IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 5, Issue 4, April 2016.

Survey on Content Based Image Retrieval Techniques

Payal dhiman[1], Yamini sood [2]

Student, Computer Science and Engineering Department, SSU (HPU) Palampur, H.P., India[1]

Assistant Professor, Computer Science and Engineering Department, SSU (HPU) Palampur, H.P., India [2]

Abstract: In the present state image retrieval plays a dynamic character. The turf of image retrieval has been a dynamic research zone for numerous eras and has been rewarded more and more devotion in current years as a outcome of the theatrical and wild increase in the tome of digital images. CBIR purposes at verdict image database for exact images that are alike to a given query image based on its features. Users can question sample images based on these features such as texture, color, region, shape and others. Mark or nearby Images can be regained in a slight fast if it is clustered in a correct way. For gathering, we use fuzzy- c mean clustering. In this system related images will be retrieved from database.

Keywords: Content based image retrieval, Auto-correlation, RGB components, Query, retrieval design, image mining.

I. INTRODUCTION

Image retrieval is the method of browsing, searching and retrieving images from a large database of digital images. As the images raise composite, retrieve the exact images become a hard problem. Content Based Image Retrieval system uses content for the retrieval process. It is a task of probing images from a database and retrieval of an image, which are observing to be visually alike to a certain sample or question image. Content-based image retrieval uses the pictorial stuffs of an image such as texture, color, and spatial layout to signify the image.

A. Image Retrieval

Image Retrieval is a process of retrieving image match to the query image based on certain features. To store, capture and transmit images have led to make vast image collections. Thus, we are met with the certain problem of having to retrieve suitable information from these collections, both proficiently and strongly. This has headed to a changed interest in image retrieval and its real applications.

1) Text based retrieval:

Traditional image retrieval engaged text as the main earnings by which to signify and retrieve images from databases. Images were kept beside with there are qualities – keywords organized by an annotator that the content of the image. While text-based image retrieval took benefit of previously well-fixed information retrieval processes, its drawbacks as an active tool to retrieve images became willingly deceptive.

2) Color based retrieval:

Later color is a low-level image feature that does not seem to classify images clearly; few CBIR systems occur only color as the image retrieval feature. Yet color does have its benefits for image retrieval. It delivers numerous dimensions at a single pixel of the image, aiding classification to be done without the need for complex3-D decision-making.

3) Content based retrieval:

Initial research in the retrieval of images grounded on their integral features has been stated. Content-based image retrieval uses illustrations of features that are repeatedly mined from the images themselves. Practically all of the present CBIR systems allow for querying-by-example, a method wherein an image (or part of an image) is nominated by the user as the query. The organization mines the feature of the query image, searches the database for images with alike features, and shows relevant images to the user in direction of similarity to the query.

B. Components of CBIR system

The CBIR system consists of the following components:

1) Query image:

It is the image to be create from the image database.

2) Image database:

It contains of n digit of images based on the user select.

3) Feature extraction:

It splits visual material from the image and protects them as structures vectors in a features database.

4) Image matching:

Feature paths of numerous images are linked with the feature vectors of query image which helps in calculating the similarity.

5) Resultant retrieved images:

Similar images having closet or same features as that of the query image are retrieved.

IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
Vol. 5, Issue 4, April 2016.

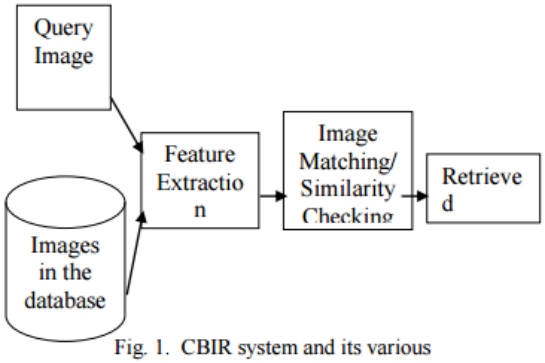


Fig. 1. CBIR system and its various components.

II. APPLICATIONS OF CBIR SYSTEM

- Architectural and engineering design
- Art collections
- Crime prevention
- Medical diagnosis
- Military
- Photograph archives
- Retail catalogs
- Industrial area
- Fashion and graphic design

III. PROBLEM DEFINITION

A. Image Database
First we have to form an image database. For this we want to hunt RGB components of images

B. RGB Components
In the color grounded image retrieval the RGB Color model is used. Color images generally are in three dimensional. RGB color constituents are occupied from each and every image and their mean values are planned and kept in the database and clustering is done grounded on these values. These three mean values for each image are positioned and considered as features.

C. Feature Extraction
The upper graded images are re-grouped according to their texture features. In which, the boundaries are gathered on the basis of arithmetical approach. Arithmetical features of gray levels are one of the regular methods to classify texture. E.g. entropy, dissimilarity, variation, standard deviation, mean, Auto-correlation, and change of both query image and target images are intended the planned values required image from the database is mined.
The Gray Level Co-occurrence Matrix (GLCM) is used to mine second command figures from an image. GLCMs have been used successfully for texture calculations.

