Volume 5, Issue 7, July 2015 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

Content Based Image Retrieval from Colored Digital Images using Enhanced SVM Technique

Gurmeet Kaur
M.Tech Student,
CSE Department
AIET, Faridkot, Punjab, India

Er. Arshdeep Singh
Assistant Professor,
CSE Department
AIET, Faridkot, Punjab, India

Abstract: ***Content-based image retrieval utilizes representations of features that are automatically extracted from the images themselves. Allmost all of the current CBIR systems allow for querying-by-example, a technique wherein an image (or part of an image) is selected by the user as the query. The system extracts the feature of the query image, searches the database for images with similar features, and exhibits relevant images to the user in order of similarity to the query. In this context, content includes among other features, perceptual properties such as texture, color, shape, and spatial relationships. Many CBIR systems have been developed that compare, analyze and retrieve images based on one or more of these features. Some systems have achieved various degrees of success by combining both content-based and text-based retrieval. In all cases, however, there has been no definitive conclusion as to what features provide the best retrieval. In this paper we present a modified SVM technique to retrieve the images similar to the query image.***

Keywords: CBIR, SVM, Content Based Image Retrieval, Modified SVM

I. INTRODUCTION

Content-based retrieval uses the contents of images to represent and access the images. A typical CBIR system is divided into online image retrieval and off-line feature extraction. A conceptual framework for content-based image retrieval is illustrated in Figure 1.2. In off-line stage, the system automatically extracts visual attributes (color, shape, texture, and spatial information) of each image in the database based on its pixel values and stores them in a different database within the system called a feature database. The feature data, for each of the visual attributes of each image is very much smaller in size compared to the image data, thus the feature database contains an abstract form of the images in the image database. One advantage of a signature over the original pixel values is the significant compression of image representation. A more important reason for using the signature is to gain an improved correlation between image representation and visual semantics.

In on-line image retrieval, the user can submit a query example to the retrieval system in search of relevant images. The system represents this example with a feature vector. The distances (i.e., similarities) between the feature vectors of the query example and those of the media in the feature database are then computed and ranked. Retrieval is directed by applying an indexing scheme to provide an efficient way of searching the image database. Finally, the system rank the search results and then returns the results that are most similar to the query example. If the users are not satisfied with the search results, he can provide relevance feedback to the retrieval system, which contains a technique to learn the user information needs.

Content-based image retrieval uses the visual contents of an image such as texture, color, shape, and spatial layout to represent and index the image. In typical CBIR systems, the visual content of the images in the database are extracted and described by multi-dimensional feature vectors. The feature vector of the images in the database form a feature database. To retrieve the images, users provide the retrieval system with example images. The system then changes these examples into its internal representation of feature vectors.

II. COMPONENTS OF CBIR SYSTEM

The CBIR system consists of the following components:

1) Query image

It is the image to be found in the image database, whether the similar image is present or not. And how many are similar kind images are exist or not.

2) Image database

It consists of n number of images depends on the user choice.

3) Feature extraction

It separates visual information from the image and saves them as features vectors in a features database. The feature extraction finds the image detail in the form of feature value (or a set of value called a feature vector) for each pixel. These feature vectors are used to compare the query image with the other images and retrieval.

4) Image matching

The information about each image is stored in its feature vector for computation process and these feature vectors are compared with the feature vectors of query image which helps in measuring the similarity.

5) Resultant retrieved images

It finds the previously maintained information to find the matched images from database. The output will be the similar images having same or closest features as that of the query image.

Kinds of CBIR

There are two kinds of CBIR:

- General
- Application specific

General: We try to match a query image to an arbitrary collection of images.
Application specific: We try to match a query image to a collection of images of a specific type e.g. Finger prints, X-ray images of a specific organs.

III. LITERATURE SURVEY

Swati Agarwal et.al (2014) In this paper author proposed a system for image retrieval based on color and Discrete Wavelet Transform which is different from existing Histogram based methods. The proposed algorithm generates feature vectors that combine both color and edge features. This paper also uses wavelet transform to reduce the size of the feature vector and simultaneously preserving the content details. The robustness of the system is also tested against query image alterations such as geometric deformations and noise addition etc. Wang's image database is used for experimental analysis and results are shown in terms of precision and recall. Maximum value for recall is obtained is 85%.

