IMAGE RETIEVAL COLOR, SHAPE AND TEXTURE FEATURES USING CONTENT BASED*

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ABSTRACT

Content-based image retrieval (CBIR) is an important research area for manipulating large amount of image databases and archives. Extraction of invariant features is the basis of CBIR. This paper focuses on the problem of texture, color& shape feature extractions. Using just one feature information for comparing images may cause inaccuracy than compared with using more than one features. Therefore many image retrieval system use many feature information like color, shape and other features. We use HSI color information especially Hue value and CSS (Curvature Scale Space) as shape information. From a large image data base, an automatic shape & color Based retrivel technique can Significantly retrival task Using Just two feature information for comparing image May cause inaccuracy than compared with using more than two features Accuracy high .We are Using three features for image Retrieval like color, shape & texture Feature ,We use HIS color information especially HUE Value and CSS(curvature scale space) as shape information. As a Result Three Features combine fulfill the aspect of Retrieval in Image.

Keywords: CSS, Image retrieval, Histogram Intersection

1 Introduction to CBIR

As processors become increasingly powerful, and memories become increasingly cheaper, the deployment of large image databases for a variety of applications have now become realizable. Databases of art works, satellite and medical imagery have been attracting more and more users in various professional fields — for example, geography, medicine, architecture, advertising, design, fashion, and publishing. Effectively and efficiently accessing desired images from large and varied image databases is now a necessity

1.1Definition

CBIR or *Content Based Image Retrieval* is the retrieval of images based on visual features such as colour and shape. Reasons for its development are that in many large image databases, traditional methods of image indexing have proven to be insufficient, laborious, and extremely time consuming. These old methods of image indexing, ranging from storing an image in the database and associating it with a keyword or number, to associating it with a categorized description, have become obsolete. This is not *CBIR*. In CBIR, each image that is stored in the database has its features extracted and compared to the features of the query image. It involves two steps.

- **Feature Extraction**: The first step in the process is extracting image features to a distinguishable extent.
- **Matching**: The second step involves matching these features to yield a result that is visually similar.

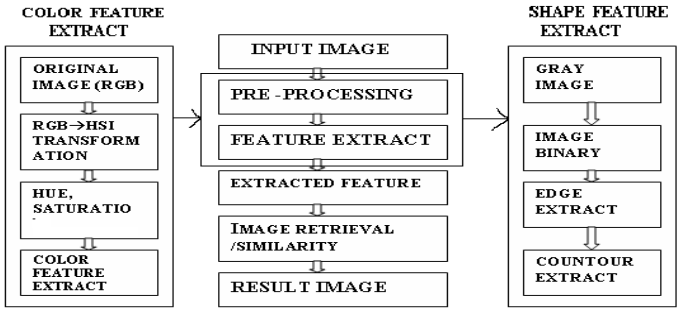


Figure1 : Overall system configuration

This project be formed 4 steps propose, preprocessing, extract of feature, store information of Image and retrieval the Image. We used CSS (Curvature Scale Space) and HSI (Hue, Saturation, Intensity) to extract the feature points. On pre-processing, implement the Image processing for next step. Extract the RGB of pixel color information for color feature and the gray-level of pixel information for shape feature. On extract of feature, can extract feature of visual, this is retrieval. This is consisting of vector of feature that base on the retrieval similarity measure from color and shape. Extract process of color information show up the progress that transfers from original image data RGB value to HSI value (as there is the flexibility to represent in the 2-D format). On extract of shape, one of step for can get the CSS Image, extract edge after transfer inputted color image to gray-level (to eliminate high intensity values and deviation of the shape). Here every object is represented in x and y coordinates of its boundary (binary images) points. Obtain the CSS image after extract contour by progress of contour tracking (smoothening of edges) then, remove the noise by clustering (technique for statistical data analysis used to extract meaningful information). On storage information of image, efficiently can be storage and management the feature information of image and, store the vector and linked image file though the indexing progress on an image. Then, as last step, retrieval progress of image and measurement of similarity, extract and show up the best of quality. For example, user query by example image to here, first time extract maxima coordinates value store from between vector of feature and image database then, compare the vector with the CSS image of query image. After output the image follow the top priority.

