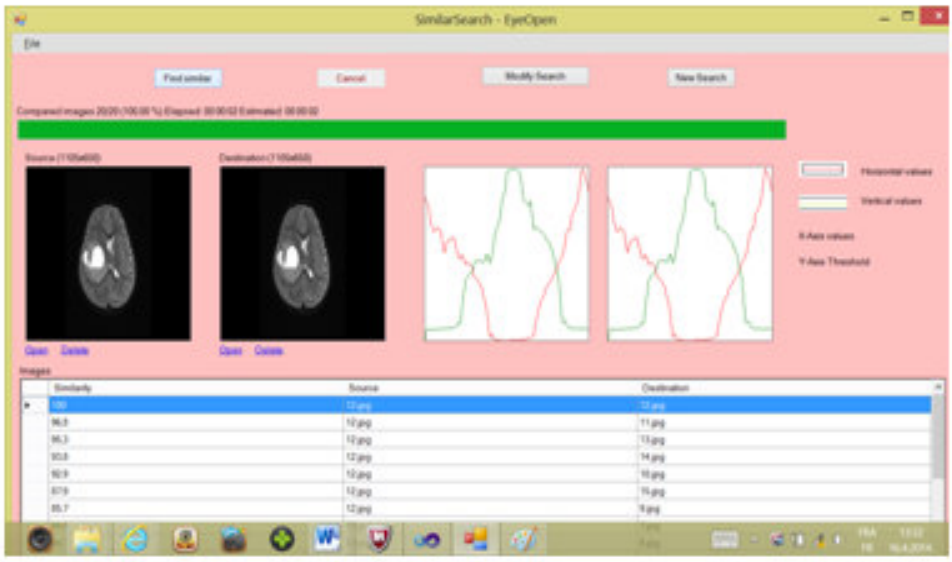

Figure 7
Retrieval of image using RGB Projection

Table 1
Retrieval of images with similarity percentagefor the query image shown inFigure 4

S.No	Test Images	Similarity %
1	12.jpg	100
2	11.jpg	96.8
3	13.Jpg	95.3
4	14.jpg	93.8
5	10.jpg	92.9
6	15.jpg	87.9
7	9.jpg	85.7
8	7.jpg	84.8
9	8.jpg	84.1
10	4.jpg	83.9
11	6.jpg	81.6
12	5.jpg	80.4
13	17.jpg	78.1
14	16.jpg	77.7
15	18.jpg	76.3
16	19.jpg	74.8
17	1.jpg	65.4
18	2.jpg	68.3
19	3.jpg	68.5
20	20.jpg	50.9

The table1 contains the Calculation of similarity measure between the query image and the similar images stored in the database.

CONCLUSION

The fast and accurate system of medical image retrieval is a great assistance to medical practitioner. The comparison of past and current medical records would help the physician to diagnose the disease. The system proposed here, compares the query image with the images in the database and produces the accuracy in terms of percentage. Many methods have proposed in this regard the traditional feature extraction system works with the content of regions of interest. The semantically meaningful regions have to be identified first before processing. This type process may not produce accurate results. In our work the pixels of entire image are searched against the query image without giving importance to any specific objects. Hence, the accuracy is assured for different imaging modalities.

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