Santhosh P. Mathew et.al.,(2014) In this paper, shape features are extracted from the database images and the same are polar raster scanned into specified intervals in both radius and angle, using the proposed Polar Raster Edge Sampling Signature (PRESS) algorithm. Counts of edge points lying in these bins are stored in the feature library. When a query image passed on to the system, the features are extracted in the similar fashion. Subse-quently, similarity measure is performed between the query image features and the data-base image features based on Euclidian Distance similarity measure and the database images that are relevant to the given query image are retrieved. PRESS algorithm has been successfully implemented and tested in a CBIR System developed by us. This technique pre-serves rotation and scale invariance. It is evaluated by querying different images. The retrieval efficiency is also evaluated by determining precision-recall values for the retrieval results. Maximum value for Recall parameter is obtained as 86%.

Manimala Singha et.al.,(2012) Presents a technique for content based image retrieval using color and texture. In this they proposed two algorithms for image retrieval based on the color histogram and Wavelet-based Color Histogram. They presented a novel approach for Content Based Image Retrieval by combining the color and texture features called Wavelet-Based Color Histogram Image Retrieval (WBCHIR). Similarity between the images is ascertained by means of a distance function. The computational steps are effectively reduced with the use of Wavelet transformation.

Ray-I Chang et.al.(2012) Proposed a novel content based image retrieval system using K-means/KNN with feature extraction. This paper first combines segmentation and feature extraction module, grid module, K-means clustering and neighborhood module to build the CBIR system. The problem with this technique is that the system architecture and modules proposed in this paper are not optimized properly.

IV. PROPOSED METHODOLOGY

Proposed system for content based image retrieval works in two phases which are as follows:

Pre Processing Phase: In this phase a dataset of images is provided to the system. For every image provided to the system, system evaluate some features like color, texture , shape and distance in between the neighbor clusters and then store the results for every image in the database.

Image retrieval Phase: In this phase query image is passed as an input to the system and features of query image are calculated as in the previous phase. These features are then compared with the features already stored in the database. Images whose features matches exactly are given high priority and other images whose features are related closely is given low priority. Final results are then displayed to the user from high priority images to the lower priority images.

The following are the steps for the proposed system working (Preprocessing Phase) :

Step 1: Input the image dataset.
Step 2: Extract the features of images (Color, Texture , Shape and cluster Distance)
Step 3: Combine these features.
Step 4: Store these features in the database.

The following steps are used in Image Retrieval Phase:

Step 1: Input the query image.
Step 2: Extract the features of query image(Color, Texture , Shape and cluster Distance)
Step 3: Combine these features
Step 4: Compare these features with the features stored in the database.
Step 5: Display the result according the image priority.

V. PERFORMANCE MEASUREMENT

Evaluation of retrieval performance is a crucial problem in Content-Based Image Retrieval (CBIR). Many different methods for measuring the performance of a system have been created and used by researchers. We have used the most common evaluation methods namely, Precision and Recall usually presented as a Precision vs. Recall graph. Precision and recall alone contain insufficient information. We can always make recall value 1 just by retrieving all images. In a similar way precision value can be kept in a higher value by retrieving only few images or precision and recall should either be used together or the number of images retrieved should be specified.

With this, the following formulae are used for finding Precision and Recall values.

$$\text{Precision} = \frac{\text{No. of relevant images retrieved}}{\text{Total number of images retrieved}}$$

$$\text{Recall} = \frac{\text{Total no of relevant images in the database}}{\text{No of relevant images retrieved}}$$

VI. RESULTS AND DISCUSSION

Proposed system is tested on more than 10000 images from different categories. Proposed system shows very good results for all types of categories.

