

An Efficient High Dimensional Indexing Method For Content Based Image Retrieval (CBIR)

Ruchi Kumari¹, Sandhya Tarar²

School of Information and Communication Technology, Gautam Buddha University, Greater Noida, India.

Abstract:

The content based Image Retrieval is the restoration of images with respect to the visual appearances like texture, shape and color. The methods, components and the algorithms adopted in this content based retrieval of images were commonly derived from the areas like pattern identification, signal processing and the computer vision. Moreover the shape and the color features were abstracted in the course of wavelet transformation and color histogram. Thus the new content based retrieval is proposed in this research paper. In this paper the algorithms were required to propose with regards to the shape, shade and texture feature abstraction. The concept of discrete wavelet transform to be implemented in order to compute the Euclidian distance. The calculation of clusters was made with the help of the modified K-Means clustering technique. Thus the analysis is made in among the query image and the database image. The MATLAB software is implemented to execute the queries. The K-Means of abstraction is proposed by performing fragmentation and grid-means module, feature extraction and K- nearest neighbor clustering algorithms to construct the content based image retrieval system. Thus the obtained result are made to compute and compared to all other algorithm for the retrieval of quality image features

Keywords — CBIR, Indexing Algorithm, DWT, K-means, Color histogram.

1. Introduction

In the recent days due to the accumulation of huge images with the support of manual annotation suggestion was very complicated. As in consecutive to solve this complications content based retrieval of images were popularized. So the content based retrieval of pictures is the technique of computer concept in which it overcomes the issues of image retrieval. In this technique rather than utilizing the common scheme of the image retrieval. Three basic methods were made like multidimensional indexing [6], retrieval system design and the extraction of visual characteristics in the content based retrieval of images. As a result the attitude of the color of an image is accomplished with the help of methods like histograms and averaging. Therefore the texture condition were accomplished with the help of vector or transform quantization's. Finally the conditions of the shape were produced by making use of

morphological operators or gradient operators. Therefore the image Processing is considered as a multiple form of Signal processing in which the contribution may be either in the form of picture or a group of frameworks based on the images. So the retrieval system based on the images is a method in which it permits the user to peruse, inquire and restore the images. Thus the content based restoration of images is the series of actions for gathering the requested query image from the large database systems. This database system contains more number of images required by the users. So the images are gathered based on the information's needed by the user. As in consecutive to recover the exact images from the image database system the initial properties like texture, color and shape appearances were used for the recovery purpose. The content based retrieval of images performs well with all kinds of images and the research is made based on the differencing the features including the query image.

The important elements of the content based retrieval of images are the appearances which contains the texture, graphical shape and color of the pictures. Thus the features can be broadly classified in to two kinds such as global and the local features. Therefore identification of the object can be made conveniently with the help of local features. The other elements utilized for the purpose of retrieval is the use of related content, in which the images can be gathered with the help of related contents that is available in the images. The elements like relevant feedback were used widely. It is a most popular component in which it helps to search the appropriate images accurately by gathering the feedbacks from the users. Hence this component retrieves the image which the user desires to recover. So it is considered as an easy and reliable method for recovering the images in content based retrieval systems.

2. Background Study

The content based retrieval of images

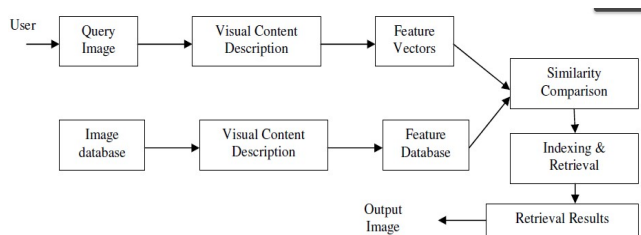


Figure 1. General architecture of CBIR

The content based retrieval is popularly used in the fields like Military, Education, Web image classification and Biomedicine. Few examples for the use of modern content based restoration of images are QBIC which denotes the Query by image content, Visual seek which denotes the web based tools for inquiring videos and images and VIPER which is referred as Visual information processing for improved retrieval.