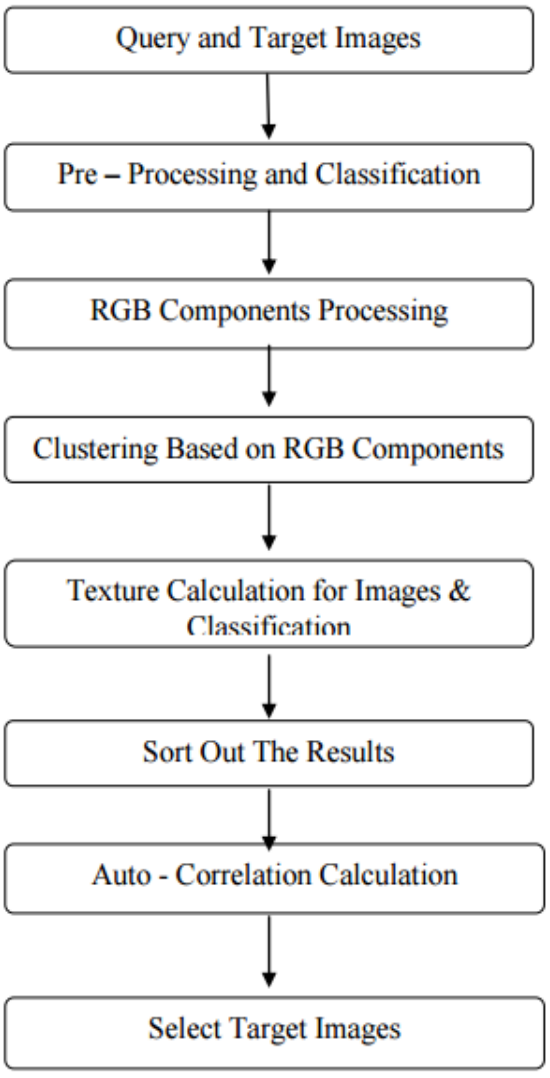
D. Fuzzy-c Mean
In fuzzy-c means clustering technique, every point has a grade of fitting to the clusters, as in fuzzy logic, rather than fitting completely to just one cluster. Thus, points on the control of a cluster may be in the cluster to a lesser degree than facts in the middle of the cluster.

E. Similarity Comparison
Similarity comparison is ended by picking query image and then relating this image with all the images in the database. Most related images are indexed at top. Then the top graded images are retrieved from the database.
- Query Image
- Images in the database
- Feature Extraction
- Image Matching/ Similarity Checking
- Retrieved Images

IV. IMAGE RETRIEVAL SYSTEM

Image Retrieval from the image collections involves the following steps-

- Pre-processing
- Image Classification based on a true factor
- RGB Components processing
- Pre-clustering
- Texture feature extraction
- Similarity Comparison
- target image selection



IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
Vol. 5, Issue 4, April 2016.

A. Pre-Processing

Pre-processing is the tag used for activities on images at the deepest level of concept. The main aim of the pre-processing is an progress of the image that overwhelms opposed distortions or develops some image features. This phase focus on image feature handling.

Filtering is a method used in pre- processing for adjusting or improving an image. The clamor in the image is filtered using linear and non-linear filtering techniques. Lucy - Richardson filtering is used here to cut the noise.

B. RGB component processing

An RGB colour image is an M*N*3 array of colored pixels, where each color pixel is a triad same to the red, green, and blue components of an image. An RGB image can be seen as the heap of three gray scale images that, when inserted into the red, green, blue ideas of a color monitor, generate the color image on the screen. By convention the three images form an RGB images are known as red, green and blue components.

The mean values for the RGB components are calculated for all images-

$$\text{Red average} = \frac{\text{sum of all the Red Pixels in the image R (P)}}{\text{No. Of pixels in the image P}}$$

$$\text{Green average} = \frac{\text{sum of all the Green Pixels in the image G (P)}}{\text{No. Of pixels in the image P}}$$

$$\text{B average} = \frac{\text{sum of all the Blue Pixels in the image B (P)}}{\text{No. Of pixels in the image P}}$$

Where R (P) = RED component pixels,
G (P) = GREEN component pixels,
B (P) = BLUE component pixels,
P =No. of pixels in the image.

After calculating the mean value of Red, Blue and Green components, the values are to be compared with each other to find the apogee value of the components. For example, if the value of Red component is Higher than the two, then we can conclude that the image is Red Intensity oriented image and which can be clustered into Red Group of Images.

Whenever the query image is already given, calculate the Red, Green, Blue components average values. Then compare this with the already stored values. C.

C. Image Clustering

Image Clustering will be a broadly advantage for dipping the sharp time of images in the database. Fuzzy c-means (FCM) is a method of gathering which lets one part of data to go to two or more clusters. In fuzzy clustering data basics can belong to more than one cluster, and with each part a set of membership levels is related. These designate the strength of the organization between that data element and a particular cluster. Fuzzy clustering is a method of conveying these membership levels, and then consuming levels to allot data elements to one or more clusters. FCM sort data in exact number of clusters.

