HYBRID APPROACH FOR EFFECTIVE FEATURE EXTRACTION TECHNIQUE IN CONTENT BASED IMAGE RETRIEVAL: A SURVEY

[1] Ruchi Kapadia, [2] Hinal Somani

[1]Student of Gujarat Technological University, Department of Computer Engineering, L. J. Institute of Engineering and Technology, Gujarat Technological University, Ahmedabad, Gujarat, India
[2]Assistant Professor at L. J. Institute Of Engineering & Technology, Ahmedabad, Gujarat, India

ABSTRACT

Content Based Image Retrieval (CBIR) is a significant and increasingly popular approach that helps in the retrieval of image data from a huge collection. Image representation based on certain features helps in retrieval process. Weather forecasting, data mining, remote sensing, medical imaging, education, crime prevention and management of earth resources are a few domains where content-based image retrieval technique is in huge demand. Content Based Image Retrieval (CBIR) is process to find similar image in the image database when a query image is given. A user gives input to the system in the form of specified query image and system return set of relevant images. In this paper we analyze different Content Based Image Retrieval techniques and their comparative study. To improve visual similarity search and image retrieval process in content-based image retrieval many studies have been conducted and methods developed in recent years, but there are a few issues that need to be addressed. To improve accuracy in terms of Precision and Recall, Ant colony Edge detection algorithm and Genetic algorithm(GA) method is used in proposed model.

Keywords: *CBIR, Genetic algorithm (GA), Feature Extraction, Precision, Recall, Similarity measure, Ant colony Edge detection algorithm*

1. INTRODUCTION

With the Internet developing rapidly, image databases become bigger and more diverse. The way to effectively retrieve digital images in a large library is still highly challenging. Professions such as law enforcement, graphic design, fashion design, medicine, publishing, advertising, crime prevention, engineering and architectural design now-a-days make extensive use of digital image databases to maintain a record and use them when necessary. This lead to a demand for a system that can quickly and effectively retrieve images which are not only similar but are also relevant[9]. An image retrieval system provides a way to access, browse and retrieve images efficiently, from the large databases . Image retrieval systems came out in light in 1979 when a conference on Database Techniques for Pictorial application was held in Florence. Retrieval of image from large databases are exponentially increasing and becoming a challenging task. For image retrieval, two methods are used namely Content Based Image Retrieval System (CBIR) and Text Based Image Retrieval System (TBIR)[3].

In the text-based system, text descriptors are used to manually annotate the images and then database management systems are used for retrieval of images. But, there are two limitations of using this approach. First,

considering the large image databases, it is not feasible to manually annotate all the images and second describing the features present in an image is highly subjective. To overcome these limitations image retrieval is carried out on the basis of the image contents. This approach, known as content based image retrieval (CBIR), was introduced in 1980's[4]. In CBIR systems, image processing techniques are used to extract visual features such as color, texture and shape from images[8]. CBIR has diverse applications in internet, multimedia, medical image archives, crime prevention, entertainment, and digital libraries and it is an important field in image processing[2].

In this paper, Section 2 describes basic working of content based image retrieval .Section 3 describes related work for various method of content based image retrieval . Section 4 describes comparative study of techniques which have been used for content based image retrieval. Proposed work and Conclusion is presented in Section 5 and 6 respectively.

2. CONTENT BASED IMAGE RETRIEVAL

Content Based Image Retrieval (CBIR) is defined as a process to find similar image in the image database when a query image is given. The generalized CBIR system shown in figure 1.
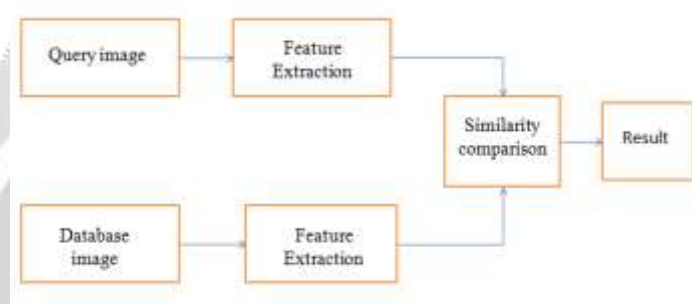
Fig -1: Working of CBIR

features are extracted for both query image and images in the database. The distance (i.e., similarities) between the features vectors of the query image and database are then computed and ranked. The database images that have highest similarity to the query image are retrieved. Then the performance analysis is carried out using precision and recall. Content based image retrieval is working with different types of image database. The Content based image retrieval involves two phases[2]. First is Feature extraction process to extract the features in terms of information of an image based on their visual contents for comparing images. And second is Matching process in which images are compared with some distance metrics, how much they are similar to each other.

