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Fetching Image Combining Different Aspects Using MATLAB

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***Abstract*—*Due to the large no of image in the database and vast use of database in various applications, there is the need a system for accessing this database. The presently working content or text based image fetching software solves the problem on the basis of query image from the database using one feature of classification and segmentation these features are calculated and used with the help of similarity features between the query image and database image. In the proposed data based fetching system, image can be fetched using different feature extraction technique simultaneously. The database consist of any format of size 256*256*256.texture, color, intensity is used. After calculating the histogram of each image in the database on the basis of these features, an image is classified according to its contents. Different classification technique can used to get the more exact features of the images and to enhance the efficiency of information fetched. The final result is compared and obtained the efficiency and accuracy that use the feature of the image with the help of comparison and fetched the image using different classification technique.*

Keywords*—*texture based image fetched, classification, feature extraction, filter classification and minimum distance.

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I. INTRODUCTION

Texture based visual information fetching is a technique for searching images from database on the basis of information inbuilt in image. it uses the visual contents of an image like spatial layout, texture, shape, colour to a new and index the image in existing content based visual information retrieval system, the content of the image are described and extracted by its feature vectors and these feature vectors can be calculated by different classification and segmentation methods available to the users [1].The content based visual information system have following parts shown in Figure 1.

- Query information:-it can be an image or text to be found the similar images in the database.
- Feature extraction:-it is used to extract the feature of the classified or segmented image and store these feature as feature vector in a database called feature database [2].
- Image database:-contain large image
- Image matching output:-find the image using feature vector.
- Retrieval image:-get the image or set of image.

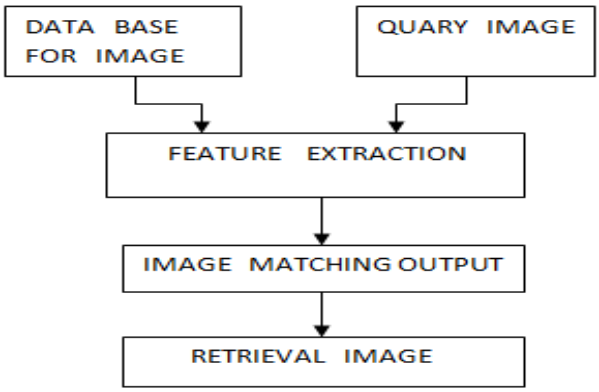

Fig. 1: fetching image system and its associated parts.

A. Image fetching

Image database contain large collection of images .in few collection of image can simply identify an image. But it is not easy in case of large collection of images. Image retrieval problem means searching and retrieving image for user request in database.

B. Visual content image

An image contains some attribute or information that is helpful in image retrieval [4]. Image content can be divided in to three components.

- Low level image:-visual feature and shape. Such as texture, motion, colour.
- Middle level image:-objects, scenes.
- High level image:-objects and scenes with different significance.

C. Content or Text Based Visual Information fetching

Information retrieval system is a system to retrieve, search and browse images from a database. Content and text based information retrieval are the two technique for retrieving and searching in database [5].

In content based information retrieval method we use content in image to retrieve and search images. Initially this system was proposed to identify the difficulties raised with text based information retrieval .content based information retrieval method gives low level image attributes and handles user query but it cannot handle high level image attribute[6].

In text based information retrieval method images are classified by subject name or classification code or key words, which are used during the retrieving and searching images. It is also called non-standardized method because every user gives own keywords for searching, sometimes the text description of user are uncompleted or may be subjective and it cannot useful for complicated image. Some texture images are not handled by text.

In text based information retrieval, there are need to handle every image manually. Hence this technique is not useful for a large image database. Text based information retrieval and content based information retrieval method combine together to design a new system gives more efficient information retrieval. This paper is organized in five sections. Section 2 presents a brief literature survey. Section 3 explains the proposed methodology and results. Section 4 concludes the paper and discusses the future research directions followed by references at the end.

II. RELATED WORK

CBIR is a fast growing research area and some exciting results have been produced in this domain. Sahu et al. [15] proposed an image mining approach based on texture analysis of image. They claimed higher retrieval efficiency than the shape based image mining approach. They also developed a trade-off between retrieval efficiency and computational cost.

Lee et al. [16] proposed a CBIR approach using wavelet spatial-color and Gabor normalized texture. The approach is particularly useful for multi-resolution image search and retrieval. They also proposed parameters namely Average Precision and F-score to evaluate the performance of their system.

Many image retrieval systems have been designed for demonstration and commercial purposes. The IBM's QBIC is a search engine which is based on Excalibur technologies.

