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CONTENT BASED IMAGE RETRIVAL SYSTEM BY USING COLOR AUTO-CORRELOGRAM METHOD

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ABSTRACT

Content-based IR is a fairly new science which means there are more unexplored areas to research, perhaps in contrast to traditional IR, which is well explored and harder to find possible improvements in. Combining genetic algorithms with CBIR methods, there are some issues. Some of the issues related to CBIR and Feature selection issue to describe the images better within the database also its selection of proper data structure to store the feature vectors. In the learning algorithms used in order to make the CBIR wiser also its participation of the users feedback in order to improve the searching result drawbacks. It's Need of more resources like CPU time, memory, disk space, etc. Determining Semantic meaning of Objects is not possible. Results may contain False Hits. A drawback associated with CBIR is the increased computational cost arising from tasks such as image processing, feature extraction.

Keywords— CBIR methods, algorithms, user's feedback, computational cost

I. INTRODUCTION

With the development of the internet and the multi-media techniques, a rapid increase in the size of digital image collections has welled up. In order to make good use of these image resources, people demand an efficient way to quickly find the image which he needs among thousands of images. CBIR (Content-Based Image Retrieval) is an image retrieval method that exploits the feature vector of the image as the retrieval index, which is based upon the content, including colors, textures, shapes and distributions of objects in the image etc. Initially, developed algorithms exploit the low-level features of the image such as color, texture, and shape of an object to help retrieve images. The difference between the user's information need and the image representation is called the semantic gap in CBIR systems. The semantic-based image retrieval methods try to discover the real semantic meaning of an image and use it to retrieve relevant images. However, understanding and discovering the semantics of a piece of information are high level cognitive tasks and thus hard to automate. The limited

retrieval accuracy of image centric retrieval feedback is to incorporate human perception subjectivity into the query process and provide users with the opportunity to evaluate the retrieval results. In order to achieve a better approximation of the users information need for the search in the image database, involving users interaction is necessary for a CBIR system. The project work proposes a User-oriented CBIR system that uses the IGA employed with the combination of implicit and explicit relevance feedback to infer which images in the databases would be of most interest to the user.[1]

II. PROBLEM STATEMENT AND OBJECTIVES

1. Problem Statement: Design effectively and precisely image retrieval system from a large image database using content-based image retrieval (CBIR) by providing a friendly framework to increase the accuracy of image retrieval.

2. Objectives of Current research work are listed as follows: 1. Implement best Feature selection method to CBIR. 2. The learning algorithms used in order to make the CBIR Best. 3. Using users feedback in order to improve the searching result drawbacks 4. Use of DCT to reduce Processing Time and computational cost arising from tasks such as image processing, feature extraction

1. A User-Oriented Image Retrieval System Based on Interactive Genetic Algorithm [1] In this paper, Chih-Chin Lai, and Ying-Chuan Chen proposed that the text based retrieval has some inconsistency problems, to alleviate the inconsistency problem, the image retrieval is carried out according to the image contents .Such strategy is the so-called content-based image retrieval (CBIR). The primary goal of the CBIR system is to construct meaningful descriptions of physical attributes from images to facilitate efficient and effective retrieval.

2. Design and implementation of Web-based systems for image segmentation and CBIR [2] In this paper, M. Antonelli, S. G. Dellepiane, and M. Goccia proposed that the text based retrieval has some inconsistency problems, to alleviate the inconsistency problem; the image retrieval is carried out according to the image contents. Such strategy is the so-called content-based image retrieval (CBIR). The primary goal of the CBIR system is to construct meaningful descriptions of physical attributes from images to facilitate efficient and effective retrieval. 4 Incorporating human preference into CBIR system with implicit and explicit feedback .

3. Efficient Relevance Feedback for Content-Based Image Retrieval by Mining User Navigation Patterns [3] Ja-Hwung Su, Wei-Jyun Huang, Philip S. Yu, described a novel method in this paper, Navigation-Pattern-based Relevance Feedback (NPRF), to achieve the high efficiency and effectiveness of CBIR in coping with the largescale image data. In terms of efficiency, the iterations of feedback are reduced substantially by using the navigation patterns discovered from the user query log. In terms of effectiveness, our proposed search algorithm NPRF Search makes use of the discovered navigation patterns and three kinds of query refinement strategies, Query Point Movement (QPM), Query Reweighting (QR), and Query Expansion (QEX), to converge the search space toward the users intention effectively. By using NPRF method, high quality of image retrieval on RF can be achieved in a small number of feedbacks. The experimental results reveal that NPRF outperforms other existing methods significantly in terms of precision, coverage, and number of feedbacks.