Discrete Wavelet Transform

Textures were designed based on the quasi-periodic patterns along with the frequency or spatial descriptions. The wavelet transforms changes completely the picture in to a multi-scale description with the guidelines of both frequency and spatial properties. Hence this permits efficient analysis of multi-scale pictures with respect to low economical costs. By conferring to this renewable,

the operations were made to display the curves, signals and images. Hence the images, curves and signals can be explained in condition to the coarse level characterization in extension to the other analysis which ranges from extensive scales to the confined scales. The best examples of the discrete wavelet transforms were Mexican Hat, Haar, Morlet, Daubechies, Coiflet. Among all these examples the Haar is considered as a most reliable and extensively, whereas the Daubachies has peculiar framework and they are essential for modern wavelet applications.

K-Means

K-Means is considered as transparent algorithms. It is mainly used to solve the clustering problems. Therefore it is commonly said as simplest independent learning algorithms which are used to overcome the clustering problems. The process taken by this algorithm is accessible in order to allocate the required set of data over a fixed sum of clusters. It considers K clusters in priority to the procedures. The important plan of the K-Means is to describe K++1 centroids which is assigned one for all clusters. Thus these fundamentals need to be located in an imaginative way. This is done because various places may lead to produce distinct results. So, the best suggestion is to locate the centroids as much as available far from one another. The other action is to precede all point associated with the given set of data's which is closest to the basic. So when no count is made to wait it means that the first step is over and the previous group is executed. Therefore after executing the previous step. It is necessary to re-compute the recent K fundamentals. After establishing these K new centroids an additional confinement need to be executed among the similar data counts to the neighboring centroids. The convolution has been created. Therefore this loop will consider the changes with respect to the step by step changes in the centroids till no more changed are need to be executed. In particular the centroids will not progress any more. Therefore this algorithm targets to reduce the detached operations.

The Research work will focus on the following research prayers.

- The self-regulating creation of textual annotations for an extensive spectrum of an images is not achievable in this image retrieval
- By manually defining the images is inconvenient and costly work for large kind of databases

- The physical explanatory notes of the content based image retrieval are context sensitive, personal and insufficient
- Commonly the text based researches were carried out by Yandex and Google. But then the results are imperfect
- Basically the work is located on the content of the picture. Thus the text located image retrieval contains drawbacks like more expensive task, loss of information, efficiency and time absorbing. To solve these issues content based image restoration system is used for restoring the pictures.

3. Proposed Methodology

In this project the algorithms were implemented based on the shape, color and texture feature extraction and with the identical texture and color. The idea of Discrete Wavelet transform is used to calculate the Euclidian distance. The computation of clusters is made by utilizing altered K-Means clustering. Basically the shape, color and texture of the image were derived [4]. Finally the measure for coincidence among the query image and the database image were made. The combined approaches of recovering the exact image were implemented and it also decreased the acceptable gap between high level features. Thus the modified K-Means algorithm handles less time for calculating and differentiating compares to all other algorithms. It is advanced for large as well as small kind of database.

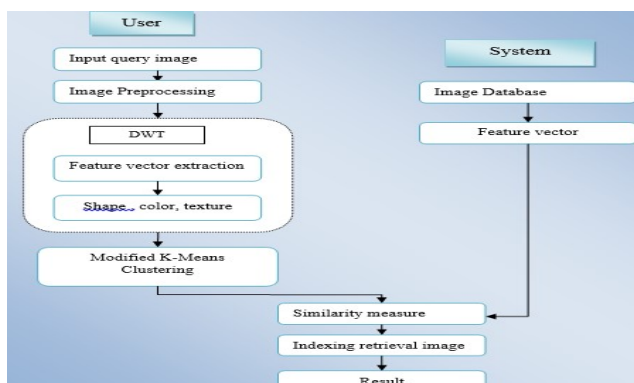


Fig:Content Based Image Retrieval Process

1. Image Input

Contributes input images for query input. It defines the width and the height attributes. These attributes were adopted to describe the volume of the images in pixels.

2. Image Preprocessing

Image Resizing

The proposed image were conquered by the utilization of various cameras in results in distinct sizes of images which disturbs the end result. In order to avoid the issues initial resizing of images is essential.

RGB to GRAY Scale Conversion

RGB Color Model

In RGB color model, all color seems to be basic spectral elements of red, green and blue. The shade of the pixel is created based on three elements which is red, green and blue. It is defined by their equivalent concentration. The color elements were commonly known as color planes or color channels [10].