The following is the results evaluated by the proposed system on the basis of parameters above

Parameter	**Value**
Precision	**91%**
Recall	**92.53%**

VII. CONCLUSION

The dramatic rise in the sizes of images databases has stirred the development of effective and efficient retrieval systems. The development of these systems started with retrieving images using textual connotations but later introduced image retrieval based on content. This came to be known as Content Based Image Retrieval or CBIR. Systems using CBIR retrieve images based on visual features such as texture, colour and shape, as opposed to depending on image descriptions or textual indexing. The main objective of this paper is to retrieve the images from database in a fast and an efficient manner using modified Support vector method(SVM).

VIII. FUTURE SCOPE

In future this system is also implemented in the field of computer Vision which is concerned with the automated processing of images from the real world to extract and interpret information on a real time basis. In future this system is used in Astronomy to the study of celestial objects (such as stars, comets, nebulae, planets, star clusters and galaxies). Further time to retrieve the system can also be reduced in future.

REFERENCES

[1] A.Kannan, Dr.V.Mohan, Dr.N.Anbazhagan, "Image Clustering and Retrieval using Image Mining Techniques", IEEE International Conference on Computational Intelligence and Computing Research, 2010.

[2] Kun-Che Lu, Don-Lin Yang, "Image Processing and Image Mining using Decision Trees", Journal of Information Science and Engineering 25, 989-1003, 2009.

[3] Dr. Sanjay Silakari, Dr. Mahesh Motwani and Manish Maheshwari, "Color Image Clustering using Block Truncation Algorithm", IJCSI International Journal of Computer Science Issues, Vol. 4, No. 2, 2009.

[4] Amanbir Sandhu, Aarti Kochhar, "Content Based Image Retrieval using Texture, Color and Shape for Image Analysis", International Journal of Computers & Technology ,Volume 3, No. 1, AUG, 2012 .

[5] Saroj Shambharkar, Shubhangi Tirpude, "Fuzzy C-Means Clustering For Content Based Image Retrieval System", International Conference on Advancements in Information Technology With workshop of ICBMG 2011, IPCSIT vol.20 (2011) © (2011) IACSIT Press, Singapore, 2011.

[6] Manimala Singha and K.Hemachandran, "Content Based Image Retrieval using Color and Texture", Signal & Image Processing: An International Journal (SIPIJ) Vol.3, No.1, February 2012.

[7] Ray-I Chang, Shu-Yu Lin, Jan-Ming Ho, Chi-Wen Fann, and Yu-Chun Wang, "A Novel Content Based Image Retrieval System using K-means/KNN with Feature Extraction", ComSIS Vol. 9, No. 4, Special Issue, December 2012.

[8] Peter Stanchev, "Using image mining for image retrieval", IASTED conf. "Computer science and Technology", Cancum, Mexico, 214-218, May 19-21, 2003.

[9] F. Long, H. Zhang, H. Dagan, and D. Feng, "Fundamentals of content based image retrieval," in D. Feng, W. Siu, H. Zhang (Eds.): "Multimedia Information Retrieval and Management. Technological Fundamentals and Applications," Multimedia Signal Processing Book, Chapter 1, Springer-Verlag, Berlin Heidelberg New York, pp.1-26, 2003.

[10] Nishchol Mishra, Dr. Sanjay Silakari, "Image Mining in the Context of Content Based Image Retrieval: A Perspective", IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 4, No 3, July 2012.

[11] S. Mangijao Singh, K. Hemachandran, "Content-based image retrieval using color moment and gabor texture feature", IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 5, No 1, September 2012.

[12] Yong Rui and Thomas S. Huang, Shih-Fu Chang, "Image retrieval: current techniques, promising directions, and open issues", Journal of Visual Communication and Image Representation **10**, 39–62, 1999.

[13] Gurpreet Kaur, "A Review: Content Base Image Mining Technique for Image Retrieval Using Hybrid Clustering", International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), Volume No. 2, Issue No. 6, June 2013.

[14] Neha Sharma, "Retrieval of image by combining the histogram and HSV features along with surf algorithm", International Journal of Engineering Trends and Technology (IJETT) - Volume4 Issue7- July 2013.

