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A Survey on Features Used for Content Based Image Retrieval System

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ABSTRACT
In this paper, we are reviewing features used for Content Based Image Retrieval (CBIR) System. CBIR is the process used for automatic indexing and retrieval of images that are depends on the content of images known as features. Features like low level features and high level features are used. The low level features such as color, texture and shape. High level features include human perception. Implementation of image retrieval using only single feature cannot provide a good solution for accuracy and efficiency. So multi features are used for efficient retrieval and accuracy. The Genetic Algorithm (GA) and Interactive Genetic Algorithm (IGA) are used for similarity matching. It helps to retrieve relevant image to the given query.
Keywords:- Content based image retrieval (CBIR), Conventional color histogram (CCH), Gray level co-occurrence matrix (GLCM), Interactive Genetic Algorithm (GA) (IGA), Pyramid Structure Wavelet Transform Model (PSWTM), Quadratic Distance Metric (QDM), Text based image retrieval (TBIR).

I.   INTRODUCTION

Nowadays, rapid advances in science and technology have produced huge amount of image data. It is very necessary to efficiently store and retrieve the image data to perform the given task to make a decision for various applications such as architecture, crime prevention, medical image archives, multimedia etc. In order to retrieve the desired image from large scale image database becomes an active and challenging research area.

Image retrieval system is a computer system for browsing, searching and retrieving images from large database of digital images. Many image retrieval systems have been developed. Text and content based are two types of approaches usually used in image retrieval. In tradition text based approach, the images are annotated by text and then use text base database management system to perform image retrieval. It has two main drawbacks. First one is that large number of labor required for manual annotation. The second is for particular image different user annotates different keywords. These drawbacks create a need to do the research in the field of content based image retrieval system [1] [2].

CBIR has provided an automated way to retrieve images based on the content of image. CBIR is the process to search relevant image in large image database when query image is given. It utilizes either low level feature or high level feature. Low level features such as color, texture and shape and high level features such as human perception. High-dimensional feature will reduce the query efficiency; low dimensional features will reduce query accuracy. The CBIR consist of two steps. One is feature extraction and other is similarity matching.

Color, texture and shape are important features in extracting information from images. Color is widely used

visual feature that allows discrimination and recognition of visual information. Color histogram is widely used as a representation technique. It captures the number of pixels having specific properties and it is statistically described as the combined probabilistic properties of diverse color channels. Texture feature is also used for image retrieval. CBIR uses some texture features like energy, entropy, contrast and homogeneity. Color and texture contain important information but two images with similar color histograms can represent very different things. Therefore, the use of shape-describing features is necessary in an efficient content based image retrieval system. Edge is local feature. It captures the shape information in the image. It is mostly used as a feature descriptor in image retrieval because edges play an important role for image perception, [9].

Image retrieval system using only single feature cannot give a sufficient retrieval accuracy and efficiency. So multi features are used for better image retrieval process. The difference between the user's information need and the image representation is called as the semantic gap in CBIR System. If this semantic gap is minimum then system is said to be efficient. The purpose of CBIR System is to construct meaningful descriptions of physical attributes from images to make efficient and effective retrieval [2] [3]. Further, Content Based Image Retrieval (CBIR) System based on Genetic Algorithm is developed. In this system, color, texture and shape features are extracted Genetic Algorithm is used to reduce the semantic gap between retrieval results and user expectation. Later, Content Based Image Retrieval (CBIR) System using Interactive Genetic Algorithm is proposed. In

this model, all three features are extracted and Interactive the user's choices it helps the user to identify the images that are most satisfied to the user's need.

The rest of this paper is organized as follows. Section II provides a survey based on features used for content based image retrieval system. Finally, conclusions are drawn in section III.

II. RELATED WORK

The various approaches are developed for Content Based Image Retrieval System. Some of the important literature that covers the more important CBIR System is discussed below.

FAN-HUI KONG [4] proposed image retrieval using both color and texture features. They presented the color feature by cumulative histogram and the texture feature extraction is done by using gray level co-occurrence matrix (GLCM) or color co-occurrence matrix (CCM). Through the quantification of HSV color space, they combine color feature and gray level co-occurrence matrix as well as CCM separately, using normalized Euclidean distance classifier. The different image retrieval experiment indicates the use of color feature and texture characteristics of the image retrieval method is superior to single color image retrieval method and color characteristics combining color texture features for the integrated characteristics of color image retrieval has obvious advantage retrieval. It improves the performance of image retrieval.

Rahul Mehta [5] proposed a method in which both color and texture feature of the images are use to improve the retrieval result in terms of its accuracy. Color extraction and comparison are performed using Conventional color histogram (CCH) and the Quadratic Distance Metric (QDM) and the texture extraction and comparison are performed using the concept of Pyramid Structure Wavelet Model (PSWTM) and the Euclidean distance. The application performed a simple color based search in an image database for an input query image, using Conventional color histogram (CCH). It then finds the similar images from image database by Quadratic Distance Metric (QDM). In order to further enhance the search the application performs a text using the based search on color result, by using Pyramid Structure Wavelet Transform Model (PSWTM) and energy level calculation. It then compares the texture features using the Euclidean Distance Equation.

Manimala Singha and K. Hemchandran [6] have presented the Content Based Image Retrieval, using features like texture and color. The texture and color features are extracted through wavelet transformation and color histogram. The similarity between the images is measured by means of distance function. The experimental result shows that this approach outperforms the other retrieval methods in terms of Average Precision. Further, the computational steps are effectively reduced with the use of wavelet transformation. As a result, increase in retrieval speed. The whole indexing time for the 1000 image database takes 5-6 minutes.

Genetic Algorithm enables unique content to grow that suits

S. Sankar Ganesh [7] described image retrieval using heuristic approach and genetic algorithm. They proposed a novel approach to CBIR System based on Genetic Algorithm. The mean value of color image is used as color feature. They considered an active contour as region feature and used Genetic Algorithm to reduce the semantic gap between retrieval result and user expectation. Experimental results have shown that the performance of this approach is appreciable.

Gali, Deval, Anand [8] presented the content based image retrieval using Genetic Algorithm. Implementation of one feature descriptor does not give sufficient retrieval accuracy. Therefore, they used the image feature descriptors, texture descriptors, and shape descriptors to represent low level image features. There is need to train these features with different weights of features computed by GA have improved significantly all the evaluation measures including average precision and average recall for the combined features method. The experimental results have shown good performance.

B. Syam [9] proposed an effective approach to retrieve the medical images by using the aid of genetic algorithm and SED with feature extraction process. The low level features such as color, texture and shape are extracted and similarity measure is done by GA. The extracted medical images are most similar to the given query medical image.

III. CONCLUSIONS

Content Based Image Retrieval System overcomes all the drawbacks of Text based image retrieval system. A query image can be retrieved efficiently from the large database. CBIR System has been used in many applications such as architecture, crime prevention, multimedia, education etc. Color, texture and edge descriptor are the three low level features can give the better performance than the single feature. Therefore, selection of features is one of the important thing in the image retrieval system.

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