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A NOVEL HAAR WAVELET TRANSFORM BASED TECHNIQUE FOR CONTENT BASED IMAGE RETRIEVAL

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Abstract

Content based image retrieval is the heart favorite topic for many researchers. Now days it is a burning research topic, because it is used in a large number of areas. This paper proposes a novel haar wavelet transform method based technique for the content based image retrieval. The wavelet haar transform is used to decompose the image data base in to the featured data base & also the input image to the feature data & then the retrieval strategy is used to extract the similar images on the basis of the distance similarity metric.

I. INTRODUCTION

Images are very rich in the visual content (such as color, texture and shape) [4], which can be used to exonerate the drawbacks of text based image retrieval system. This is possible only when these can be represented in form of mathematical vectors accessible by computers [5]. A Content Based Image Retrieval is an interface between a high level system and a low level system. In a CBIR the visual image content is represented in form of image features. These are extracted automatically and there is no manual intervention. By doing so the dependency on humans in the feature extraction stage has been eliminated. These automated feature extraction approaches are computationally expensive. So there is a lot of scope for minimizing computational complexity in CBIR [6].

Image processing algorithms do help in interpretation and manipulation of visual content of image to generate feature vector out of it [3,7,8]. Further image processing domain is researched for making the conversion of visual content of images in to respective feature vectors faster, robust, better and more efficient

with feature vectors being as small as possible [1,2]. C1-5 Typical CBIR systems can organize and retrieve images from the image databases automatically by retrieving some features such as color etc from the images and looking for similar images which have similar feature vectors. Content based image retrieval systems operate in two phases. In the first phase, feature extraction (FE), a set of features which is called feature vector is generated to accurately represent the visual content of each image in the database. The size of the feature vector is much smaller in size than the original image.

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In the second phase, similarity measurement (SM), searching distance between the query image and each image in the database using their feature vector is computed so that the most similar images can be retrieved [6,9]. One problem of this approach is, to judge semantic similarity there has to be reliance on visual similarity, which creates problems due to semantic gap between low-level content and high level concepts. CBIR can be used for real life applications.

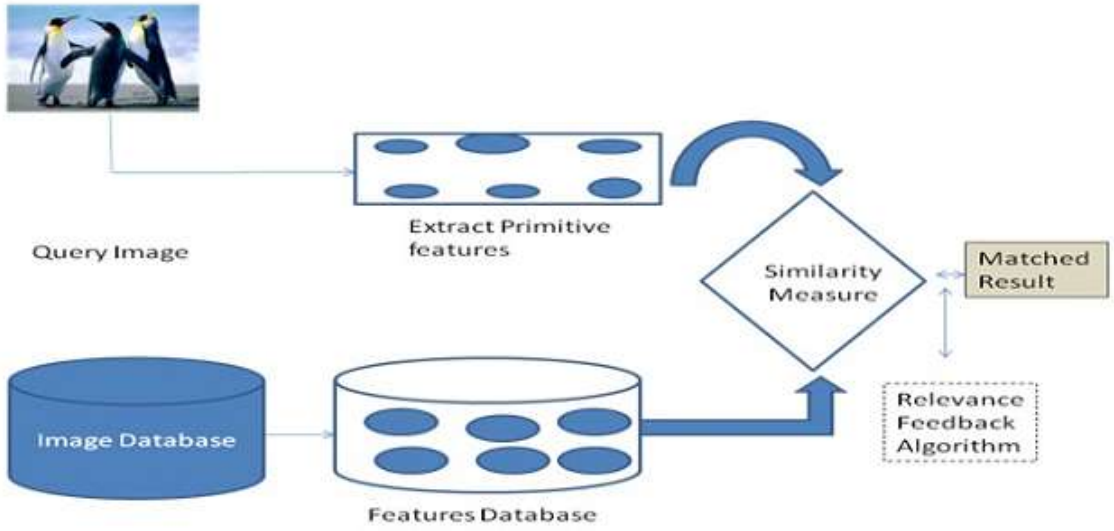


Figure 1: Architecture of a typical CBIR system

In a typical CBIR system, the low level features of the image are represented in the form of a multidimensional feature vector. The feature vectors of images in the database form a feature database. The feature extraction process is started when a user query the system using an example image. The same feature extraction routine which is used for building the feature database is used to convert the query image into the internal representation of feature vector. The distance between feature vectors of query image and those of the target images is calculated using the similarity measure. The retrieval of the image is performed by applying the indexing scheme on the image data base. Recently, user's relevance feedback is also incorporated to further improve the retrieval process in order to produce perceptually and semantically more meaningful retrieval results

