A REVIEW ON CONTENT BASED IMAGE RETRIEVAL BASED ON SHAPE, COLOR AND TEXTURE FEATURES USING DWT, MODIFIED K-MEANS AND ANN

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Abstract - *Content based image retrieval (CBIR), as the name suggests is the retrieval of images based on some of the visual features like color, shape, texture etc. It has proved being a champion among the most remarkable research areas in the recent years and it's need can be found in various specific domains, for example, Data processing, Education, Medical Imaging, Crime bar, Weather surveying etc. This paper reviews the completely unique technique that uses an effective calculation for Content Based Image Retrieval (CBIR) in context of Discrete Wavelet Transform (DWT), Modified K-Means Clustering and Artificial Neural Network. There are two basic steps to be followed in CBIR i.e. feature extraction and similarity measurement. This paper comparatively utilizes wavelet transform which helps in the image compression and denoising. Image compression helps to reduce the storage space of images which can eventually increase the performance. Discrete wavelet transformation decreases the size of feature vector as well as preserve the content details.ANN is more effective and efficient algorithm for the similarity measurement and also ANN is used to train and test the proposed framework. The blend of DWT, Modified K-Means procedures and Neural Network expands the execution of image retrieval structure for shape, shading and surface based request. Trial happens demonstrate that the proposed plot has higher retrieval exactness than other traditional plans like Precision and Recall.*

*Key Words***:** *dwt, modified k means, ANN, Gabor filter, Haar wavelet*

1. INTRODUCTION

In early days as a result of extensive image accumulations the manual approach was more tough so as to beat these difficulties Content Based Image Retrieval (CBIR) was presented. Content-based image retrieval (CBIR) is the use of laptop vision to the image retrieval drawbacks. During this approach rather than being physically annotated by textual keywords in this approach pictures would be indexed utilizing their own particular visual contents .The visual contents might be shading, surface and shape. This approach is alleged to be a general framework of picture retrieval. There are three key bases for Content Based Image Retrieval which is visual component extraction, multidimensional categorization and retrieval system design. The shading viewpoint can be accomplished by the strategies like averaging and histograms. The surface angle can be accomplished by utilizing changes or vector quantization .The shape viewpoint can be accomplished by utilizing gradient operators or morphological operators.

A picture retrieval system may be a system that permits us to browse, to make a search and retrieve the pictures. Content Based Image Retrieval is that the method of retrieving the required question image from a large range of databases that rely on the contents of the image. Color, texture, shapes and other native features are the square measures or the overall techniques used for retrieving a selected image from the pictures database. Content based mostly Image Retrieval systems works with all the pictures and therefore the search is based on comparison of features with the question image.

The principle elements of CBIR are the features which incorporates the Geometric shapes, hues and the texture of the picture. There are basically two types of features that are global and local features. Object recognition should be possible effortlessly by utilizing the local features. The consequent element is the related content or text in which the pictures can likewise be recovered utilizing the content or text related with the picture. The other element is the relevant feedback wherever it helps to be a lot more precise in making the search of relevant pictures just by absorbing the feedbacks of the user.

1.1 Feature Extraction

Feature extraction is a methodology that is applied to any image so that we can categorize and recognize the pictures from huge set of data on the basis of those features. The features can be color, shape, texture etc.

1.2 Color

One of the most beneficial and distinguishing feature is the color. A color histogram methodology is more effective and efficient, that's why it is more frequently used for CBIR. For more color histogram match HSV color space are used. The use of HSV color space is to manipulate the hue and saturation.

1.3 Color Histogram

If the color pattern is unique and that color pattern is compared with the massive range of the data set in that case

color histogram is an efficient representation of the color. The division of colors in global and local way in an image is calculated effectively by characterizing the color histogram. When there is large number of images in an image databases the histogram comparison can saturate the discrimination. To resolve this issue joint histogram technique is efficient.

1.4 Texture

Another feature of image apart from color is texture. Texture features are proven to be helpful in computer vision and pattern recognition. Texture feature methods are of two types i.e. Structural and Statistical. Structural methods are more efficient because they are regular and they include morphological operator and adjacency graph. Whereas statistical method includes multi resolution technique and markove random field for e.g. gabor filter and wavelet transform. They can decompose the image using haar wavelet.

1.5 Shape

The next feature is shape which can be described by some of the geometric shapes. Image retrieval by the use of shape feature is done by checking the similarity between shapes. A shape can be illustrated in many aspects. Some of the shape parameters are Centroid, mean, variance, dispersion and mass. Shape does not mean the shape of an image but he shape of the region. Some of the common shape descriptors are:

- Fourier transform
- Moment Invariant

The areas where CBIR system can discover its prime significance are Biomedicine, Military, Education, Web picture classification. Viper which is Visual Information Processing for Enhanced Retrieval, and QBIC which is Query by Image Content and Visual seek are some of the examples of current CBIR system. QBIC and visual seek are the web tools for searching pictures or videos from the large database.

2. RELATED WORK

Swati Agarwal, A. K. Verma, Nitin Dixit[1] has presented a unique algorithm based on color edge detection and discrete wavelet transformation and was totally different from the conventional histogram methods. In this color and edge features are mixed together and also focused on reducing the size of feature vector as well as to save the details of the contents.

Ms.VrushaliYashwant Erande, Prof.P.R.Badadapue, [2] has proposed two algorithms to measure the similarity between images i.e. DML and ANN and proves that the proposed algorithm is more effective and has improved the retrieval accuracy.