2. **Procedure for Color Feature:**

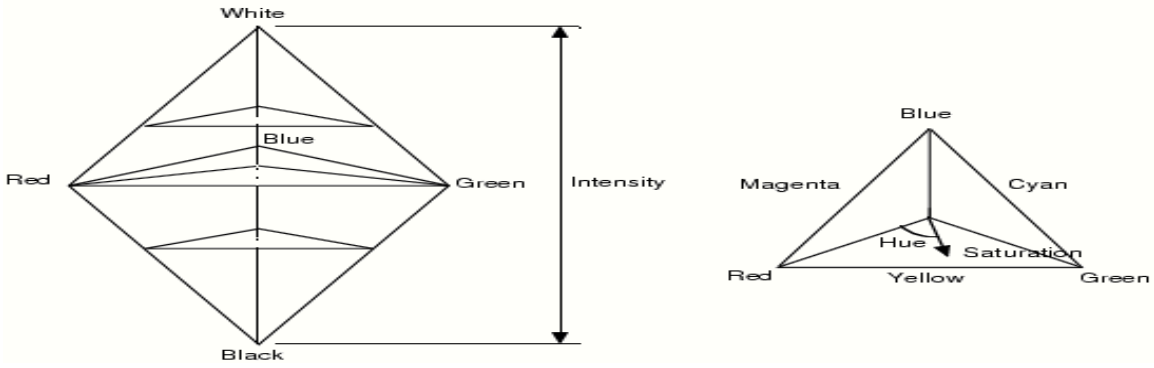


Figure 2: HSI Color Space

1. Input Query Image
2. Call ‘cal histogram’ function and get an hsv converted output along with histograms plotted as given below
   a. Take Query Image in RGB. Using ‘input’ function (input(enter query image,s);)
   b. Change RGB to HSI using ‘rgb2hsv’ function, (rgb2hsv(query image)).

The calculations for HSI is done using

$$H = \begin{cases} \theta & if\ B \le G \\ 360 - \theta & if\ B \ge G \end{cases}$$

$$\theta = \cos^{-1}\{\frac{\frac{1}{2}[(r-g)+(r-b)]}{[(r-g)^2+(r-b)(g-b)]^{\frac{1}{2}}}\},$$

$$S = 1 - \frac{3}{(r+g+b)}[Min(r,g,b)], \qquad I = \frac{1}{3}(r+g+b)$$

   c. For histogram calculation take size of HSV image, ([M,N,ttt]=size(hsv image)).
   d. For plotting histogram keep range as 0-1 in steps of 0.1, and plotting is done.
   e. Plotting is done by calculating the variables for histogram function by rounding off the HSV values.
3. Calculate length of histogram for training samples (in order to give same length for database images).
4. Upper and Lower Threshold values.
5. Apply Limits for mesh grid with range of 0-1 insteps of 0.1 and 0.05.
6. 3-d interpolation for query image. The Interpolation is done by using the function ‘interp3’.

$$d(H(im_m), H(im_n)) = \sum_{i=1}^{N} | H(im_m, i) - H(im_n, i) |$$

$$d(H(im_m), H(im_n)) = \sum_{i=1}^{N} \min(H(im_m, i) - H(im_n, i)$$

7. Interpolation means, to Calculate value of a function between the values that are already known.
8. Now the Histogram Interpolation is done for query image and database images, by initializing threshold values as 0.01 and 0.8.
9. In the above two equations, first equation- calculates the difference between query image and database image histograms. While the second equation takes the color histogram intersecting with histogram intersection difference giving out the HSI values.

10. Go for all database images, and perform interpolation of each image in database with length equal to T samples.
11. Calculate Absolute value of query and database interpolated values using the given formulae as in variable 'fine'.
12. Apply Lower Threshold for fine Variable output.
13. Store the upper threshold applied value as fine2.
14. Compute Similarity Measure using mean and length of the 2 threshold applied output.
15. Plot the similar Images and store it in other folder 'shape'. Rename the query image as s2.jpg.
16. Call the Shape Feature.

