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Artificial Neural Network Technique for CBIR Based On Query Image Feature Extraction

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ABSTRACT: In order to increase the Content-Based Image Retrieval (CBIR) system retrieval accuracy are obtain by applying effective clustering technique. It's only focused on accuracy not time or space consumption. The main idea of this paper isto extract images feature such that shape, color and texture features for image retrieval process. HSV are calculated from the images. Then images are converted to grayscale and preprocessing is applied. Clustering of the images is done by Self-Organizing Map (SOM). From key image take out the color histogram then texture features. After that image shape will be determined by using edge detection method to an image. In other hand use shape filters to identify given shapes of an image. Latter the individuality of the global color histogram withlocal color histogram are compared first and find which is best among two characteristics. Then best histogram feature, texture features and shape feature are compared and explored for CBIR. By these works, the CBIR is created by using color, shape and texture fused features by means of constructing feature vectors weights. After that feature vector are cluster using Self-Organizing Map. The query image features are extracted and it compared with cluster. After that display the similar images which match with the cluster images. The proposed idea is to apply the neural network technique for clustering to increase the accurateness of image retrieval.

KEYWORDS: CBIR, color, texture, shape, SOM, histogram, cluster, a co-occurrence matrix.

I.INTRODUCTION

The CBIR usually refer the Content-Based Image Retrieval system that is image retrieved from the image database directly based on some specific feature of an image .The aim of the CBIR is to explore by low level feature of an image such as color, shape and texture etc., and to calculate the image feature vector by applying appropriate methods. The image retrieval system concentrates on approximate similar image retrieval.

The color distribution usually represents by color histogram that is one of the image feature. The shape and texture feature of images that are aid to improve the accuracy of the CBIR system. The texture is rapid pixel representation. Shape is most important feature of an image that are represents some specific image region.

The experiment is done by using color, texture and shape that are fused together. That value given as input for cluster the image. Then the query image is given as input, from that extract the feature that match with cluster. From cluster like images are retrieved. Shape is included with existing work [1] such as color and texture.

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II .EXISTING SYSTEM

A. Color feature extraction

The color is property of an image that is independent to rotation, scaling, translation and etc., when those are compared with the other image if only based on the color characteristics. Moreover color space calculation is so simple when compared to other feature of an image. The color feature based image retrieval is the basic concept of the CBIR [2].

Color histogram

A color histogram is the regularity of the different color distribution. The histogram having two characteristic those are globaland block color histogram. The global color histogram is best when the images are difficult to segment.

A.I.Global color histogram characteristic

The images are fetching from the database since the RGB color space is not satisfy the visual condition. So that images are convert RGB to HSV color space. The HSV is the most using color space in CBIR.

Calculate the Global color histogram by:

1. Find HSV color space from RGB color space.
2. Apply image quantification.
3. Count the each image feature value
4. Similarity calculates by Euclidean distance.

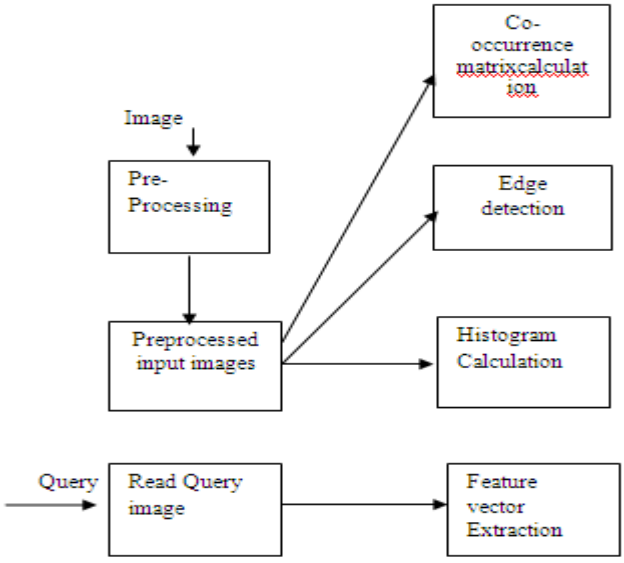

Fig1. Image retrieval model

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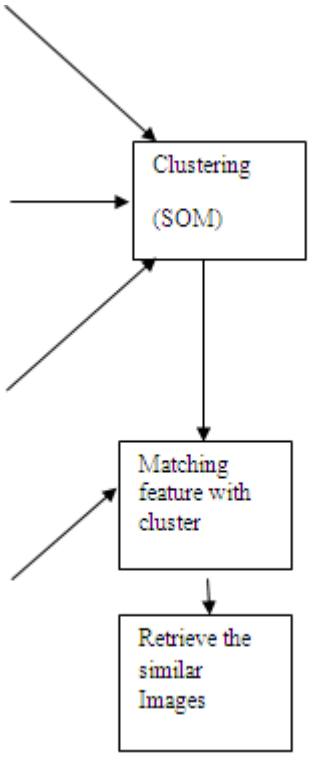
The main drawback in this characteristic is that, it only depend the frequency of color not a spatial distribution.

