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Image Retrieval based on Texture using Various Discrete Wavelet Transform Sub Bands

[1] Jasti Sai Krishna, [2]Mrs.T.M.Sirisha and [3]K. Valli Madhavi
[1] PG Student, [2] Assistant Professor, [3]Associate professor
[1,2]Department of Computer Applications, Godavari Institute of Engineering & Technology Rajahmundry, India
[3]Department of Computer Applications, Chaitanya Institute of Engineering &Technology, Vizag, India

***Abstract*—**The proposed method is used for effective retrieval of an image. By using various Discrete Wavelet transform (DWT) sub bands, which are used to extract the features from a texture image using CBIR method. Content Based Images Retrieval (CBIR) is used for searching images based on visual content of the image. The vital features of images are colour, shape and texture. In this paper, an efficient image retrieval based on texture can be proposed. This paper describes a novel technique of feature extraction to a texture image at multiple scales based on block by block comparison of Wavelet Transformation. Here, user will give a query image for this we will extract the image features by using proposed method. DWT technique will decompose the image into 2 levels, after that we will check similarity measurement. Same procedure is carried out for the image database and then by comparing the query mean with image database then user retrieves the images which are having similar mean.

Keywords*—texture, Wavelet transform, feature extraction, CBIR, image retrieval, DWT.*

I. INTRODUCTION

Due to the exponential growth of image data there is a compelling need for innovative tools which can be easily manage, retrieve and visualize images form a large database [3] . In general, two different approaches have been applied to allow searching on image collections: one based on image textual metadata and another based on image content information. The textual based image retrieval (TBIR) extracts the features textual data i.e. annotation, tag, keyword of an image, which is a difficult task. Content-Based Image Retrieval (CBIR) systems are used to extract content form images such as color, texture, and shape rather than meta search [8][6]. One of the main advantages of this is will get output as images. Since CBIR has widely used to describe the process of retrieving desired images from a large collection of database. The CBIR system extracts the features of the query image [3]. The main goal of the CBIR is to find images which are similar to the query image visually without using any textual description. For achieving this we have proposed method in CBIR system [7].

In this paper we will focuses on extracting texture feature component from an image. Texture plays an important role in image retrieval system. It will be used for many purposes such as segmentation, compression and retrieval [4]. Texture is one the primitive feature extraction in CBIR [2]. Wavelet Transformation is one of the examples for texture analysis [5]. It has been used to characterize the invariance of certain image. The discrete Wavelet Transformation (DWT) is identical hierarchal sub band method.

The wavelet transform is a multi-resolution technique, which can be implement tree structure and is similar to sub band decomposition. Wavelet transform is a recent transformation. It is now making it easier to compress, transmit, and analyze many images. Unlike the Fourier transform, whose basis functions are sinusoids, wavelet transforms are based on small waves, called wavelets [10], of varying frequency and limited duration. Texture gives us information about the spatial arrangement of color or intensities in an image or selected region of an image [9]. Texture is also an important visual feature that refers to native surface properties of an object and their relationship to the surrounding environment. The existing system's what we have is the up to first level decomposition using DWT [1]. In this paper we introduce new approach to find second level decomposition.

II. PROPOSED METHOD

This paper mainly focuses on Wavelet based texture features for Content-Based Image Retrieval is proposed. Wavelet transformation is used to decompose the image into sub bands. It will give better performance and it ensures image search from a large database. This paper proposes the algorithm for CBIR using various discrete wavelet transform sub bands. Here, DWT is unique to identify hierarchical sub band system where the sub bands are specially arranged and represent octave-band decomposition. By applying DWT, the image is actually divided i.e., Decomposed into four sub bands and these will be obtained by using Horizontal and vertical filters.

The sub bands are labelled as LL1, LH1, HL1 and HH1. Where LL1 refers approximation image, LH 1 is vertical, HL1 represents horizontal and HH1 is diagonal components of an image. To obtain second level of wavelet transformation the sub band LL1 alone further decomposed into another four sub bands. This will give two level wavelet decomposition. That sub bands are represented a labelled as LL2, LH2, HL and HH2. Convert 2-D discrete wavelet transforms (DWT) decomposes the image into sub-images, 3 details and 1 approximation. The approximation looks just like the original only on 1/4 the scale. Step8: The approximation looks just like the original, only on ¼ scales. The 2-D DWT is an application of the 1-D DWT in both the horizontal and the vertical instructions. By Carrying out the block by block feature comparison both in horizontal and vertical directions, a sub band is formed across the texture boundaries. The decomposition is starts from top left corner. To decompose the sub image blocks for query image using proposed method is the best approach.

The following algorithm shows how the image will be decomposed by using DWT and it shows it gives better results to the image retrieval process. The proposed method finds effort to extract the primitive features of the query image and compare them to those of database images. .The algorithm describes that the query image will be given by user and for that we will apply DWT concept and compress the image i.e., we will divide the image into blocks, starting from the top left corner. For that proposed images we will calculate mean and similarity cheeking with the image database means, which are similar those images will be displayed to the user.

A. Algorithm:

Step 1: Read the query image.

Step2: Convert RGB into 2-D discrete Wavelet Transforms (DWT) decomposes the image into sub-bands, three details and one approximation

Step3: Obtain sub image blocks, starting from the top left corner..

Step 4: Decompose the image blocks using DWT.

Step 5: For the compressed image we will find mean and we will be relevant similarity measurement with image database.

Step6: The anticipated mean whichever is equal to the mean of the image database are displayed to the user.

