Signature Based Approach For Image Retrieval Using Color Histogram And Wavelet Transform

Wasim Khan, Shiv Kumar, Neetesh Gupta, Nilofar Khan

Abstract— **In this article, a method is proposed for image mining based on analysis of color and texture properties of an image. Color and texture are the primitive image descriptors in content based image retrieval systems. We first resize all the database images to obtained similar space. For color based Image Retrieval, HSV color model is used to obtain color histogram of image and for texture extraction Haar wavelet transform is used. Then the proposed method evaluates different number of signatures for HSV and wavelet coefficients. Similar process is applied on the submitted query image. Finally Euclidian distance between query image and database images is calculated and the images having minimum distances are extracted from the database as results.**

***Index Terms*: Color histogram, Content-based image retrieval, Euclidian distance, Haar wavelet transform. HSV model,**

I. INTRODUCTION

During the last decade, a new image retrieval approach, called Content-Based Image Retrieval (CBIR), emerged. In this approach, the content of an image is described using low-level features such as color, texture, and shape. Despite their advantages over the traditional text-base image retrieval systems, CBIR systems face a major problem commonly referred to as the semantic gap, whereby the description of the images using the low-level features is unable to capture the semantic intended by the user in his/her queries. Therefore, CBIR systems produce a large amount of false positives in the retrieval process. A significant improvement is obtained by integrating the spatial distribution of the visual features since it captures better the contents of the images and reduces the number of false positives[7]. The exponential growth of image data that are being generated makes it imperative to use computers to save, retrieve and analyze images. The problem of image retrieval as been an active area of research since early 70's.

In order to make the best use of information in images, we need to organize the images so as to allow efficient browsing, searching and retrieval. The basic two approaches for image retrieval are text-based and visual-base. Early image retrieval techniques were generally based on textual annotation of images rather than visual features. In other words, images were first annotated with text and then searched using a text-based approach from the traditional database management systems [2] .Content-based image retrieval (CBIR) has been an active research topic in the last few years. Comparing to the traditional systems, which represent image contents only by keyword annotations, the CBIR systems perform retrieval based on the similarity defined in terms of visual features with more objectiveness. Although some new methods, such as the relevant feedback, have been developed to improve the performance of CBIR systems, low-level features do still play an important role and in some sense be the bottleneck for the development and application of CBIR techniques. A very basic issue in designing a CBIR system is to select the most effective image features to represent image contents. [1].Color and Texture features are of the great majority of content based image retrieval system. However the robustness, effectiveness, and efficiency of its use in image indexing are still open issues. In image preprocessing, the features used to represent color and texture information and the measures adopted to compute similarity between the features of two images are critically analyzed [3].

II. PROPOSED METHOD FOR IMAGE RETRIEVAL

Content-based image retrieval (CBIR) is a new but widely adopted method for finding images from vast and un annotated image databases. In CBIR images are indexed on the basis of low-level features, such as color, texture, and shape that can automatically be derived from the visual content of the images [9]. Here we propose an efficient approach for image retrieval based on color and texture descriptor features. Similar to most CBIR systems, we need to index images by extracting their features in an offline process. We then submit a query image and find similar images to that query based on a matching criterion. We first start with feature extraction. Figure1 represents proposed scheme architecture for this step. Firstly a database is prepared of different type of images. After this, analysis is performed on database. Analysis represents assessment of different descriptors used in this approach. Database is indexed according to values of different images. Finally the database is arranged on the basis of measures. When a user query is submitted for similarity matching the steps of analysis and feature selection is repeated as performed with image database. Now the value of query image is compared with the values of different images stored in database. As a result, the images having closest values compared to query image color and texture values are extracted from database.

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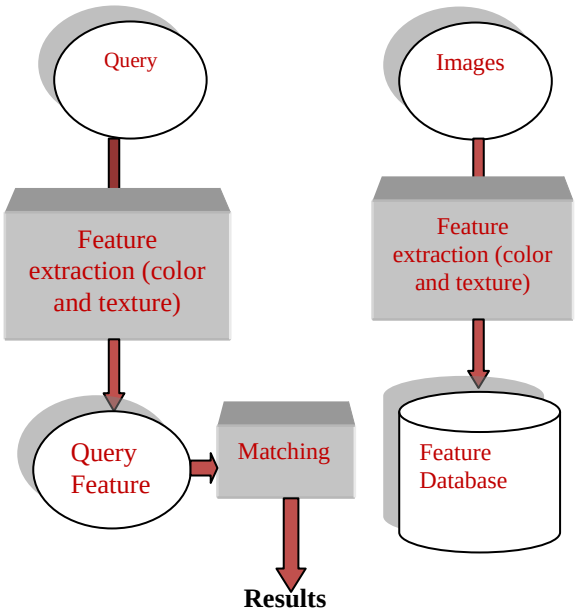