4. A human-oriented image retrieval system using interactive genetic algorithm [4] S.-B.Cho and J.-Y.Lee, propose a user-oriented CBIR system that uses the interactive genetic algorithm (GA) (IGA) to infer which

images in the databases would be of most interest to the user. Three visual features color, texture and edge of an image are utilized in our approach.

5. Distance-based relevance feedback using a hybrid interactive genetic algorithm for image retrieval [5][6] Arevalillo-Herrez et al introduced a new hybrid approach to relevance feedback CBIR. Their technique combines an IGA with an extended nearest neighbor approach to reduce the existing gap between the high-level semantic contents of images and the information provided by their low level descriptors.

IV. IGA (INTERACTIVE GENETIC ALGORITHM)

Interactive Genetic Algorithm (IGA) is a branch of evolutionary computation. The basic difference between IGA and GA is the creation of the function, that is, the fitness is determined by the users valuation and not by the mathematical function. A user can interactively determine which members of the population will produce again, and IGA automatically generates the next generation of content based on the users input. During repeated rounds of content creation and fitness assignment, IGA enables unique content to grow that suits the users choices. Based on this reason, IGA can be used to solve problems that are difficult or impossible to devise a computational fitness function. The search process is repeated until the user is satisfied with the result or results cannot be further improved. When the IGA is applied to develop a content-based color image retrieval system, the following components should be considered: Solution represent. In order to apply GA to a given problem, one has to make a decision to and an appropriate genotype that the problem needs, i.e., the chromosome representation. In the proposed approach, a chromosome represents the considered various types of image features (i.e., color, texture, edge) in an image[9][10].

Initial population: The IGA requires a population of potential solutions to be initialized at the beginning of the GA process. Usually, the initialization process varies with the applications; here, it adopts the query results of a sample image as initial candidate images. Figure1 shows below shows some factors that could influence the initial population or that should be taken into account when an initial population is generated randomly, It has been recognized that if the initial population to the GA is good, then the algorithm has a better possibility of finding a good solution. It is also interesting to note that

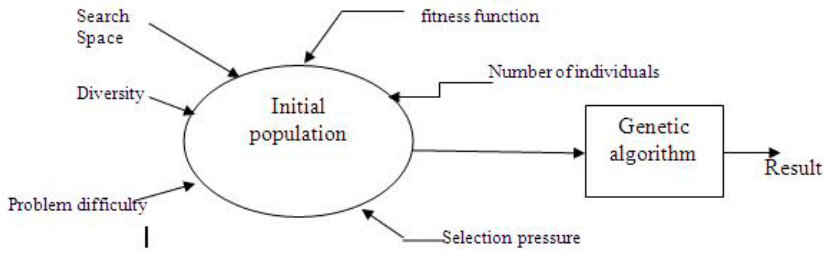

Fig.1 Factors influence the initial population

although quick performance improvements occur with a smaller population size, a larger population helps the genetic algorithm and better solutions. Fitness function: The fitness function is employed to evaluate the quality of the chromosomes in the population. It determines how likely it is, that it will reproduce. A fitness function evaluates each solution to decide whether it will contribute to the next generation of solutions. Fitness is usually

measured in terms of how well the chromosome solves some goal problem. e.g., if the genetic algorithm is to be used to sort numbers, then the fitness of a chromosome will be determined by how close to a correct sorting it produces. [7][8].

V. SYSTEM DESIGN AND ANALYSIS

System architecture is the conceptual model which defines the structure and behaviour of the system. An architecture description is a formal description and representation of a system. System architecture represents the structure of system components, external visibility of those components and their relationships between them. The language used for architecture description is called the architectural description language.