Photobook system is developed by Massachusetts Institute of Technology.

Netra content based information retrieval system use spatial location, shape, and texture and colour histogram to calculate the feature vector. For calculating the texture feature vector, it uses the standard deviation for normalized mean [7]. It gives Gabor wavelet transform for each image. To calculate the shape feature vector, it uses the centroid distance of contour, the curvature function of contour and coordinate function of

contour shape [8]. It calculates feature vector as a bounding box. This system allows user to search on the query example. In this system similarity can be matched by Euclidean space.

KIWI system finds key value in an image at key point. It does handle entire images. It calculates the feature vector on the basis of shape and color. Color feature vector is calculated by colour histogram and shape feature vector is calculated by Gabor filters. It allows user to search by query example [9].

RETIN content based information retrieval system is developed on the basis of colour and texture. It does not handle images as a single entity. In this system random pixels value is selected for each image and its texture and colour feature are calculated. The colour feature vector is calculated by colour histogram and texture feature vectors calculated by Gabor transformation for images. It allow user to search by query example. It also gives flexibility to allow the user to identify region of interest and use it for searching an image.

IPURE system is developed on the basis of spatial location, shape, colour and texture. First it divides the image in two parts and calculates its feature vectors. Colour feature vector is calculated by average colour in colour space. Texture feature is calculated by wild decomposition. Shape feature vector is calculated by Fourier transform, orientation axis and its size. The spatial location vector is calculated by bounding box and centroid.

Image Miner system is based on the shape, texture and color. Color feature vector is calculated by color histogram. Texture feature vector is calculated by grey level matrix. Shape feature vector is calculated size of image contour boundary coordinates and centroids. The system feature vector is calculated by classify scenes with values and keywords [10].

III. PROPOSED METHODOLOGY AND RESULTS

A block diagram of typical content and text based information retrieval are shown in Figure 2 which itself retrieve visual attribute like spatial information, texture, shape and color of every image in the database and find its pixel value to stores in a database called feature database.

The feature value of color, texture, shape and spatial information of every image is small. It is called compact representation spatial information, shape, color and texture in a vector form called feature vector. The user query is processed and calculates its feature vectors and then identifies images whose feature vectors are similar to that of user query and the best similar value is extracted [11].

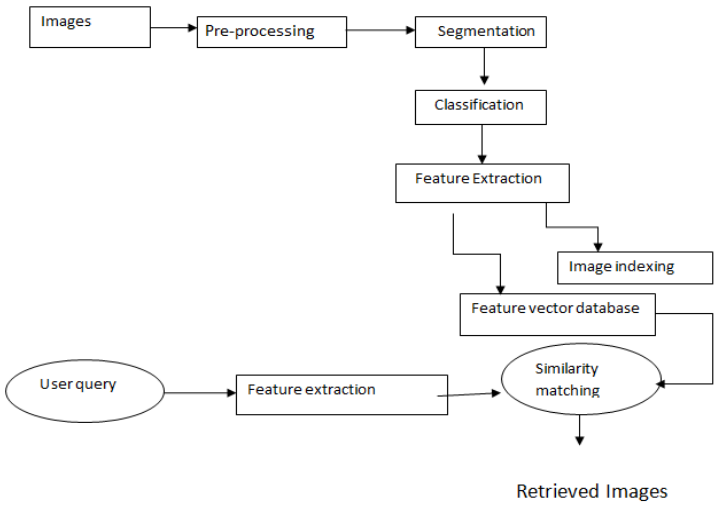

Fig. 2: Flowcharts of the content and text based information fetching system.

The size of feature database is much smaller compare to the original image database. Thus contain and text based information become fast and cheap. In content and text based information retrieval, the system extract image in two ways. In first case we match two images and find the most similar images for query and in second case, we find the image based on query information. In complex images, it is complex task to identify several features such as color feature vector shape feature vector etc. Complex image has multiple objects and calculating features of these objects is a complex task. To overcome this problem, identify the exact image feature within the image and combine these features for meaningful result at retrieval time obtaining correct image feature for particular class of image reducing feature database using indexing feature.

No any feature or attribute is suitable for information retrieval of every image. Color feature vector is mostly used for representing and describing color images. Texture is mostly used for representing pattern scene and surface properties. Texture feature vector is basically used in satellite images, cloud and medical images

[12]. Shape feature vector is used for describing and representing boundaries of real world edges of objects. In practical, no single feature vector is suitable for describing any image [13].
Feature calculated from image describe and define the content of the image which is shown in Fig.3.

