Content Based Image Retrieval Using Texture and Color

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Abstract: Content Based Image Retrieval (CBIR) is the most important and effective image retrieval method and widely studied in both academia and industry arena. In this paper we propose an image retrieval system, called Wavelet-Based Color Histogram Image Retrieval (WBCHIR) based on the combination of color and texture features. This reduces the processing time for retrieval of an image with more promising representatives. CBIR aims at searching image databases for specific images that are similar to a given query image. User always wants a friendly environment so that they can easily and effectively use the system without actually going into the finer details of the working. So, to create such a user friendly platform for the system we have designed a (GUI) Graphic User Interface where user can actually select the method which they want to be used for the image retrieval and that will give them an option of using different method if the result is not as per their requirement. The larger the collection of images, the greater is the chance that it contains an image similar to the query image.. The aim of this project is to review the current state of the art in content-based image retrieval (CBIR), a technique for retrieving images on the basis of automatically-derived features such as color, texture and shape.

***Keywords*- WANG Database, Feature Extraction.**

I. Introduction

The image processing industry is one of the fastest growing technologies. Technology, in the form of inventions such as photography and television, has played a major role in facilitating the capture and communication of image data. The influence of television and video games in today's society is clear for all to see. CBIR aims at searching image databases for specific images that are similar to a given query image. It also focuses at developing new techniques that support effective searching and browsing of large digital image libraries based on automatically derived imagery features. It is a rapidly expanding research area situated at the intersection of databases, information retrieval, and computer vision. Although CBIR is still immature, there has been abundance of prior work. The CBIR focuses on Image features to enable the query and have been the recent focus of studies of image databases. The features further can be classified as low-level and high-level features.

Users can query example images based on these features such as texture, color, shape, region and others. By similarity comparison the target image from the image repository is retrieved. Meanwhile, the next important phase today is focused on clustering techniques. Clustering algorithms can offer superior organization of multidimensional data for effective retrieval. Clustering algorithms allow a nearest neighbor search to be efficiently performed. Hence, the image mining is rapidly gaining more attention among the researchers in the field of data mining, information retrieval and multimedia databases.

II. Literature Review

J. Han et al present a novel five-stage image retrieval method based on salient edges. In this algorithm the canny operator is performed to detect edge points. Then, the WaterFilling algorithm is employed to extract edge curves. Then salient edges are selected and the shape features in terms of the salient edges are yielded. A similarity measure, integrated salient edge matching, that integrates properties of all the salient edges, is introduced, and used to compare the similarity of the query image with the images in the database. Finally, the best matches are returned in similarity order. The presented approach is easy to implement and can be efficiently applied to retrieve images with clear edges.

M. Herraez et al presents a novel approach to combining features when using multiimage queries consisting of positive and negative selections. A fuzzy set is defined so that the degree of membership of each image in the repository to this fuzzy set is related to the user's interest in that image. Positive and negative selections are then used to determine the degree of membership of each picture to this set. The system attempts to capture the meaning of a selection by modifying a series of parameters at each iteration. The algorithm is easy to use and yields the highest performance in terms of the average number of iterations required to find a specific image. However, it is computationally more expensive and requires more memory than two of the other techniques.

G. Quellec et al propose content-based image retrieval (CBIR) method for diagnosis aid in medical fields. In the proposed system, images are indexed in a generic fashion, without extracting domain-specific features: a signature is built for each image from its wavelet transform. These image signatures characterize the distribution of wavelet coefficients in each subband of the decomposition. A distance measure is then defined to compare two image signatures and thus retrieve the most similar images in a database when a query image is submitted by a physician. To retrieve relevant images from a medical database, the signatures and the distance measure must be related to the medical interpretation of images, they propose to adapt the wavelet basis, within the lifting scheme framework, and to use a custom decomposition scheme. Weights are also introduced between subbands. All these parameters are tuned by an optimization procedure, using the medical grading of each image in the database to define a performance measure.

Nidhi Singh et al propose a framework which is able to select the most appropriate features to analyze newly received images thereby improving the retrieval accuracy and efficiency. The algorithm comprises of designing feature vectors after segmentation which will be used in similarity comparison between query image and database images. The framework is trained for different images in the database and its performance is found to be quite satisfactory when compared with the performance of conventional methods of content based image retrieval.