3. RELATED WORK

3.1 Combination of Global and Local Features using DWT with SVM for CBIR

 In this paper the proposed approach combines global Feature like color, shape, texture and local features like local features-spatial domain present to signify and   index the image .here apply Haar Discrete wavelet transform(HDWT) on query image. Haar Discrete Wavelet Transform (HDWT) is used for decaying an image into horizontal, vertical and diagonal region. Wavelets give multi-resolution ability and superior energy compaction [1]. Color features are extracted using three methods such as the color Correlogram, color moment, Color histogram extracted Texture features are using gray level Cooccurrence matrix. For Similarity comparison Relative standard Derivation (RSD) and for classification SVM classifier is used. In this system, the overall accuracy has reached up to 90%.[1]

3.2 A Content Based Image Retrieval using Color Edge Detection and Discrete Wavelet Transform

 In CBIR using color edge detection technique, image is converted from RGB to YCbCr color space. After this on Y plane, canny edge detection technique is applied and then planes of an image are combined and again color

space conversion from YCbCr to RGB is done. Image Histogram is calculated for each plane of resultant image. Finally discrete wavelet transform is applied on the Histogram to get feature vector of reduced size.

3.3 Complementary Feature Extraction approach in CBIR

In this paper the proposed approach generate feature vector that both combines both color and texture feature. Here A Local Binary patterns(LBP) is used for texture analysis of image and Average RGB color image Descriptor method used for color analysis of image . then complementary feature extraction approach using LBP and average RGB has been proposed. In LBP technique Each pixel value is assigned a binary bit position from which a central pixel is chosen to compare it with eight neighbouring pixels. Euclidean distance is used as similarity measure for finding similar image in database[3] .here combine the color and texture feature because only single feature descriptor not provide accurate result.

3.4 Content Based Image Retrieval Using Interactive Genetic Algorithm

In this paper the proposed approach uses concept of interactive Genetic algorithm , Gray level Cooccurrence and edge histogram Descriptor. For the color information of an image, we use mean, the standard deviation, color distribution and image bitmap. In addition, the texture features used are entropy of GLCM and edge histogram. Similarity matching of the features of the query image and database images is done using Euclidean distance. After these steps are performed, obtain retrieved result. Under each image a Yes/No select button is provided the user submits the relevant images. After user evaluation, IGA is applied to the system which provides refined search results. If the user desired results are obtained, the process ends here. If not, the process can be repeated until the user is satisfied.[4]

3.5 A Method For Content-Based Image Retrieval Using Visual Attention Model

This approach is based on regions of interest (ROIs) which are being extracted from images using visual attention models. The proposed method uses a model of visual attention which calculates saliency map within image[5] . only using of saliency map we could not discriminate two candidate images, because two images may have same map. Because of mentioned issues, Here includes other technique for efficient feature extraction. After select important region from image Gabor filter and SIFT descriptor are used for texture feature extraction. To capture an efficient feature extraction color histogram and HOG feature is used. At last Earth Mover's distance is used for similarity matching.

3.6 A Revised Averaging Algorithm for an Effective feature extraction in CBIR system

In this paper the proposed approach is introduced averaging method for feature extraction model .first take the image and apply filter to remove noise from image [8] . Grabcut algorithm is using to remove background. In other path linear stretching and Gaussian filter apply. Sobel is high pass filter which remove low frequency from image and amplifying high frequency content of an image .after feature extraction is done ,as output get matrix form of data which are very complicate for similarity matching. Averaging algorithm convert the output data into 1 dimension so the complexity of data is reduced. At last k mean clustering and storing is done.

3.7 SIFT implemented Efficient Content Based Image Retrieval System Using Neural Network

This approach is used Scale Invariant Feature Transform (SIFT) for standout amongst the most nearby feature detector and descriptors which is utilized as a part of the vast majority of the vision programming. Take image ,extract color feature using color moment and extract shape feature using GLCM method .All the extracted features are stored in vectors for future use .Here different feature vectors are classified using k means clustering; storing this feature (indexing) data into different cluster will make retrieval of images quicker and apply trained ANN. In similarity matching process, Images whose features match the most with the features of input images are retrieved as the output.[6]

3.8 Optimization of image retrieval by using HSV color space , Zernike moment and DWT technique

In this paper the proposed approach combine color , shape and text Feature .color correlogram incorporate the spatial connection of color. Color histogram method is used for color feature .To analysis of surface feature of image discrete wavelet transform method is used. Zernike moment is apply to extract shape feature .Zernike

moment is invariant to rotation and robust to noise[7].For the texture Feature Extraction Gabor filter is used. After feature extraction similarity matching is done using RSD . Classify the images using SVM classifier and combine global and local features. In this system, the overall accuracy has reached up to 82% .