*3.**Shape retrieval***

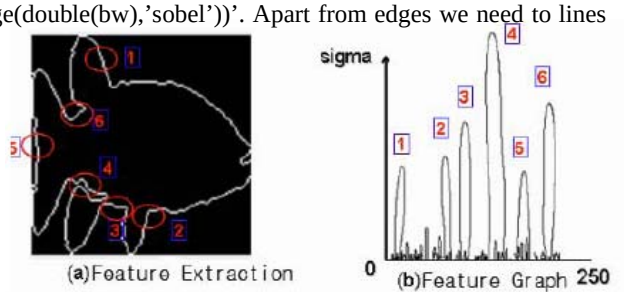
3.1 **Definition**

Shape may be defined as the characteristic surface configuration of an object; an outline or contour. It permits an object to be distinguished from its surroundings by its outline [15]. Shape representations can be generally divided into two categories [2]:

- Boundary-based, and
- Region-based.

3.2 Procedure for CSS:

1. Take Query Image in RGB. Using 'input' function (input(enter query image, s).
2. Change RGB to Gray level using 'rgb2gray' function, (rgb2gray(query image)).
3. Convert gray level values in binary by calculating threshold for gray image using 'graythresh(grayimage)'.
4. Binarising is done using 'im2bw(gray image)'.
5. Edge detection is done using function 'edge(double(bw),'sobel'))'. Apart from edges we need to lines and disks (eg. leaf)



6. Contour tracking is done by using Circularity formulae $Circularity = \frac{(border\ length)^2}{area}$

7. Combine both edge and lines part using 'imdilate' function (imdilate(edge,strel)).

4.Texture retrieval:

4.1Definition

Texture is that innate property of all surfaces that describes visual patterns, each having properties of homogeneity. It contains important information about the structural arrangement of the surface, such as; clouds, leaves, bricks, fabric, etc. It also describes the relationship of the surface to the surrounding environment. In short, it is a feature that describes the distinctive physical composition of a surface.

4.2 Procedure for Texture:

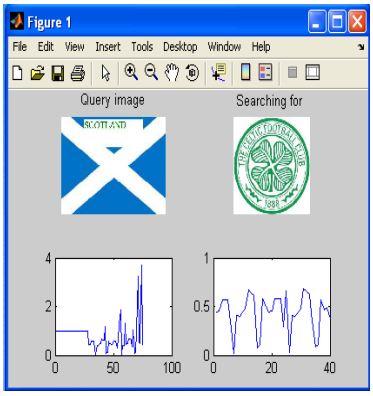
1. Horizontal and Vertical blocks are defined for texture identification.
2. Image Container = struct(' '); It creates a structure by taking the image and pixel values as one field and data and its values as other field.
3. Limit = Max Count (i.e. Size of Image).
4. In For Loop- a. Image File as I/P
   b. Use Floor Function in order to round off the H & V block values in accordance with Image size.

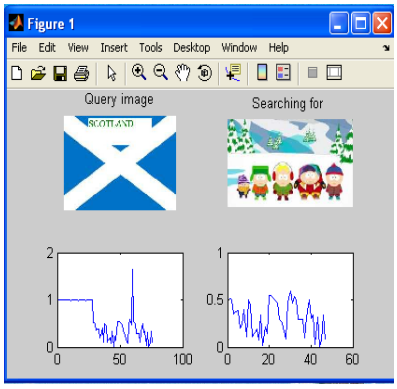
5. Define few other variables as 1's and 0's as per requirement.
6. Design a loop for H and V blocks
   a. X and Y limit for Columns and Rows
   b. Plotting a new sub image with X & Y limit as Rows and Columns
   c. Increment Count for Rows. by taking images from the directory as provided.
   d. Increment count for Columns.
7. For Comparing Query Image and images in directory use for loop and using blocks, keep the resulted image in tex directory.
8. Try to match the query image & Image in directory and show the result, if it is matching with name matched.jpg as, matched and not matched.