Gray color Model

It is also commonly referred as gray scale or gray level image, intensity. Here the pixel value indicates the intensity values. The image generated with the help of sensors and the image receiving component signifies the intensity and the brightness of the light of a picture [6] [7]. It adopts the two-dimensional spatial and the three dimensional spatial co-ordinates. Thus the image which includes only the intensity is known as gray scale images.

In this method it helps to alter the RGB value of a pixel into a gray scale value.

GRAY TO BINARY Image Conversion

The binarisation of images is made by utilizing Otsu approach; whereas in MATLAB it can be made by utilizing graythresh operations.

Gray Thresh Functions

The gray thresh operation is nothing but the global image threshold by using the Otsu's technique. In

MATLAB the command is given like $\text{level}=\text{graythresh}(I)$ in which it calculates for the global threshold level. It may be adopted to change an intensity image in to a binary image. Thus the gray thresh function utilizes the Otsu's approach in which it selects the threshold to reduce the intraclass deviations of the black and white pixels. The graythresh operations avoids any nonzero imaginary part of I.

Morphological Processing

In this functions like filling and closing were implemented to perform disk type structuring components to bridge the gaps in the images.

Feature Extraction by utilizing DWT

For every input image the color and shape appearances were extracted with the help of discrete Wavelet transform.

Share Feature Extraction

The consecutive shape appearances were studied. They are

- Image boundary
- Image edge

Image Boundary

1. Initial step is the truncating the images
2. Calculating the white pixel which is considered as a border of a seed calculation

Image Edge

1. The threshold values were adopted to detect the Sobel edge to gray scale image
2. AND functions were adopted.
3. Estimating the surplus pixels.
4. Partitioning the extra pixels within the location of the image.

Color feature extraction

- The estimation of color feature were made by
- Totalling the RGB color appearance
 - Totalling the L^*a^*b color appearances, where
 - L^* -Total value of brightness
 - a^* -Total value of intensity channel a

b^* -Total value of intensity channel b

- Necessity of seed pixels
- Discovering the value for other three more seed color appearance by computing the value of x, y, z elements for computing of L^*a^*b .

Altered K-Means Clustering

Initially the Modified K-Means clustering algorithm describes the capacity of the K clusters. Then the K-Means assigns the recovered images from the closest cluster, which is based on the appearances retrieved from the pictures by it. The algorithm performs its function till it satisfies the few difference in the mobility of the feature points in each and every cluster [12] [13].

Algorithm for modified K-Means

The K-Mean algorithm is considered as a famous clustering algorithm. This algorithm is applicable to segmenting the image, bio informatics and data mining. It is more understandable for small kinds of datasets. So in this project the implementations of K-Means algorithm are executed for a large kind of datasets. Therefore modified K-Mean algorithm neglects pursuing in to nearby optimal values and also decreases the approval of cluster- failure parameters.

Algorithm: Altered technique(S,K), $S=\{x_1, x_2, \dots, x_n\}$

Input: The numeral clusters $k_1(k_1 > k)$ and a set of data consist of n items(X_{ij}).

Output: A group of K clusters (C_{ij}) which lowers the Cluster - failure parameters

Algorithm

1. Calculating the ranges among all data counts in the set D
2. Achieving the nearest pair of data count from the set of data D and create a data-count set A_m ($1 \leq m \leq k+1$) which consists of two data counts. Finally eliminating the two data counts from the set D
3. Achieving the data count in D which is nearest to the data count set A_p , Extending it to A_p and eliminate it from D.