4. COMPARATIVE STUDY

Table- 1: Comparison of Implemented Techniques

Sr. No	Title	Method Used	Advantages	Disadvantages
1	Combination of Global and Local Features using DWT with SVM for CBIR	HDWT , SVM , GLCM , Color correlogram and Color Histogram is used	Improve exactness and execution recovery	Need to implement more classification technique
2	Content Based Image Retrieval using Color Edge Detection and Discrete Wavelet Transform	Canny edge detector Manhattan distance and DWT is used	Robustness is high against query image alteration	Searching speed is Less.
3	Complementary Feature Extraction approach in CBIR	LBP,RGB Color descriptor , Euclidean distance	Better image quality on human vision.	Texture analysis of LBP operator Is less depend on security
4	Content Based Image Retrieval Using Interactive Genetic Algorithm	EHD , IGA , Mean , Standard deviation, Image bitmap ,GLCM is used	Less no of irrelevant images are retrieval	Take only low level feature
5	A Method For Content-Based Image Retrieval Using Visual Attention Model	HOG ,saliency detection algorithm, SIFT ,earth mover's distance	More robust on variation in rotate and scale	Only Work on visual variation
6	A Revised Averaging Algorithm for an Effective feature extraction in CBIR system	K-mean clustering algorithm, Sobel edge detection algorithm	Reduce the complexity of feature extraction model .	Not respond properly for image that contain only Sceneries
7	SIFT implemented Efficient Content Based Image Retrieval System Using Neural Network	Neural network , SIFT ,color moment,Canny edge detection algorithm , GLCM is used	Good for understanding-g complex Semantic	Time consuming
8	Optimization of image retrieval by using HSV color space , Zernike moment and DWT technique	Color Histogram , Color Correlogram ,Zernike moment , DWT ,Gabor filter is used	Robustness is high	Add Extra low level Feature such as shape to improve efficiency

Here Table 1 provides the information about the method used and also include about the advantages and disadvantages of each and every methods.

5. PROPOSED WORK

As seen all the methods that are invented for CBIR , most of the method suffers through about the   less precision, less Recall, Time consuming ,Searching speed, Accuracy, Semantic gap , Less efficient , Extract more feature etc . The proposed model main focus is to improve precision and recall. In order to find more relevant image and extract edge ,a new Content based image retrieval technique has been proposed and following are the steps.

Step 1: Take the image from the database and query image.

Step   2: Applying pre processing technique on image.

Step   3 : Extract the color and Texture Feature.

Step 4:For shape feature extraction ANT colony algorithm are used to finding the edges from the image.

Step   5:store this feature in feature vector.

Step 6:Apply Genetic algorithm to feature vector to finding maximum feature point

Step 7:If we receive the Maximum Feature point than process is stop.

Step 8:Other wise go to the Feature vector and again process is start.
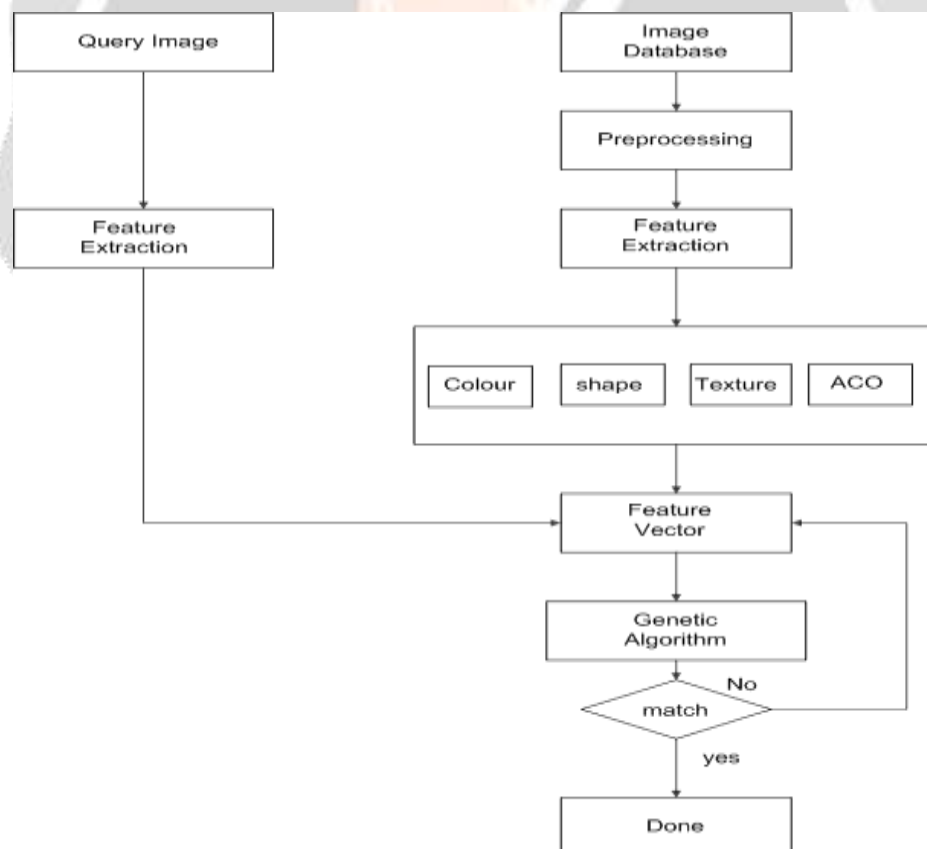
Fig -2: Proposed diagram of CBIR

6. CONCLUSION

Content based Image Retrieval System is a method to locate the related image in the image collection when the given query image. According to literature review various author have research based on content based image

retrieval technique . In proposed work try to get the maximum accuracy of retrieved image using Ant colony edge detection and Genetic algorithm also prove result with different parameter like Precision and recall.

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