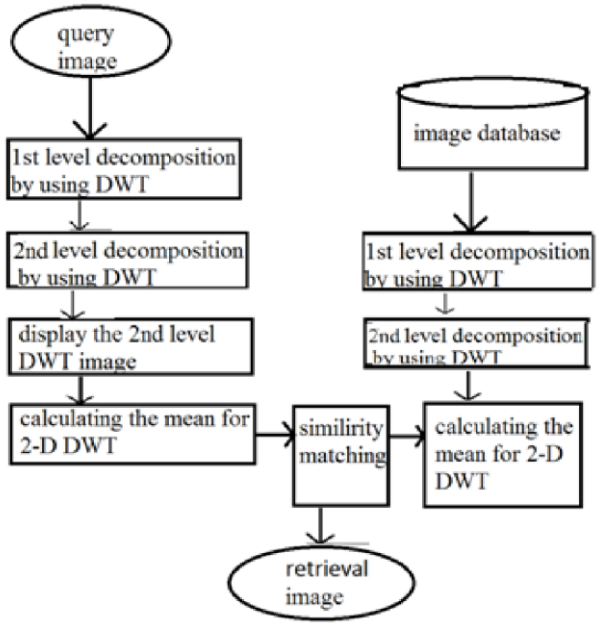

Figure 1: The Block Diagram for DWT

The block diagram shows that the flow how the Query image will be decomposed by using the DWT technique of various sub bands and how the image search and system works can be shown on figure 1.

III. EXPERIMENTAL RESULTS

The experimental results after applying DWT transform on input image. Consider an example

Figure 2: Original image

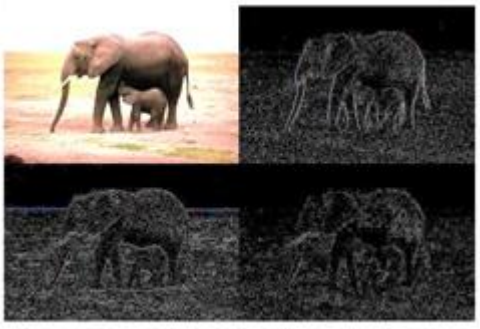

Figure 3: DWT 1st level output

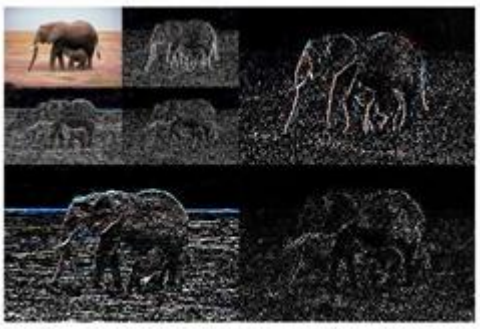

Figure 4: DWT 2nd level output

Table 1: The means of original image and proposed DWT Levels

Category of Images	Original Image Mean	First Level Mean	Second Level Mean
horse	179.9118	160.5732	146.5056
White horse	160.6258	159.4181	153.798
gorilla	224.833	159.3944	138.1596
elephant	198.2735	161.4785	144.0327
Double bus	160.9771	156.3527	151.8145
bus	165.4832	155.7203	148.7404
Historical building	187.684	162.3135	148.4582
drazon	225.5048	159.869	138.5568
building	179.0767	157.8167	144.9487

The original image and proposed decomposed image using DWT and variations from original image to 1st level and 2nd level are shown in Table 1.

A. Bar Chart for Comparing Means of DWT

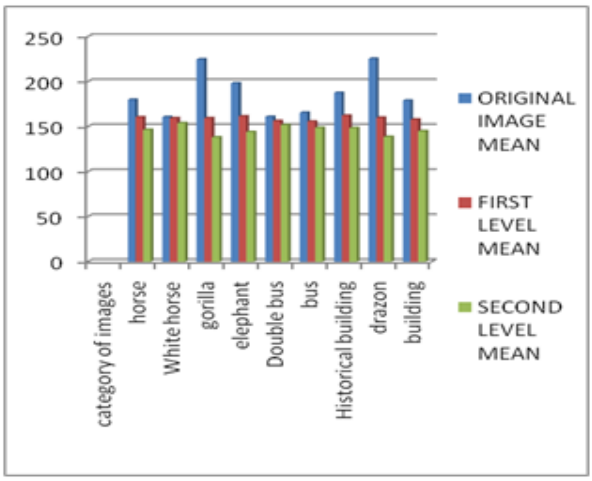

Figure 5: Bar Diagram for Calculated means

Here, the above Bar chart shows the proportionality changes occurred in each level from original image to each level of sub bands of DWT. Here it will shows clearly that computed mean value is rapidly decreased for each level of proposed method of decomposed image using DWT technique for various sub bands . It shows that our method works efficiently and the experiment proves the image is decomposed for each level So, obviously we will get good results with the proposed methodology.

CONCLUSION

In this paper, My work is done on colour texture Based on Image Retrieval System. The application performs find similar images from a large database by using DWT of various bonds. It gives better results and reduces time complexity in searching of images. Finally the conclusion of this project is to be given in two levels by using DWT concept and by using some images like horse, buildings, elephant, bus etc. The below images which are used for experimentation.

Figure 6: Category of images

In this paper, I have considered elephant as a query image. Our proposed method will produce two outputs 1st level and 2nd level decomposed images for query image. For this image we will compute mean and after similarity checking with image database. Finally, it will show the similar images related to query image. For my experimental results I have used the above images. The Experimental results shows, it is an effective method and gives better performance. This will give more similar images from large collections. My further work will focus on doing third level decomposition by using this procedure and experiments on how effective the 'image search' is better than present systems

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