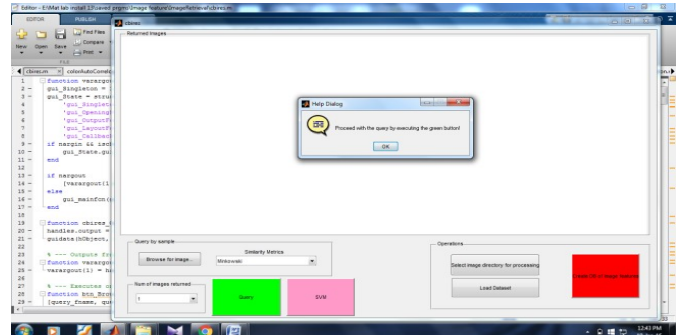
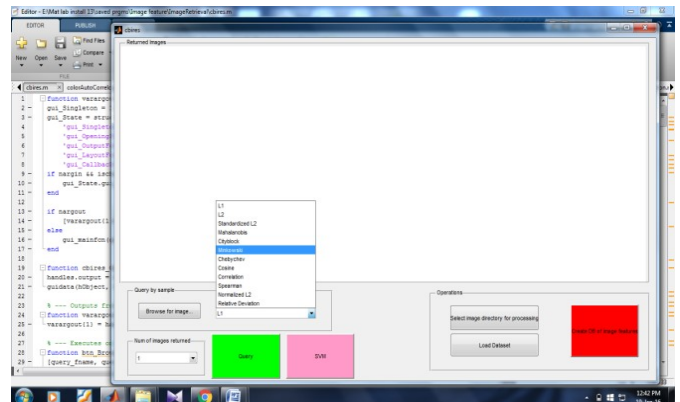
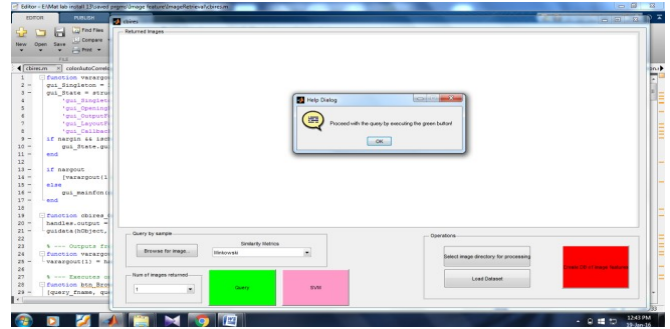
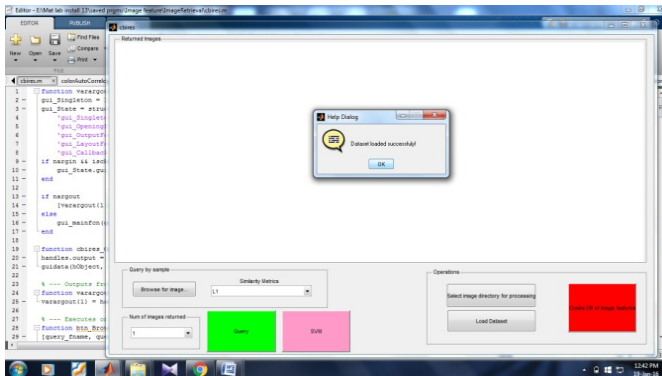
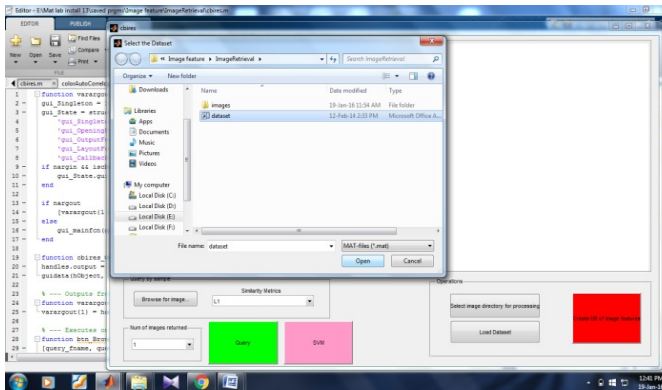
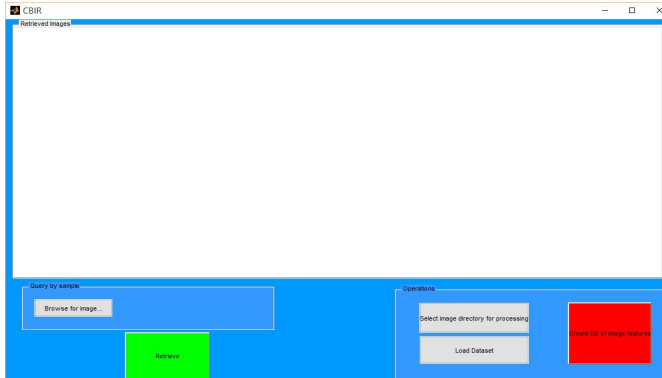
4. Reiterating the step 4 till the needed sum if data counts in Am extents (n/k).
 5. If $p < k+1$, then $p=p+1$, achieving other pair of data counts from D among which the range is smaller and creates another data-count group A_p if the condition doesn't satisfy then move to the step 4.
- The implementation made in this paper is the equipment of altered K-Mean algorithm.
 - It is a famous algorithm for clustering and widely adopted in the fields of bio informatics, image segmentation, and data mining.
 - This algorithm performs well for the small as well as large sets of databases.