Example: 1 (Sco_flag.jpg)

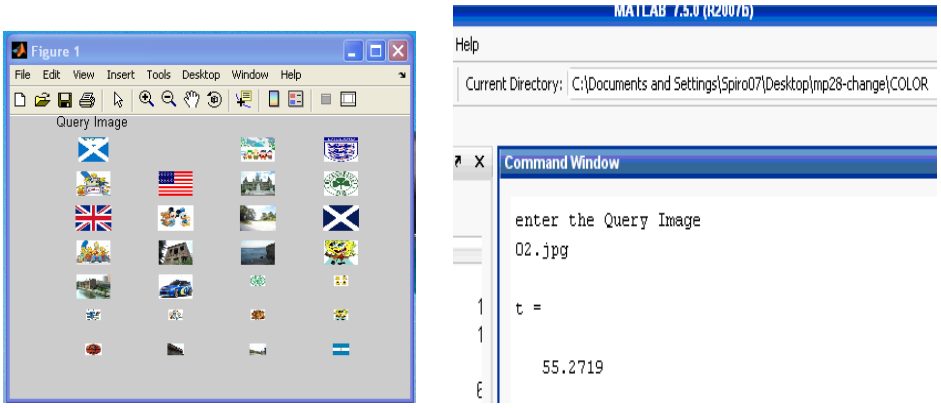
1. **Input image is given as query,**

and histograms are plotted as per below figures

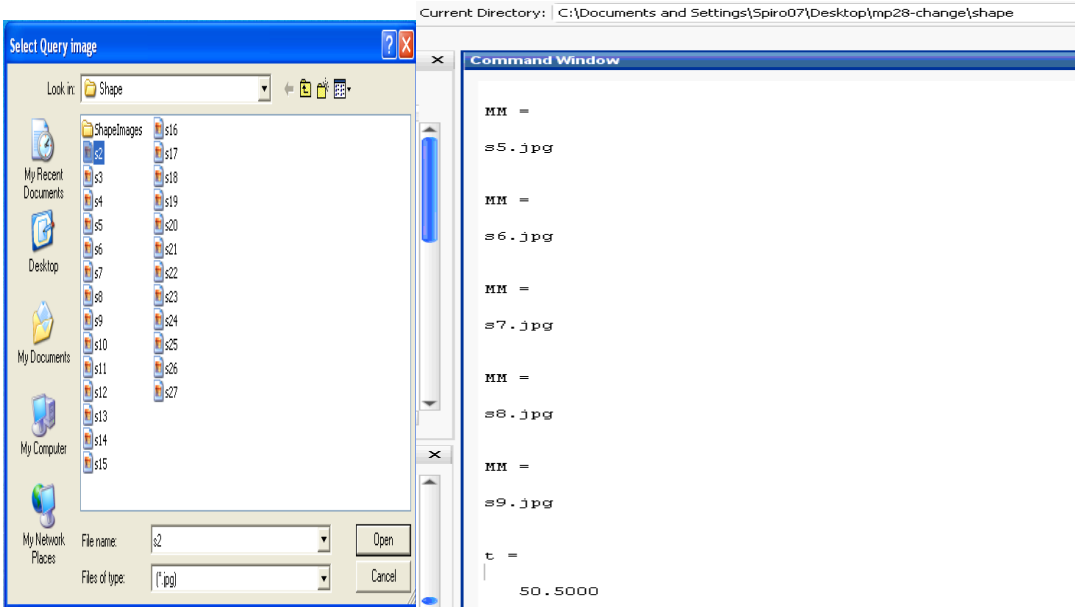




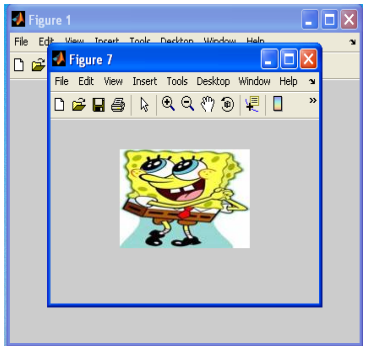
2. All the images in database that are matched in terms of color are displayed below