II. PROPOSED SYSTEM

The modules are as follows:

Image Decomposition:

As we have already mentioned that the image will be decomposed using the haar & wavelet transform. It means that the image will be decomposed n the color feature data base will be prepared for all the images. In decomposition, each image is converted in matrix. The meaning of decomposing an image using wavelet transform is converting the image features in the matrix form and a color feature set is prepared. Then these images are indexed using the k means algorithm. It will help in improving the search results. Then an image is entered as input & on the basis of similarity measure (the features of the input image are compared with the features of the data base) the relevant images are returned as output.

- **Image indexing & Image clustering**

  After the image decomposition, we get all the image features in the form of the matrix. Then the k means algorithm is used to make clusters to keep images with similar features. This process is known as indexing & clustering. It makes image retrieval efficient.

- **Image search & Image Retrieval:**

  Sample image is given as input and the CBIR returns all the similar images as output. The sample image is decomposed & the features are extracted in form of matrix form. Also the image data set is decomposed & the features are extracted in the matrix form. Then the features of the input images are compared to the same of the data base & the similar images are retrieved.

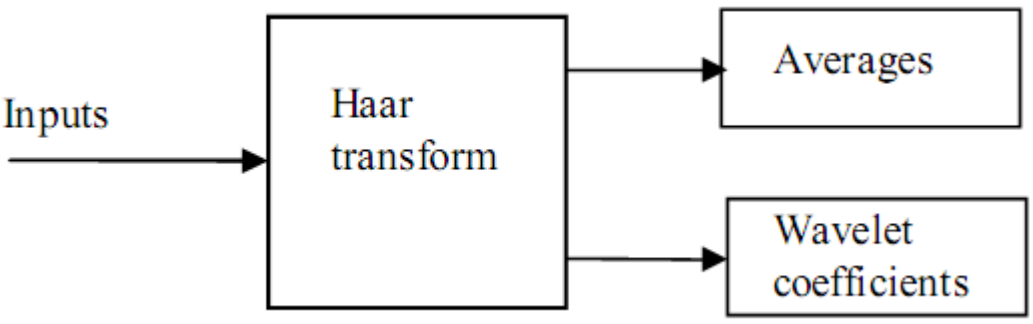
A. Methodologies Used:

K Means Algorithm for Indexing & Clustering:

Steps:
1. If in the data set D the data points contain both positive attributes and the negative attributes as well then switch to step 2 otherwise switches to step 4.
2. In this step, the algorithm finds the minimum value of the attribute in the input data set D.
3. Subtract the minimum value found in step 2 from each data point attribute.
4. Calculate the distance from origin for each of the data point.
5. According to the distances found in step 4, sort all the data points.
6. Make k equal sets by partitioning the sorted data points of step 5.
7. In this step centroid is chosen. The middle point of each set is selected as centroid.

B. Haar wavelet transform For the image decomposition and the image retrieval

We have used Haar wavelet transform & it is as follows:



C. Retrieval Strategy:

The features of the input image are compared to the features of the image data base. To do so, a similarity measure is used. In our project, we are using the Euclidian distance as the similarity measure. X and Y correspond to the distance between feature vectors of query image and those of the target images in the image database. It is as follows:

$$D = \sqrt{\sum_{i=1}^{n} (X_i - Y_i)^2}$$

Advantage of the proposed model:

The efficiency/ recall rate will be better in comparison to the existing recall rate:

Recall Rate = (No of relevant images retrieved) / (Total no of relevant images in the data base)

III. CONCLUSION

In this paper, we have proposed an efficient CBIR, the recall rate is better. Featured database is made using wavelet haar transform. The image data base is decomposed in to the featured data base & also the input image to the feature data using the wavelet haar transform & then the retrieval strategy is used to extract the similar images on the basis of the distance similarity metric.

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