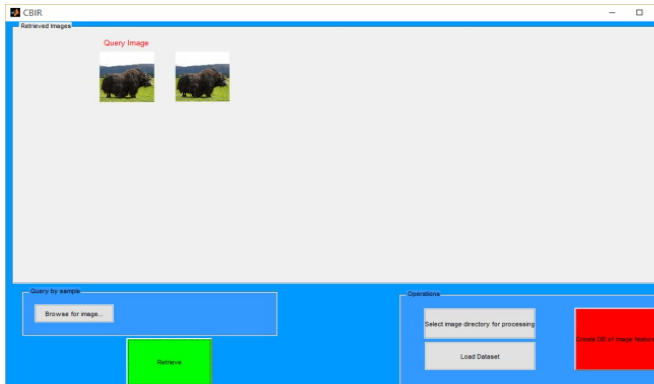
4. Implementation

- The implementation of content based restoration of images results [8] in various challenges such as high dimensional descriptors, scalable indexing for multimedia databases [1][2][3], huge numbers of headings, memory and disk space necessities and correct retrieval [5].
- So the content based multidimensional techniques are in need of frequent and scalable retrieval system.
- To establish the rapid values for indexing high-dimensional image [1][2][3] data's it can be satisfied by constructing large scale content based restoration systems of pictures.
- In this paper distinct algorithms were implemented due to the color, texture and shape feature extraction and verified for the identical color and texture.
- The concept of discrete wavelet transform was implemented to calculate the Euclidian range, to compute the clusters by selecting the altered K-Means clustering [13].
- Thus the feature extraction of the image is recovered by the use of discrete wavelet transform. In the enhanced organizations, the images were verified with regards to the color feature.
- So in this paper RGB color feature were recently used. The descriptive statistics criteria's were selected for the feature extraction.
- The wavelet transform enables to catch and produce the low frequency components in an effective manner. It has volatile resolution disintegration with unrelated coefficients. The strength of the growing transmission helps the acknowledgment of the image at various characteristics.
- This algorithm prevents the usage of cluster error criterion.
- 200 images are available in the experimental image database from varied categories
- From various websites in worldwide, from the Corel Photo Collection compact discs, and from the picture Bank compact discs the images are gathered.
- The recovery experiment's objective is to calculate the retrieval efficiency between the with and without the database categorization.
- Easy interpretation is possible to interpret, because of its easy calculations and results obtained from these measures.
- From each image classification, totally 20 images are selected at random and carries out the retrieval process. And for the retrieval experiments, it selects almost 100 query images.
- From each of the query performed, it records the total sum of suitably recovered images to the total sum of recovered images gathered.
- The implementation of this algorithm mainly helps to break down the pictures so that the energy produced by each break down images were computed at the similar scale.
- The procedure followed by the energy level algorithms are, the breakdown of the whole image into four equal parts of sub-images.
- So by the utilization of this algorithm, the energy levels of the sub-bands were computed and it also leads to break down of low-low sub band image.
- Hence this process is iterated for all the pictures in the database. Thus by use of this algorithm, the

query image is seeker for in the collection of data's which contains the images. This mechanism is iterated till all the pictures in the database have been differentiated with the query picture. So after the achievement of Euclidean distance algorithm. A collection of Euclidean distances has been arranged. Thus five most searched pictures are then presented as an output of the research of texture.

5. Results





6. Conclusion

Thus the investigation of this study displays that the implementation of the content based image retrieval systems achievement is best for the purpose of image retrieval. The truthfulness of this system is also enhanced. So the discrete wavelet transform and the K-means algorithm were interconnected for accomplishing the best outcomes. Then the analysis is made by comparing the retrieved images with the images gathered from the internet. So for grid modulation and fragmentation the modified K-Means(Sun, Peng and Hwang, 2009) was implemented. Hence the converted K-means is productive than the K means which avoids the clusters in the blank pages. The outcomes of the analysis displays that the implementation of converted K means provides with the empty clusters without any error. The quality of the feature extraction with the help of discrete wavelet transforms achieved well in the implemented work.

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