A.II.Block color histogram characteristic

Usually the Global color histogram means that images are separated by nxn blocks. If block size is too small it is meaningless. The computation cost is high is block size is too large. So select the appropriate block size by analysis, the image are divided into 3x3.

In each and every block, convert RBG to HSV color space and also apply color quantization. The color feature is calculating every block. Middle blocks having higher weight value. Since block histogram is best [1].



B. Texture feature extraction

Texture is referring that pixel or pattern repetition and also surface property. It gives visual image pattern that hold info about the image structural arrangement and it provide relationship between them. Texture has four parameters that are moment of inertia, relevance, capacity and entropy[4].

The co-occurrence matrix is adopts to extract texture feature. Since the computation speed of texture is high when compared to color feature extraction. Likewise the feature vector dimension is lesser[5].

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B.I.Co-occurrence matrix

The input image pixel of Nr and Nc respectively. Assume Zr={1,2,3,…..,Nr} is vertical domain space and Zc={1,2,…..,Nc} is horizontal domain space. If the θ is direction and d is the distance, then element in the matrix will be P(i,j/d, θ) that expressed to calculate gray level co-occurrence pixel logarithmic of i and j. Assume that distance is 1 if θ values equals 0°, 45°, 90°, 135° respectively.

B.II.Texture feature extraction steps

The texture is extract from the image by following steps

1. Appropriate color conversion.
2. Quantification of gray scale image.
3. Calculate feature value.
4. Apply internal normalization.
5. Compare the texture feature.

By the above five step the image texture feature is calculated. Using Euclidean distance, texture feature value are compared, if the distance is smaller that image getting higher similarity [3].

III. PROPOSED SYTEM

A. Shape feature extraction

Shape feature extraction is another one aspect of CBIR that refer shape some specific region of an image but not an image shape. It can be finding by segmentation or apply canny edge detection method to the images. Also shape filter can be used to find the shape of images. For large images the segmentation is not possible so apply canny edge detection method to fine the particular image shape.

B.Image clustering by SOM

The clustering can be performed by using Self organizing map which use the unsupervised learning process. This is a kind of artificial neural network .In the SOM grid hold the neuron that refer as cluster. Those neurons are represented in 2D feature map. Neurons get the input as fused feature which given as single vector. Using unsupervised modeinput images all are trained.

Algorithm-

1. Assign each and every vector to their won cluster.
2. Distance computation among all clusters.
3. Two clusters are merge if that are close to one another.
4. Step 2 is performed until one cluster is left.

IV. RESULTS AND DISCUSSION

The first and foremost activity of image processing is image preprocessing.140 images are collected from the 7 different category such as animals ,architecture, interior design ,Indian places, technology, arts, cars. Preprocessing images that involves the activity of remove the noise, intensity normalization, resize the images etc.

A. Preprocessing steps

1. Convert to same format

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2. Noise removal
3. Resize the image
4. Histogram calculation
5. Histogram equalization

A.1 Convert to same format

In image processing first and foremost step is to convert the all different type of image into same format. Convert all image type to .gif format.

A.2 Noise removal

The image noise is refers as random brightness variation. This noise is produced by the digital camera or sensor. This is called as electronic noise. The car image is shown here

A.2.1 Salt and pepper noise

This noise refers as 'impulsive noise' which means that bright pixels over in the dark region as also dark pixel over in the bright region. This kind of noise are generated when error occur in analog-digital converter. This avoided by use the subtraction of dark frame.

Fig2.Salt and pepper noise

A.2.2 Filter (noise removal):Median filter

The most effective filter is median filer for salt and pepper noise removal. It follows the non-liner filter method. This noise removal, that aids to improve the accuracy in image retrieval system.

Fig3.Salt and pepper-noise removal

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A.3 Resize the images

Convert the all various image window size into uniform window size .This helpful for easily process the images. 256x256 window size is used here.

A.4 Histogram calculation

Histogram is nothing but color variation in the images. That can perform using imhist()in MATLAB.

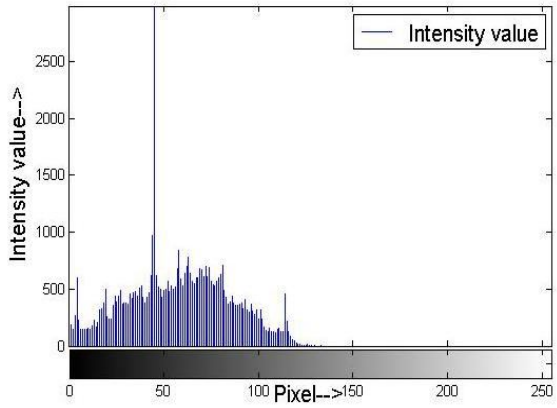

Fig4.Histogram calculation

A.5 Histogram Equalization

Itequalizes the image intensity value in the images. It helpful for enhance the image contrast. histeq() is MATLAB command used.