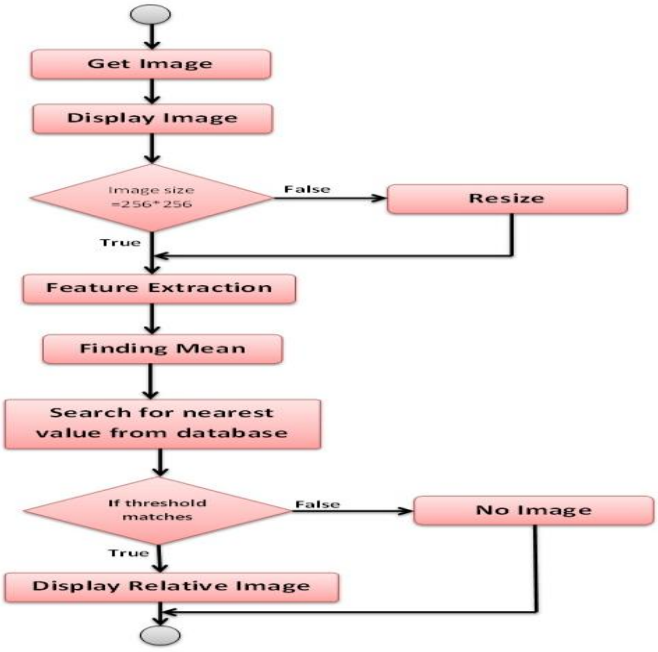

Fig.2. Activity Diagram

VI. COLOR HISTOGRAM VS. COLOR AUTO-CORRELOGRAM

The color histogram is one of the most important techniques in content-based image retrieval. Its efficient to compute and effective in searching results. Most commercial CBIR systems use color histograms as one of the features. For an m*n image I, the colors in that image are quantized to C1;C2;…,Ck: The color histogram H(I) = h1; h2;…, hk; where hi represents the number of pixels in color Ci. The color histogram also represents the possibility of any pixel, in image I, that in color Ci. The color histogram is easy to compute. It only needs to go through the image once, so the computation complexity is . And because color is one of the most prominent perceptual features, in many cases the effect of using histogram to searching and re-trieving image is quite good.
Example:

Consider the two images in Figure 3.

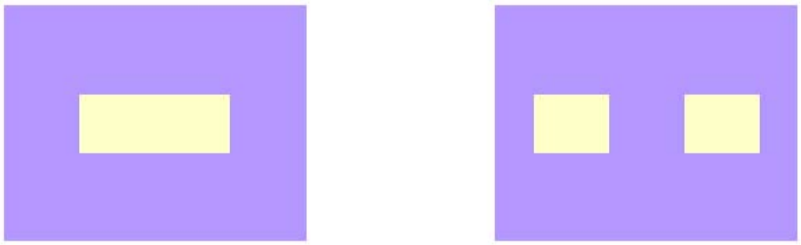

Fig.3. Sample Images

I

It's easy to know, the histogram of these two images are exactly same. We can't tell these two images from each other from the histogram. But the auto-correlogram will be different, as shown in Figure 4.

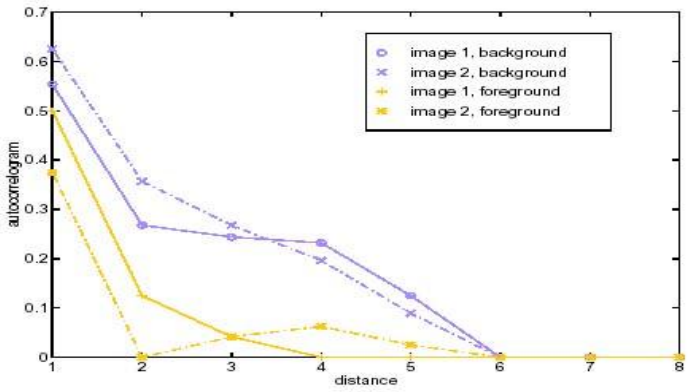

Fig.4. Auto-correlogram of the sample images in figure 3.

VII. RESULT AND DISSCUSSION

The results of our test had shown as below:

1. When use the target image itself as query, both methods have good performance.

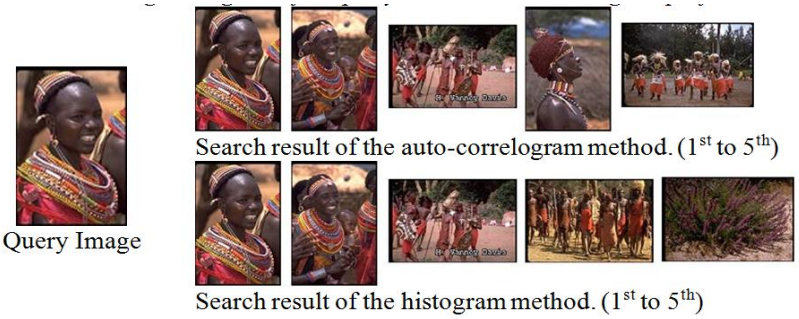

Fig.5. Searching Results

2. The correlogram method is more stable to color change than the histogram.

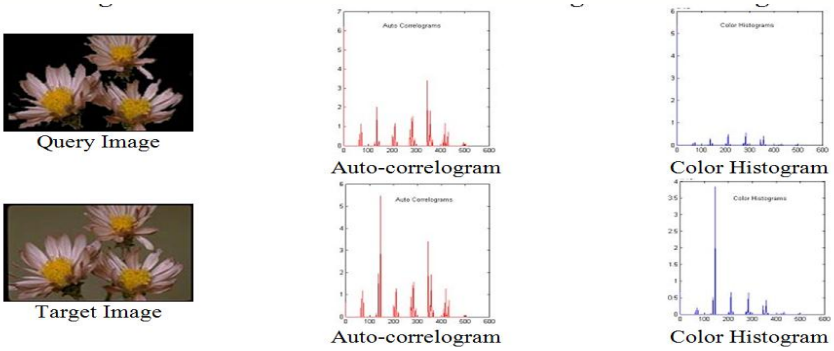

Fig.6. Searching Results

Have the target image in the image database. We change to background of it to black. And use the change image as query to search the database. If use the correlogram method, we still can get the target image (rank 1st). But if one can use the histogram method, the target image will rank 48th in the searching result. We can see from the graph of the auto-correlogram and histogram, the difference between the two correlogram is not as much as the two histograms. That's the reason that the correlogram method is stable than the histogram.

3. The correlogram method is more stable to large appearance.

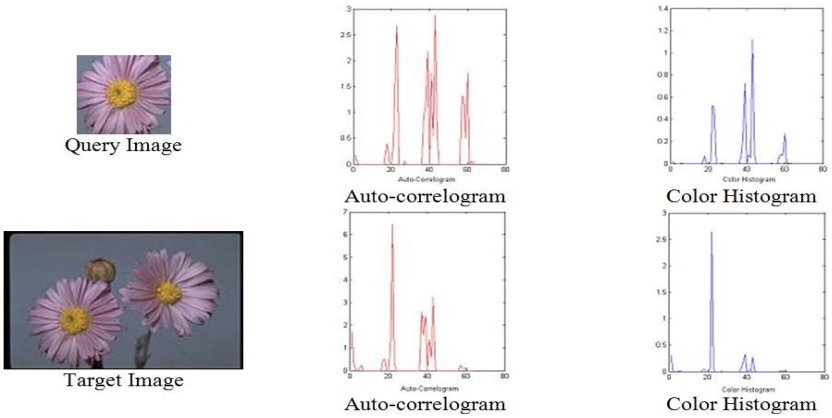

Fig.7. Searching Results

We have the target image in the database; crop the owner as the query image. Using the correlogram method, we still can find the target image (rank 1st), If use the histogram method, the target image will rank 48th.

4. The correlogram method is more stable to contrast and bright change than the histogram method we have the target image in the database.

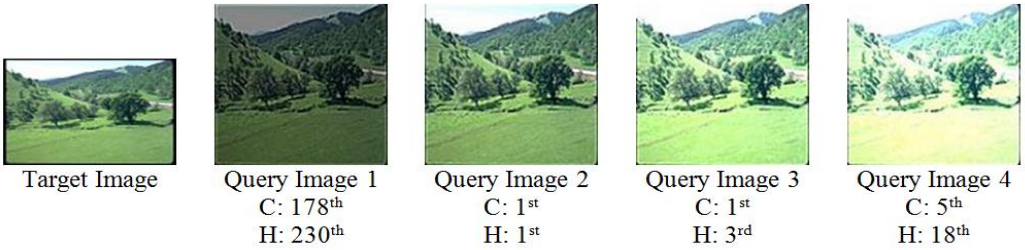

Fig.8. Searching Results

We change the brightness and contrast to get the four query images because there are many dark images in the database, so the searching result of the query image 1 is not good. But even in this situation, the correlogram method works better than the histogram method. And we can see, in every other situation, the correlogram method has quite good result and the histogram method works worse than it.

Fig.9. Searching Results

CONCLUSION AND FUTURE WORK

From the test results, we can tell that the color auto-correlogram method has quite good result in the image retrieval system. It describes the global distribution of local spatial correlations of colors [1]. It's easy to compute. The computation complexity is higher than the histogram, but still linear to the size of the image. The auto-correlogram is more stable than the histogram to color change, large appearance change and brightness & contrast change. But it doesn't work as well as the histogram when there is large scare change.

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