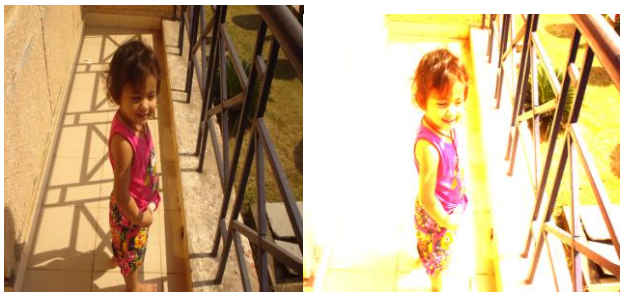

Fig.3: Images with complex and simple features.

A. Texture Feature Vector

Following methods are used for calculating texture feature:

- Statistical technique: It analyse the distribution of grey colour values by calculating neighbours featured vector at every pixel of the image .It calculate the co-occurrence matrix data, grey level run length, grey level differences, statistical moments and autocorrelation function[14].
- Grey value co-occurrence matrix: It is used to calculate grey value matrix for sampling the image. Relative frequency is stored is stored in matrix form. Suppose an image A(x, y) and t(x, y) is its position operator. A matrix B=n*n and its element is the number of times intensity calculates. Suppose a (i) is the position which specifies the relationship with operator t. Let its relative points with grey value m (k).Let Q be the n*n matrix which store the value by dividing B from the sum of point pair that matches t.
- Q(x, y) =joint probability of pair of points match
- Q=co-occurrence matrix calculated by t.
- Matlab code for calculating grey level co-occurrence matrix is
- Z=imread (‘1.jpg’);
- T=greycomatrix (z,’offset’, [2, 0]);
- Texture feature vector= $\sum_{x,y} Q^2_{x,y}$
- Inverse difference Moment = $\frac{\sum_{x,y} Q^2_{x,y}}{|x-y|}$
- Contrast feature vector = $\sum_{x,y} |x-y| Q^2_{x,y}$

B. Shape Feature vectors

- Following methods are used calculating shape feature vector:
- Area: Calculate the number of pixels of areas within a region.
- Perimeter: Calculate the number of pixels within a boundary for a particular object.
- Compactness: It is calculated by how the number of pixels is closed within a shape.
- Compactness = $\frac{(Length)^2}{\text{Area}}$
- Eccentricity: It is the ratio of the longest length of an object to longest length perpendicular to it. It is calculated by how shape is circular. If object is perfectly circular then its e=0.
- Elongation: It is calculated by ratio of the height of the box and width of the bounding box. It is the small square box which contains object.
- Elongations (E) = x / y
- Where x = height of bounding box

- And y = width of the bounding box
- Moment of Inertia: It is used to calculate the shape feature vector that contains the distribution of mass with respect to axis.

Moment $(m_{x,y}) = \sum (a - \bar{a})^{x} (b - \bar{b})^{y}$

- Where x, y is the point within the region.

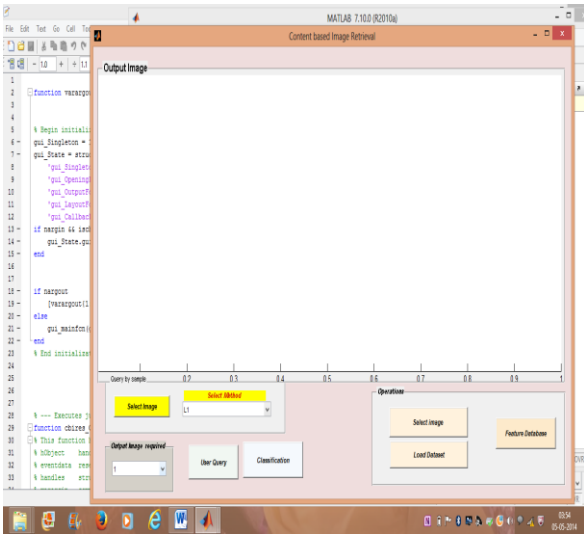

Fig. 4: Content and text based information fetching system.

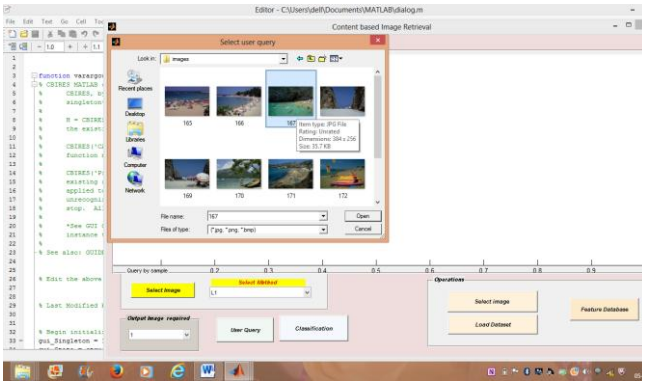

Fig. 5: Selecting classification feature extraction technique.