Figure 1: Proposed System Architecture

According to figure when a query image is submitted for image retrieval ,its color features are extracted and matching operation is performed between query image features and the image features stored in database .The result close to the query image is then retrieved from the database.First we load the database in the Matlab workspace after loading the database we resize the image for [128. 128] to get the similar size of images after that we Convert images from RGB to Gray and HSV for texture and color. Then we normalize the gray image for fixed mean. After this we find the square mean value of this 10 coefficient that gives 10 signature of each image. After that we find out different signatures of hue, saturation and value .When a test image is loaded we apply the procedure 2-8 of algorithm to find signature of test image after that we determine the normalized Euclidean distance between query image signatures and database image signatures with indexing. The closest values are displayed on GUI as result.

Color histograms are frequently used to compare images. Examples of their use in multimedia applications include scene break detection and querying a database of images .Color histograms are popular because they are trivial to compute, and tend to be robust against small changes in camera viewpoint[5].In this paper ,gray level variations are used to compute the texture feature of any image. For this purpose the color image is first converted in to gray level image. Then the values of wavelet coefficients are computed from gray level variations. According to combined color and texture features, images are extracted from the database.

A. Flow Chart for Proposed Scheme

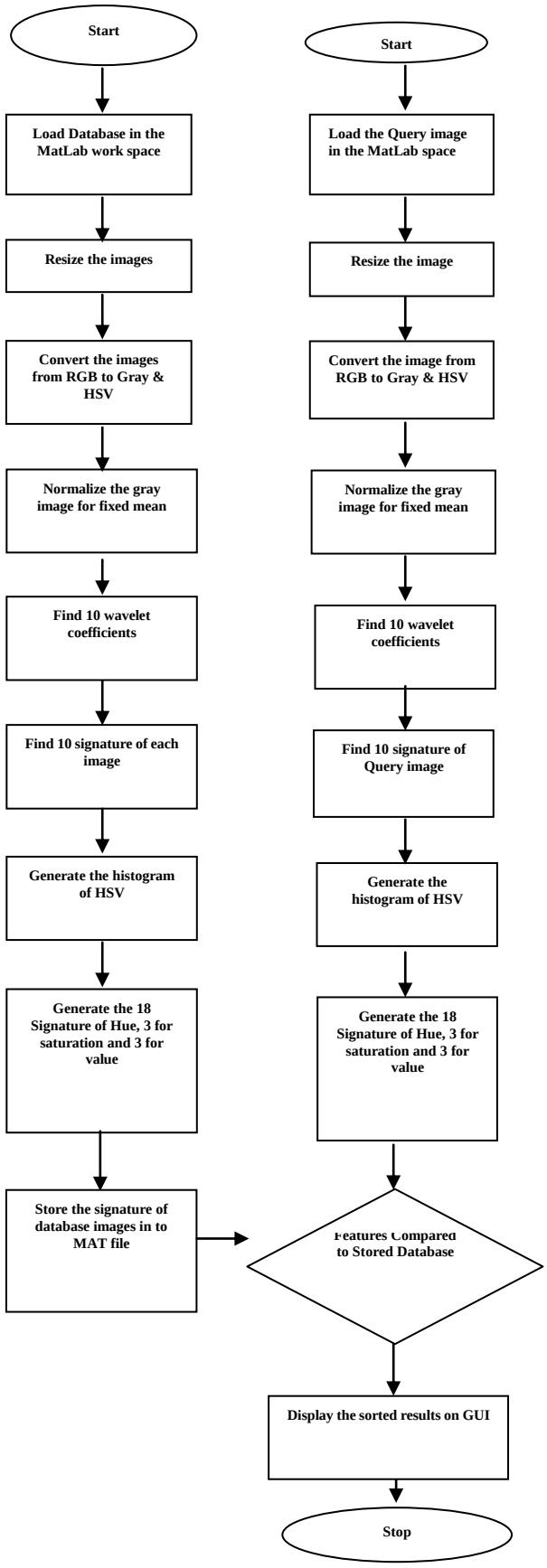

Figure- 2: Flowchart for proposed method

A. Algorithm for Proposed Scheme

Step 1: Load database in the Mat lab workspace.
Step 2: Resize the image for [128. 128].
Step 3: Convert image from RGB to Gray and HSV.
Step 4: Normalize the gray image for fixed mean.
Step 5: Apply the 3 level 2-D wavelet transform to find the 10 wavelet coefficient.
Step6: Find the square mean value of this 10 coefficient which give 10 signature of each image.
Step 7: Generate the histogram of hue, saturation and value.
Step 8: Generate 18 signatures of hue, 3 for saturation and 3 for value.
Step 9: Store the signature of database images into the mat file.
Step 10: Load the test image.
Step 11: Apply the procedure 2-8 to find signature of test image.
Step 12: Determine the normalized Euclidean distance of signature of test image with stored signature of database.
Step 13: Sort the normalized Euclidean distance values to perform indexing.
Step 14: Display the result on GUI.

III. EXPERIMENTAL RESULTS

The experimental results among a large database show that our approach for image retrieval works very effectively. Given a feature representation for each database image, retrieval consists of extracting a set of feature vectors from a query image and relying on a similarity function to evaluate which feature representation best explains those features. Closest values as a result display on GUI. For the same purpose Mat Lab tool is used for feature extraction. GUI represents the images having combined features of texture and color closest to the submitted query image.