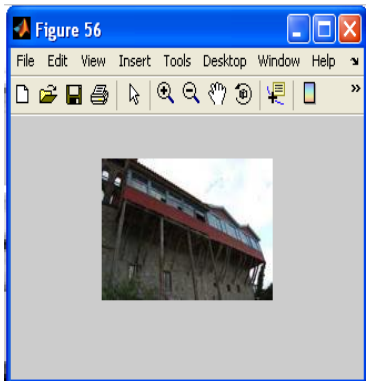


3. After Completion of Color retrieval, image ‘S2’ is given as input for Shape Feature.

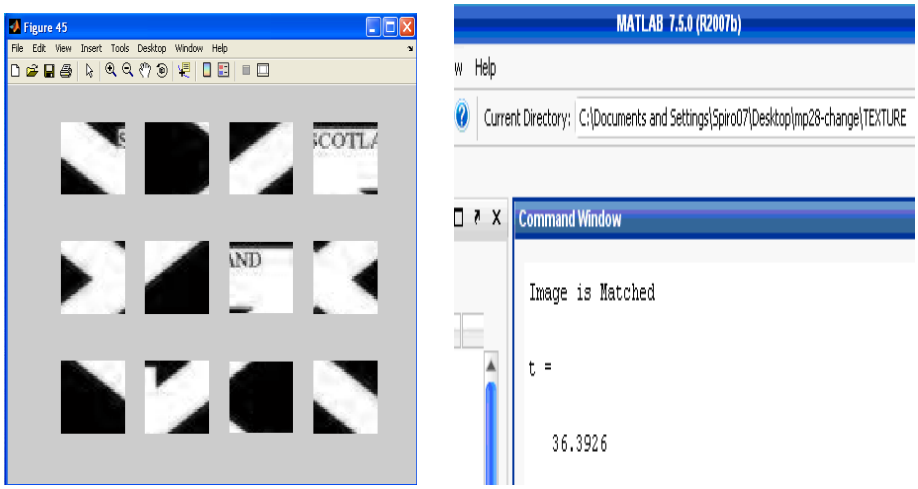


4. Shape Extraction is done for only images shown in the above figure (s3- s27)

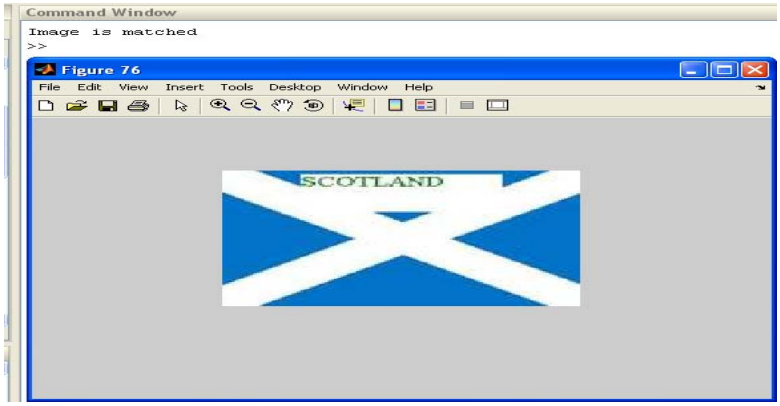




5 .Now Texture Extraction is done by dividing it into 12 blocks of 4x3 size

