Content Based Image Retrieval: A Review

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Abstract - *Digital Image Processing domain is constantly contributing to make digital era more concise. Specifically Image Retrieval is the trending research area now-a-days. The main problem is, with the increasing volume of digital data the complexity of searching a specific image and retrieving the particular data associated with it is increasing. In recent years the content based image retrieval system has been developing at enormous speed. In content based image retrieval system the key parameters to taken into consideration are color, edge and texture. In CBIR system, for color RGB, HSV, HSI, for edge- canny edge detection and for texture- GLCM Gabor Transform and Tamura Feature are used. The general process flow in CBIR system is firstly to insert the query image then the system will extract features, then will average them, indexed and then stored to the appropriate cluster.*

*Key Words***:** Image retrieval, CBIR, GLCM, cluster.

1. INTRODUCTION

Images are always treated better than the text as it conveys more information than the text. Hence most of the data have been converted and stored into the digital form. Data retrieval is a tedious process as the exact data extraction is the only objective. Due to the large growth in the digital image processing the data storage have been reached the optimum level due to which a typical image search and retrieval became a tedious job. To make this job easier text based and the content based techniques are used for search and retrieval. The objective is to work on collection of images and retrieve similar images based on the features. The retrieval methods are free browsing, concept based retrieval and content based retrieval.

In free browsing method one have to go through the entire database till the required data sample is found. Next in the concept based method which is also termed as the text based retrieval method some predefined data have been attached with image or audio file and by comparing that data finally the retrieval is carried out. Lastly in the content based retrieval method the search of specific content of the information is carried out and then the main image is extracted. The technologies present mostly uses the concept based and the content based image retrieval scheme. The attachment of predefined data to a typical data file is a tedious job as, it requires human intervention also so much time consuming.

In the content based image retrieval method a typical feature is taken into consideration. Feature can be defined as an attribute that can capture a definite visual property of an image.

Generally the image features have been classified into the three categories as color feature, texture feature and the shape feature. The most commonly used techniques of feature extraction are block transaction coding, edge detection, applying transform matrices, histogram SOM(Self Organizing Map) and LDA(Latent Dirichlet Allocation).Specifically for color extraction method RGB space, LUV space are used to eliminate the impact of color dominance. In texture extraction method Gabor Wavelet Transform is used and in edge or the shape detection the canny edge detection, sobel edge detection, pratt edge detection, etc are used.

2. Literature Review

An approach is proposed for retrieval based on combination of color, texture and edge features of image. Performance evaluation of studied image retrieval techniques and proposed technique is done using parameters like sensitivity, Specificity, Retrieval score, Error rate and accuracy[1]. In this image retrieval system extraction is based on the averaging method clustering image, revised averaging algorithm to reduce the complexity of extraction and efficiency[2]. Gabor wavelet transform is mostly combining of features of image and the Gabor Wavelet Transform is degrade into distinct scaling and orientation with various of filters to minimize the unwanted information of the images[3]. In this methodology only the color feature get extracted from image and at first image is divided into 16 equal sized segment after that the average value of each color component is considered into account[4]. Rather than the transform and averaging techniques an unsupervised learning technique is also used i.e. First a Self Organizing Map (SOM) and then Latent Dirichlet Allocation (LDA)[5].

3. METHODOLOGY

In this paper a method is introduced to extract the features of image by using content based image retrieval. The main objective is to detect the content of image like color texture and image, but most of the times it happens that in methods of content based image retrieval it takes more time to retrieve the image and also with some noise. Hence in this paper a novel approach have been proposed which will

comprised of the number of stages which will ultimately lead to the proper extraction of feature of image i.e. color, texture and shape.

There are two types of image retrieval techniques Texture based image retrieval and content based image retrieval techniques, in the image the color, texture and shape is only the parameters who describe an image. In color image contain visual patterns, surface properties, for texture scene is need to describe an image completely, so many images have to describe by many feature so that we need to used multiple features together for CBIR. A simple flow chart for the proposed system is given below:
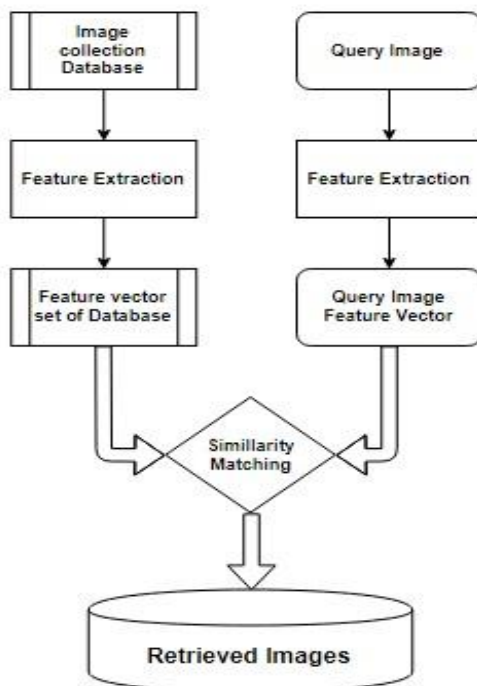
3.1 Architecture of CBIR:

Figure: 1.Block Diagram of CBIR system

The basic concept of content based retrieval is divided into three parts that are given feature extraction, feature matching and retrieval system design. The CBIR is used for proper organization of generated large amount of images is also needed.

Flow of design:

The CBIR techniques has some following steps that are given below,

Create a Database:

Create or store some image database to prepare for own database for testing purpose or as a inbuilt database.

Query Image:

The query image is nothing but an input image which is we giving to the system as input and according to that images system will find out similar images.

Features Extraction:

Extract the important features from query image and database image like color, texture and shape etc.

Feature Matching:

Measure the content of query image and database images and based on that it checked and the feature which are closed to the input image it retrieved the corresponding images from database.

Retrieve Image:

Based on the image features content it will retrieve the images

3.2 Image retrieval Based on color Features:

Color is most important content in the color image and it is most widely visual content. In this type of feature identifiers the proportion of pixels of specific color in the image. It is a three dimensional and as vector in it. In color image normally RGB, YCbCr, HSV, HSI etc, various color descriptors based on the color coherence vector, color histogram, color moments and color correlogram.

Segmentation

The feature extraction from the captured images can be carried out with the number of techniques available. In this paper we are going to use the super pixel segmentation so as to make the system more robust.

3.3 Image retrieval Based on Texture features:

The texture is an important feature in the image which is used in pattern recognition. The texture is similarity can be useful in make difference between areas of images with similar color. The texture is like sky, leaves and sea etc. The texture is categories into two type that are statistical and structural. The local texture descriptors are Gabor Transform and Tamura.

3.4 Image retrieval Based on shape features:

The shape is nothing but edge in images edge indicates sudden change in the pixel density of the image. There are various types of edge detection techniques canny, sobel, prewitt and Robert edge detection techniques.

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