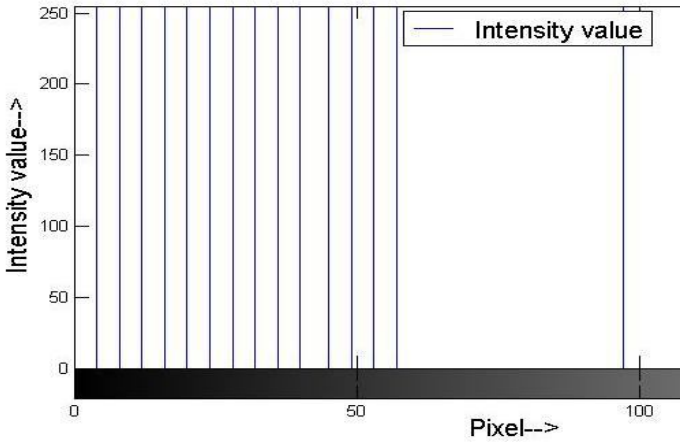

Fig5.Histogram equalization

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In below image, X-axis refer pixel of an image and Y-axis refer intensity of the particular image.After the preprocessing the image ,give this preprocessing output to the feature extraction module input.

B.Feature extraction

The preprocess output is used to perform the feature extraction. The color, texture and shape are extracted and form the single matric using MATLAB function.

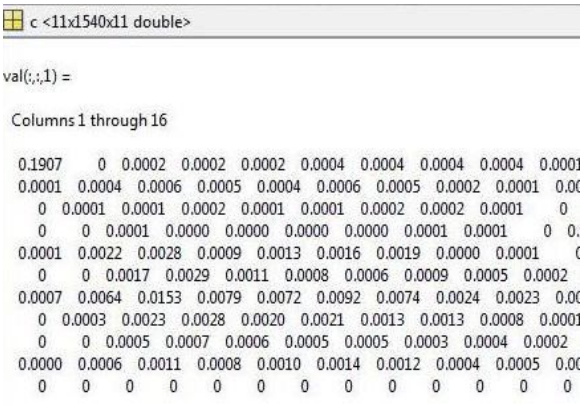

Fig6.Merging all feature value

C.Cluster the images by SOM

After all the three features are extracted that are convert to single vector[4] that give the input to SOM. Those are cluster 140 images based on feature value input.

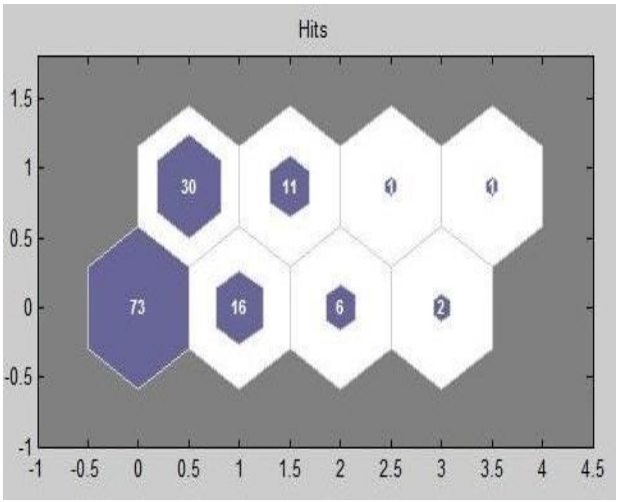

Fig7. SOM cluster

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After that query images are given from which extracts color, shape and texture feature then that are fused then that match with SOM clusters, then it retrieves the similar images which belongs to same cluster.

```
y =

    (8,1)         1
    (1,2)         1
    (1,3)         1
    (1,4)         1
    (1,5)         1
    (1,6)         1
    (5,7)         1
    (1,8)         1
    (1,9)         1
    (1,10)        1
    (1,11)        1
    (1,12)        1
    (5,13)        1
    (1,14)        1
    (1,15)        1
```

Fig8. Retrieve SOM cluster

V. CONCLUSION

The proposed work uses the color, texture, shape extractionfeature for CBIR. The SOM technique is used for clustering process. The clustering process is helpful for similar image grouping. After that query image are given, from that image extract all needed feature that compared with the SOM clusters. Similar images can be retrieved quickly and accurately. In future spatial location will be fused to create the CBIR more robust. Shape is added with the existing work [1] and can retrieve the images in very accurate manner.

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