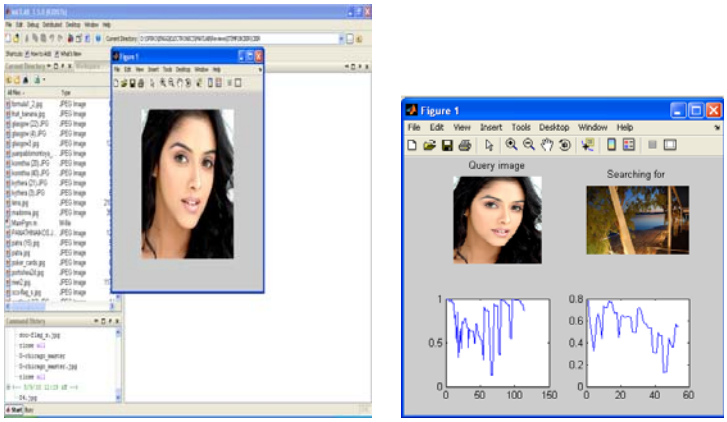


6. The Image if 'Matched' is displayed both on Command window as well as an output figure, else displays 'No image is Matched'

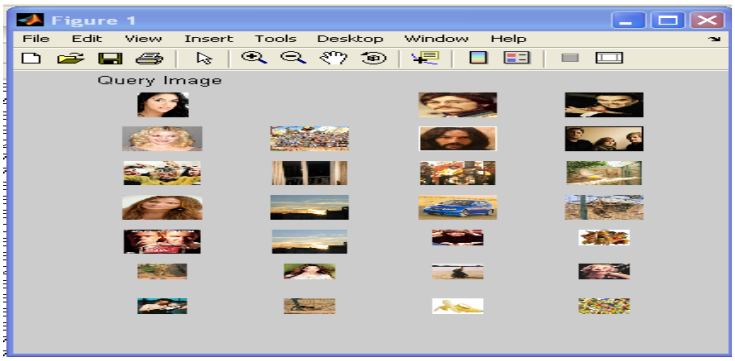


Example: 2 (04.jpg)

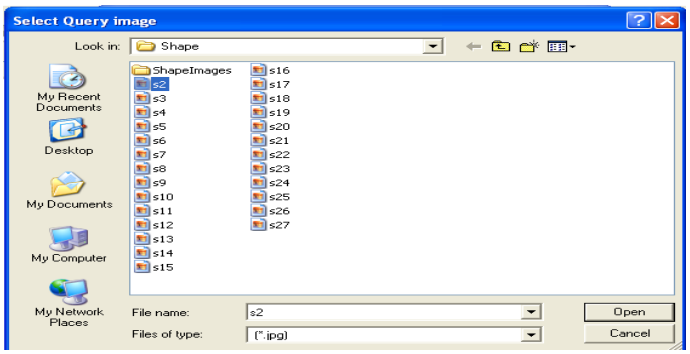
1. Input image is given as query, and histograms are plotted as per below figures