S. Park et al propose a method of content-based image classification using a neural network. The images for classification are object images that can be divided into foreground and background. To deal with the object images efficiently, in the preprocessing step the object region is extracted using a region segmentation technique. Features for the classification are shape-based texture features extracted from wavelet-transformed images. The neural network classifier is constructed for the features using the back-propagation learning algorithm. Among the various texture features, the diagonal moment was the most effective. A test with 300 training data and 300 test data composed of 10 images from each of 30 classes shows classification rates of 81.7% and 76.7% correct. The classes with the feature values regularly distributed have higher classification rates.

Manesh Kokare et al presented a Cosine-modulated wavelet transform based technique for extraction of texture features. The major advantages of Cosine-modulated wavelet transform are less implementation complexity, good filter quality, and ease in imposing the regularity conditions. Texture features are obtained by computing the energy, standard deviation and their combination on each subband of the decomposed image. Retrieval efficiency and accuracy using Cosine-modulated wavelet based features is found to be superior to other existing methods. Another advantage of proposed method is that the retrieval time required is 6.69 times less than the Gabor based method.

III. IMPLEMENTATION

5.1.1. Image Representation in matlab

An image is stored as a matrix using standard Matlab matrix conventions. There are five basic types of images supported by Matlab:

1. Indexed images
2. Intensity images
3. Binary images
4. RGB images
5. 8-bit images

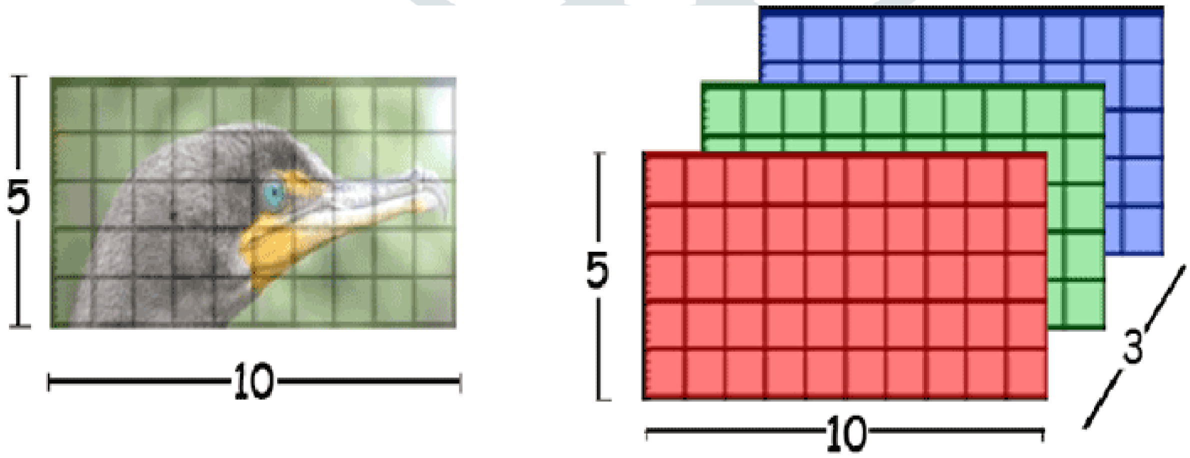

Fig: 5.1.1(a) Color image representation and RGB matrix

MATLAB handles images as matrices. This involves breaking each pixel of an image down into the elements of a matrix. MATLAB distinguishes between color and grayscale images and therefore their resulting image matrices differ slightly. A color is a composite of some basic colors. MATLAB therefore breaks each individual pixel of a color image (termed 'true color') down into Red, Green and Blue values. What we get as a result, for the entire image, are 3 matrices, one

representing each color. The three matrices are stacked next to each other creating a 3 dimensional m by n by 3 matrixes. For an image which has a height of 5 pixels and width of 10 pixels the resulting in MATLAB would be a 5 by 10 by 3 matrixes for a true color image.