D. Auto-Correlation

The texture signifies the vitality content of the image. If an image holds high textures, then the dynamism will be high related to the normal and small texture images. There are many texture limits to be measured. However, here, the texture limit Auto-Correlation is extremely attentive and which is to be planned for the query and target images.
Auto-correlation presents to the correlation of a period chains with its own former and coming values.

E. Image Retrieval by Contrast Comparison

After clustering, likeness comparison is performed. To relate images with probe image we find alteration between the standards of their red, green and blue components as well as their auto-correlation. Then we accomplish indexing to sort the retrieved images. While stand-in indexing the image from database with the minimum change is classified on the top and so on. Then the upper ordered images from the catalog are retrieved.

F. Performance Measurement

Estimation of retrieval show is a critical problem in Content-Based Image Retrieval (CBIR). Several unlike methods for calculating the performance of a organization have been shaped and used by investigators. We will use the most mutual estimation approaches namely, Recall and Precision typically offered as a Precision vs. Recall graph. Recall and Precision unaided contain inadequate material. With this, the subsequent methods are used for finding Precision and Recall values.

Precision = No. of relevant images retrieved
Total number of images retrieved
Recall = Total no of relevant images in the database
No of relevant images retrieved

V. RELATED WORK

In this segment we resolve into the review of Content based image retrieval for image databases. It defines the previous work which had been done on a CBIR system using texture feature extraction and other methods.

By Kannan in 2010[1] In this paper content based image retrieval method was proposed. It uses the feature of the image for its retrieval. The entropy texture feature is used here.

Kun-Che in 2009[2] In this paper Pixel-wised image characteristics were extracted and changed into a database like table which permits a variety of data mining algorithms to make explorations on it.

Silakari in 2009[3] In this paper a framework of unsupervised clustering of images based on the color feature of image. Clustering of images based on color moment and Block Truncation Coding to extract features

from an image database is proposed. K-means clustering algorithm is conducted to group the dataset in various clusters.

AmanbirSandhu, AartiKochhar in 2012[4] Presents a technique for content based image retrieval using texture, color and shape for image analysis. In this paper they worked with the three features i.e. texture, color and shape and its different combinations. The GLCM is used for texture feature extraction, histogram for Color feature extraction and for shape different factors are found like area, Euler No., eccentricity and Filled Area.

SarojShambharkar and ShubhangiTirpude in 2011[5] Proposed a technique for image retrieval using fuzzy-c mean clustering. In this they said an optimization model or objective function must be devised to search for the optimal partition according to the chosen objective function. The way that most researchers have solved the optimization problem has been through an iterative locally optimal technique, called the FCM algorithm and hence they suggested a fuzzy-c mean algorithm.

ManimalaSingha and K.Hemachandran in 2012 [6] 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, Shu-Yu Lin, Jan-Ming Ho, Chi-Wen Fann, and Yu-Chun Wang in 2012[7] 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 neighbourhood 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.

Peter Stanches in 2003[8] Used image mining for image retrieval. In this paper after low level image properties extraction image mining was made for obtaining associate rules, describing the high level image semantic features. It deals with high level image semantic features which combine color, shape and texture features of an image.
Dr. Fuhui Long, Dr. Hongjiang Zhang and Prof. David Dagan Feng in 2003[9] Represents fundamentals of content-based image retrieval. They introduced some fundamental techniques for content based image retrieval, including visual content description, indexing scheme, similarity/distance measures, user interaction and system performance evaluation. Their emphasis is on visual feature description techniques.

VI. CONCLUSION

The main objective of the image retrieval is to retrieve the images from database very fast and in an efficient manner. The images are pre-processed with various techniques and the texture calculation is highly focused. Here, the images are clustered based on RGB Components, Texture values and Fuzzy C means Clustering algorithm. Clustering is very efficient and powerful technology to handle large data sets. It assists faster image retrieval and also allows the search for more relevant images in large image databases. Auto-correlation is used to compare the images and to improve the system performance.

REFERENCES

[1] Mrsmonikajain, Drs.ksingh, ―Content based image retrieval systems using clustering techniques for large data sets‖, IEEE International journal of managing information technology, 2011.
[2] Henning Müller, Nicolas michoux,davidbandon, ―Content based image retrieval systems in Medical Applications- Clinical Benefits and future Directions. Review paper of medical science.
[3] Dr. Shishirk.shandilya, NidhiSinghai ―Content based Image retreival systems‖, International Journal of Computer applications Vol. 4, No. 2, 2010.
[4] AmanbirSandhu, AartiKochhar, ―Content Based Image Retrieval using Texture, Color and Shape for Image Analysis‖, International Journal of Computers & Technology ,Volume 3, No. 1, AUG, 2012
[5] SarojShambharkar, ShubhangiTirpude, ―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] ManimalaSingha 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‖, Cancun, Mexico, 214-218, May 19-21, 2003.

.

DOI 10.17148/IJARCCE.2016.54197