2. All the images in database that are matched in terms of color are displayed below

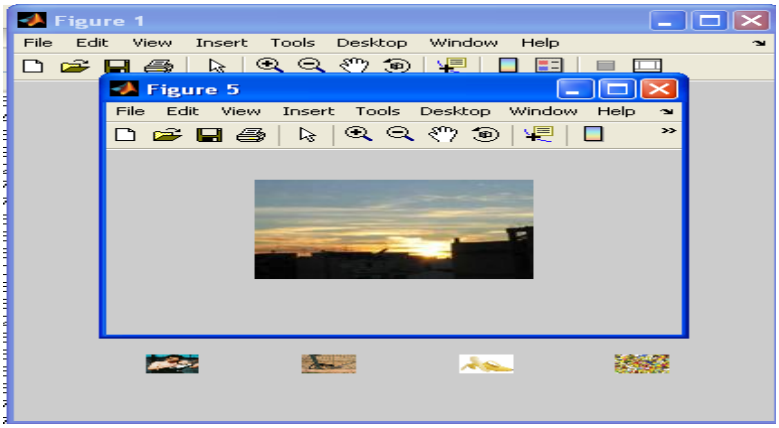


3. After Completion of Color retrieval, image ‘S2’ is given as input for Shape Feature.

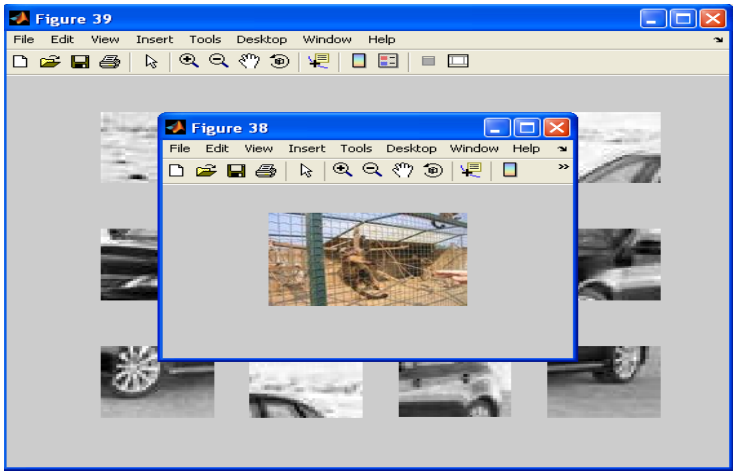


4. Shape Extraction is done for only images shown in the above figure

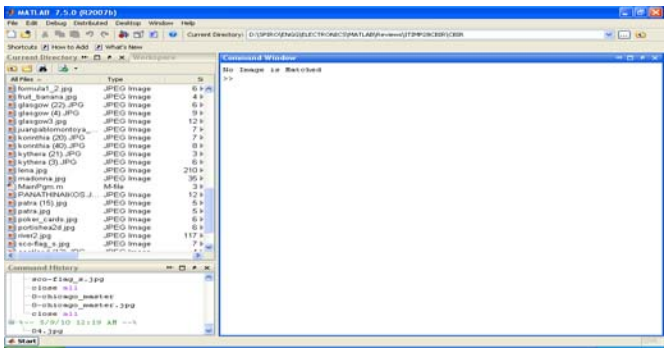
(s3- s27)



5. Now Texture Extraction is done by dividing it into 12 blocks of 4x3 size



6. The Image if 'Matched' is displayed both on Command window as well as an output figure, else displays 'No image is Matched'



5. Retrieval and Similarity

In this project Image retrieval is done by dividing the retrieving part into three parts, namely

Color feature: All Images that are matching with respect to color in database are separated in other folder.

Shape Feature: Images matched in color are extracted with respect to shape and again filtered for texture.

Texture Feature: Lastly all filtered images matched with respect to texture part and image comparison is done for remaining images, and result is displayed.

These three features combine fulfill the aspect of Retrieval in Image domain.

6. Conclusion:

The footnotes are used like in this example. Color information on some of information by image makes usefulness but, as weakness of color information is that can search the similar color range, different image. On existing experiment, present method image DB retrieval by Image information. But, as new trend experiment, put to practical use Image by the space information. This paper proposes that get the single shape-feature then, increase to the complex shape feature. A result of experiment, more get the accuracy 656 compare of single feature use and, get the accuracy result on rotation-transition. Study the more result by some of feature like a color, shape and texture and, need to get quick retrieval and accuracy that method of figure up the similarity and improve method of store to DB.

7. REFERENCES

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8. AUTHOR BIOGRAPHIES

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I would like to Expess my sincere gratitude to my Internal Guide for his insightful advice, motivating suggestion and support. Asst.Professor SAKE POTHALAIAH , graduated from the Department of ECE in National Institute of Technology Waragal in 2006, he obtained his M.E. degree from the department ECE, University College of Engineeering ,OU in2008. He is working as Assist Prof, Deprtment of ECE,Sri Indu College of Engg. He has published 6 research papers in international conferences he interests are in Ad hoc wireless networks woks. Image Processing, Control System and Bio Medical Signal Processing.

I Express My Gratitude to Dr.K ASHOK BABU Professor & Head of the Department(ECE) and for his constant co-operation, support and for providing necessary facilities throughout the M.tech program and He has 15 Year of Experience At B.tech and M.tech Level and Working as a professor At Sri Indu College of Engg&technology