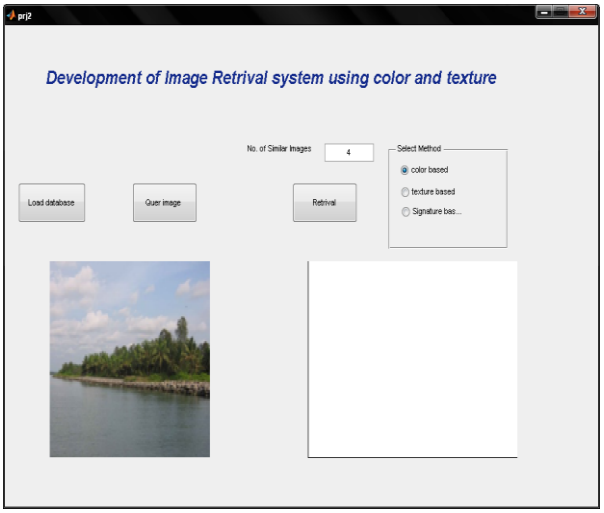

Figure 3: Interface after loading the query image for beach

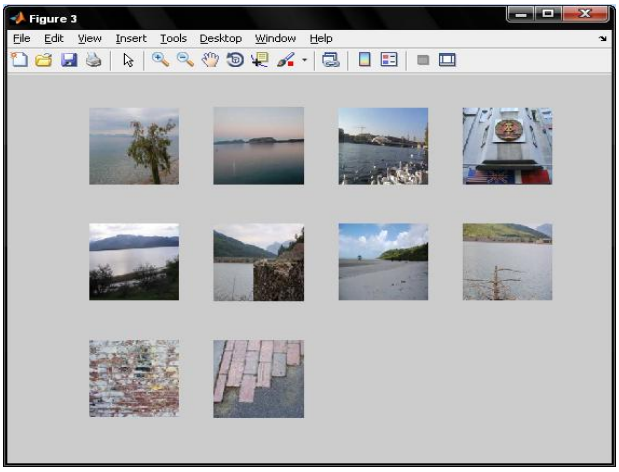

Figure 4: Resultant images

Figure 5: Interface after loading the query image for bricks

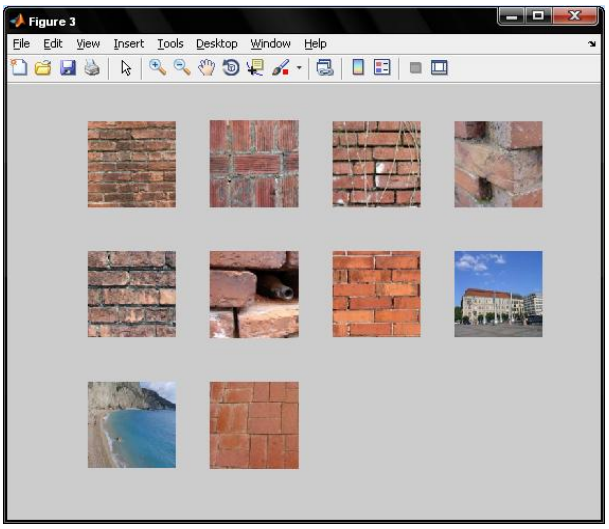

Figure-6: Resultant Image

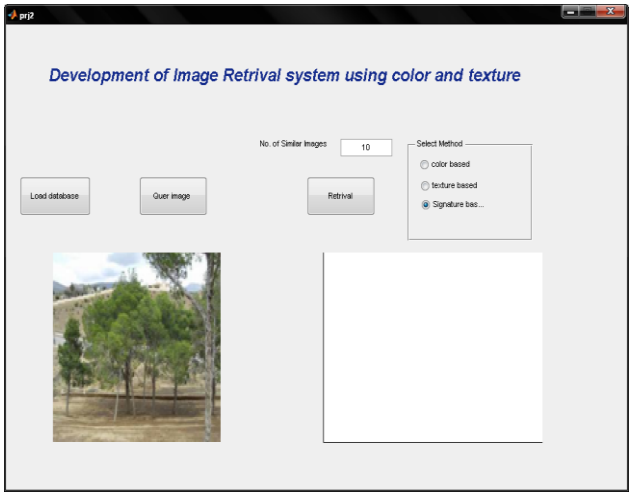

Figure 7: Interface after loading the query image for nature

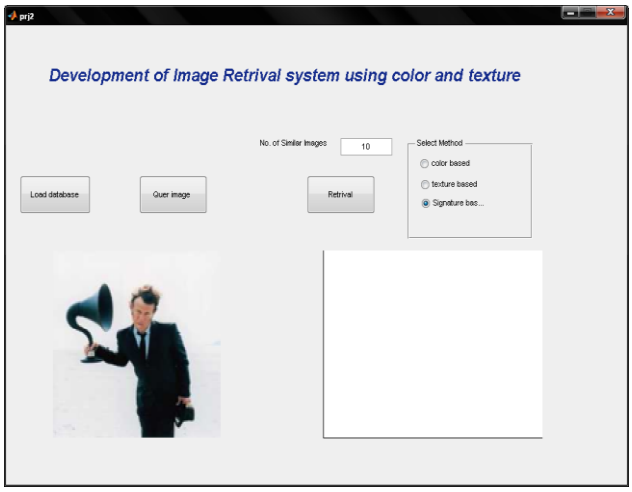

Figure 8: Interface after loading the query image for others

IV. COMPARISON CHART OF SCHEMES USED

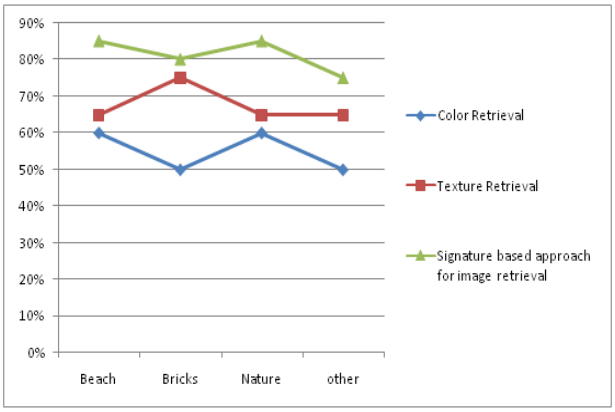

Figure 09: Comparison Chart

IV. CONCLUSION AND FUTURE WORK

The thesis proposed an efficient Signature Based Approach for Image Retrieval Using Color Histogram and Wavelet Transform. For color retrieval, color histogram method is used. Color histogram counts the bins having same color intensity in image. In this thesis HSV color model is used. For texture retrieval, discrete wavelet transform is used. From the wavelet family Haar transform is taken in to consideration. We then developed a mechanism for image retrieval based on these two image features with the help of MATLAB tool. When a query image is submitted, its texture and color value is compared with the texture and color value of different images stored in database. The images having closest value compared to query image are retrieved from database as result.

This work can be extended by taking other feature of image in to consideration. Some other parameter values can also be used for measurement.

VI. REFERENCES

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