Manimala Singha and K.Hemachandran[3], Has presented WBCHIR wavelet based color histogram image retrieval by

using texture and color features. In this the combination of color and texture features are used to scale and translate objects in an image. This proposed system was a fast retrieval method on WANG image database.

GuoyongDuan, Jing Yang, Yilong Yang[4] has compared the drawbacks when only one feature is used nad has presented a new method which combines color, texture and shape features for better image retrieval.

Ms.Pragati Ashok Deole, Rushi Longadge[5] Has presented a paper on classification of images using k nearest neighbor algorithm and it shows that CBIR is used to retrieve the query image on the basis of shape, color and texture features from large image database

FelciRajam and S.Valli[6] has presented a paper which focused in decreasing the semantic gap between low level visual features and high level semantics which helps in better image retrival.

Sajjad Hussain; Manzoor Hashmani[9] has used back propagation algorithm to train the proposed model known as SML using ANN and singular value decomposition. Results proved that back propagation algorithm have better precision.

S. Mangijao Singh, K. hemachandran[10] has proposed a CBIR method which can mix the color and texture features. For color features the image is divided into 3 equal regions and for texture they used gabor filter and the results proved that the proposed method has higher retrieval accuracy than the other conventional methods.

3. CBIR TECHNIQUES

3.1 Discrete wavelength transformation (DWT)

One of the most important visual features of CBIR system is texture. A scientific definition of texture is stated as "Texture is an attribute representing the spatial arrangement of gray levels of the pixels in a region or image. When there is no other information, the object in an image can be differentiated by their texture features. Common Texture feature extraction is wavelet transform and co-occurrence matrices and the most widely used is discrete wavelength transform in the field of image processing. It transforms the image using wavelet filter , Daubechie filter. The DWT decomposes the image into four components i.e. lower resolution approximation image (LL), horizontal (HL), vertical (LH) and diagonal (HH) detail components

Feature extraction Using DWT

As we know that in most of the systems the analysis of picture is done on the basis of its color feature and RGB color feature is used at present. Case of Statistical element extraction procedures incorporates mean and standard deviation calculations. In this system we are using mean and for each input image color features are extracted with the use of DWT.

The wavelet change gives a proper premise to image handling with on account of its valuable features. Some of the advantages of wavelength are as follows:

- To compact the majority of the signals energy into some transformation coefficient and this ability of wavelength transform is known as energy compaction.

- It is capable of representing and to capture high frequency transients and low frequency elements.

- The capacity of a dynamic transmission, which encourages the gathering of a picture at various characteristics.

- It is capable of variable decomposition decay with relatively uncorrelated coefficients.

Algorithms for DWT

The distinctive feature extraction modules are created using DWT in such a way that the code acts like a communication interface amongst client and database. This database is collection of machined pictures improved with a developed filter.

Image reading segment

By clicking on the browse option by the user the code will interact with the user and it will shows the dialog box which will list the images in the folder and the user will select any particular image with desired extension for feature extraction and then the image which is selected is approved and the result is provided to the user. On appropriate choice the chosen picture is allotted with storage location and that particular image is read using that storage path. Then the image is being converted to gray scale image and is displayed.

3.2 Modified K-Means

This paper illustrates an approach called as data clustering with the use of modified k means algorithm which is based on the view of the change of the sensitivity of introductory focal point of groups or center of clusters. This algorithm divides the entire space into various portions and computes the frequency of information point in each fragment. Like the conventional k means algorithm the number the quantity of group's centroid (k) will be given by the client in the similar way and the quantity of division will be k*k (`k' vertically and also `k' on a level plane). Each cluster's centroid threshold distance is defined to compare the distance group centroid and data point through which we are able to decrease the computational effort while calculating the distance between the cluster's centroid and data point. The numerical computation and complexity will decrease by using modified k means algorithm.

With the use of modified k means algorithm the problem of generation of null clusters is eliminated. The modified algorithm works very well.

3.3 Artificial Neural Network (ANN)

Artificial neural network, also called as neural network or connectionist system neural network is an interconnected assembling of simulated neurons, using a connectionist approach for how to deal with the calculation. Neural system is a flexible system and is used for exhibiting complex associations among all the sources of data or to find designs in data. Hubs in a stimulated neural system are known as neurons or neurodes or handling components or units and all these are joined together to frame a network. All the collection of connected units in a network is known as artificial neuron. Every connection in an ANN can transmit and receive signals from one artificial neuron to another.

In an implementation of ANN, the output of each hub or neuron is computed by a non linear function of total of its inputs between artificial neurons is a real number. These Artificial neurons or connections have their own weight . This weight increase or decrease the entire strength of the signal. These artificial neurons are organized in layers. Completely different layers might perform different types of changes on their inputs. Signals travel from the primary (input), to the last (output) layer, after traversing the layer many times.

The main aim of neural network is to solve the issues in the similar manner as humans do. Various fields where artificial neural network is used is playing video games, in machine translation, in medical diagnosis, speech recognition and many more.

There are three layers in neural network classifier which are information layer, a concealed layer and yield layer. The information layer comprises of input hubs, the concealed layer comprises of shrouded hubs and the yield layer comprises of yields hubs.

4. CONCLUSION

By using modified k means, dwt and ANN algorithm, this paper exhibits that CBIR system function efficiently and apart from efficiency it also enhances the accuracy. This system first join division and matrix module , feature extraction module and modified k means clustering module to combine the CBIR framework and with clustered featured vectors ANN is trained. The feature based DWT and ANN into CBIR framework design proves to be more accurate for image retrieval. This integrated approach results in better image retrieval with less computation time.

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