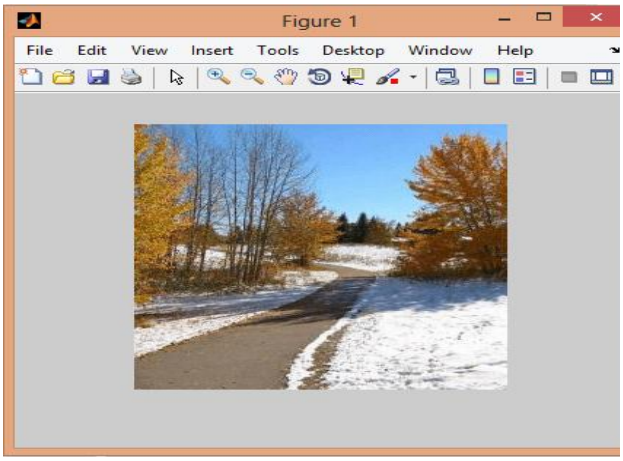

Fig 6: User Query Image.

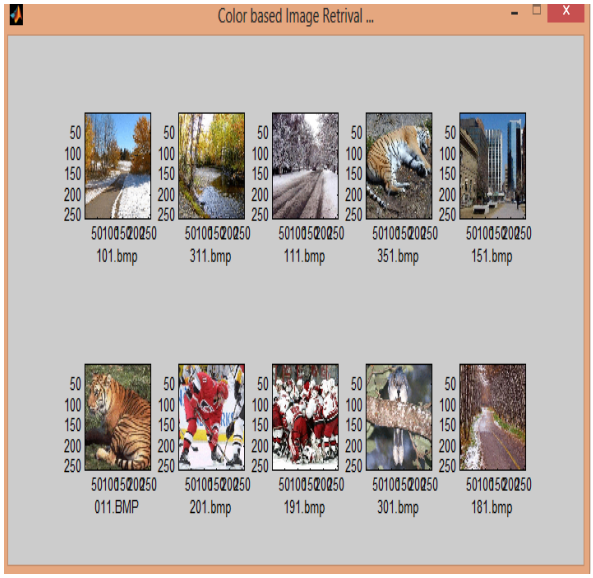

Fig. 7: Image fetching using colour feature

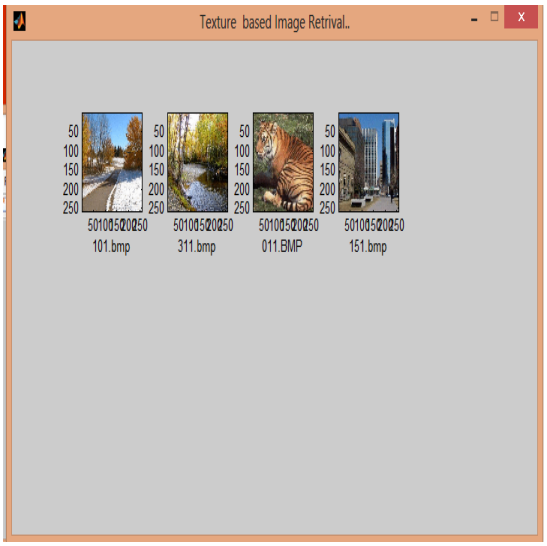

Fig 8: Image fetching using Texture feature.

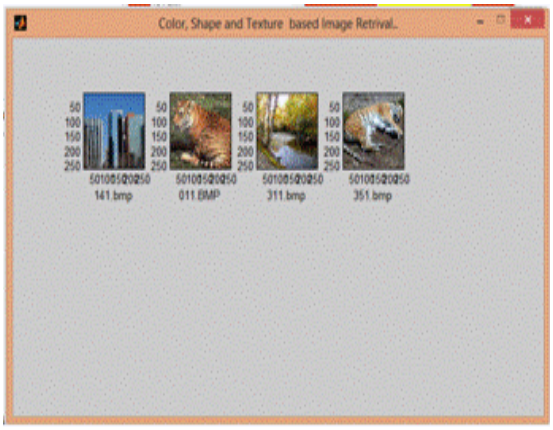

Fig. 9: Image fetching using color, shape and Texture feature

Content and text based information retrieval system and its process is shown in figure. In Fig. 4, user can select feature extraction technique which is shown in figure 5.Suppose user select a query image like Fig. 6 and can retrieve image on the basis of colour, feature and texture feature which is shown in Fig. 7 and figure 8. User can also retrieve image using colour, shape and texture feature which is shown in Fig. 9.
Image transformation method: It calculate the texture features by calculating frequency of the content of the image. It uses Fourier transform to describe the global frequency and uses a window function.