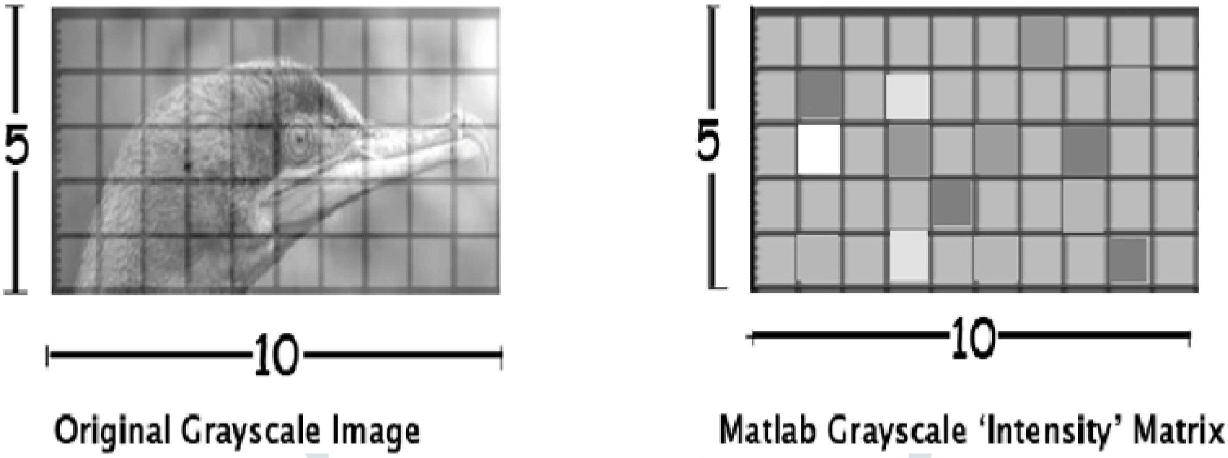

Fig: 5.1.1(b) Grayscale image representation

A grayscale image is a mixture of black and white colors. These colors, or as some may term as 'shades', are not composed of Red, Green or Blue colors. But instead they contain various increments of colors between white and black. Therefore to represent this one range, only one color channel is needed. Thus we only need a 2 dimensional matrix, m by n by 1. MATLAB terms this type of matrix as an Intensity Matrix, because the values of such a matrix represent intensities of one color. For an image which has height of 5 pixels and width of 10 pixels the resulting matrix would be a 5 by 10 matrix for grayscale image.

5.2. GUI

The Graphical User Interface was constructed using ***MatLab GUIDE*** or ***Graphical User Interface Design Environment***. Using the layout tools provided by ***GUIDE***, we designed the following graphical user interface figure (**aDemo.fig**) for our CBIR application:

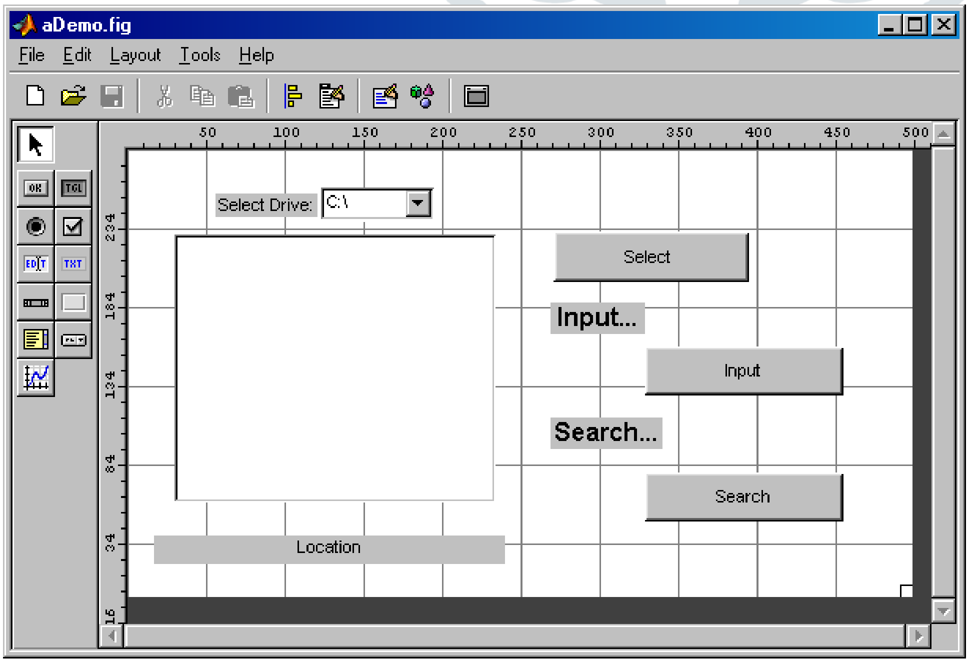

Fig: 5.2(a) GUI Design

IV. CONCLUSION

CBIR technology has so far had little impact on the more general applications of image searching, such as journalism or home entertainment. Only in very specialist areas such as crime prevention CBIR technology been adopted to a significant extent. This is no coincidence – while the problems of image retrieval in a general context have not yet been satisfactorily solved, the well-known artificial intelligence principle of exploiting natural constraints has been successfully adopted by system designers working within restricted domains where shape, color or texture features plays an important role in retrieval. The process of designing of CBIR system has been successfully carried out and the expected outcome is achieved.

V. REFERENCES

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