IV. CONCLUSION AND FUTURE WORK

The performance of content and text based Information retrieval is measured by Precision and Recall.

$$\text{Precision} = \frac{\text{Number of useful images retrieved}}{\text{Total number of images retrieved}}$$

$$\text{Recall} = \frac{\text{Retrieved number of useful images}}{\text{Number of useful images in database}}$$

This technique has been used to evaluate the performance of the retrieval system. During the precision recall method apply on ten thousand images and get 8000 useful images after 20 operations. Initially, the precision was calculated and latter steps the cumulative precision was calculated. It was for only based on texture feature vector. Figure 7 shows the number of images versus cumulative precision and Figure 8 shows the chart of cumulative precision after getting the number of useful images. Performance of system using different feature is shown in Tables.

TABLE 1: Performance using Colour Feature

No. of image in database	No. of image retrieve	No. of useful image retrieve	No. of useful image in database	precision	recall
100	15	4	10	0.6	0.4
50	10	3	8	0.3	0.37
1000	40	6	22	0.15	0.27
3000	60	7	80	0.11	0.08
5000	75	10	90	0.13	0.11
10000	75	10	99	0.13	0.10

TABLE 2: Performance using Texture Feature

No. of image in database	No. of image retrieve	No of useful image retrieve	No of useful image in database	Precision	Recall
100	15	8	10	0.53	0.8
50	12	6	8	0.5	0.75
1000	20	14	22	0.7	0.63
3000	40	30	80	0.75	0.37
5000	80	60	90	0.75	0.66
10000	90	60	99	0.66	0.60

TABLE 3: Performance using Shape Feature

No. of images in database	No. of image retrieve	No. of useful image retrieve	No. of useful image in database	Precision	Recall
100	15	5	10	0.33	0.5
50	14	4	8	0.28	0.5
1000	25	10	22	0.4	0.45
3000	75	25	80	0.33	0.31
5000	90	30	90	0.33	0.33
10000	99	35	99	0.35	0.35

TABLE 4: Performance using Colour, Shape and Texture feature

No of Image in database	No. of Image Retrieve	No. of useful image retrieval	No. of useful image in database	Precision	Recall
100	8	8	10	1	.8
50	7	7	8	1	.87
1000	20	15	22	.75	.68
3000	75	60	80	.8	.75
5000	100	70	90	.7	.77
10000	100	75	99	.75	.75

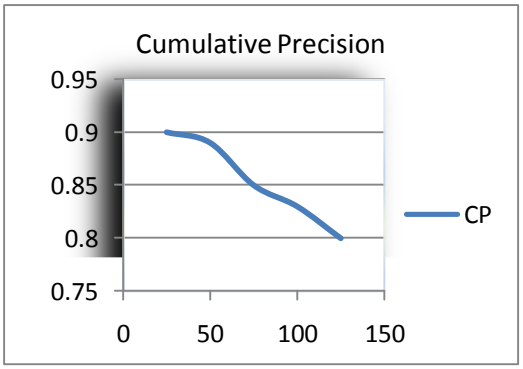

Fig. 7: Representing the number of image versus Cumulative precision.

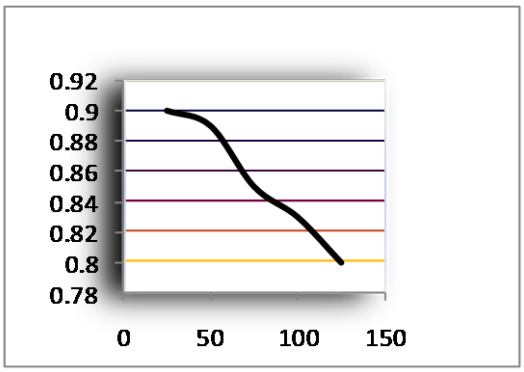

Fig. 8: A chart of cumulative precision versus retrieved images.

Currently, the system focuses on different attributes of the images. It's expected to be applied on GPU processor for fast processing. Because if number of images increases in database the performance of the system decreases.

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