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CONTENT BASED IMAGE RETRIEVAL USING TEXTURE METHOD

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Abstract- **With the advancement in technology, there is a great need of Content based image retrieval system. It can be used in various fields like Crime Prevention, weather forecasting, Education, Medical Imaging and Remote sensing and management. This paper presents the content based image retrieval method using texture method. This method enhance the performance of acquisition and searching.**

Keywords: Image retrieval, content based image retrieval system, Gabor method, and feature extraction.

I. INTRODUCTION

Content image retrieval system has gained importance during last decade. A lot of researches have been done by researchers in depth[1-2]. The Content Based Image Retrieval (CBIR) have been originated with work of Kato for the automatic retrieval of images from the database based on colour and texture. Since then the method is used to retrieve images from the large collection of database on colour, texture and shape basis. Even though colour plays a vital role in interpreting images, there are some situations when colour method is not enough. In industries texture method is used to enhance the quality of image and even though helps colour method also. Therefore, texture can be used in high level interpretation of data.

Texture is considered as one of the feature extractions attributes by many researchers, it provides measures of properties like smoothness, coarseness and regularity. Mainly the texture feature of an image are analysed through statistical, structural and spectral methods. In this paper apart from colour histograms, texture is also used for quality interpretation of data and methods like LDP & Gabor is used.

A. Gabor algorithm

Gabor is introduced for texture interpretation of data. Gabor filters are collection of wavelets, with each wavelet capturing energy at specific type and in the specific direction. This expansion provides localized description of frequency. Therefore, features like texture can be extracted from this group of energy distribution. The scale and orientation makes gabor filter useful for analysis. The filters of gabor filter designed to detect different frequencies and orientations. Gabor features can be calculated from each filtered image and resultant images are retrieved. Our model rely on the fact that input images are excepted as Query by example(QBE) and any combination of images. The low level features we are using are mean, median and standard deviation of red, green and blue colours. Texture feature consist of homoginiety, correlation, contrast and energy that are retrieved from the images. The edge features include vertical, horizontal, 45 degree diagonal, 135 degree diagonal and then isotropic are added.

For a given image P(x,y), the discrete gabor wavelet transform is given by a convolution:

$$W_{MN}=\sum x\sum y I(x,y) g min *(x-x1,y-y1) \quad (1)$$

It is conjugate and where m, n specify it scales and orientations of wavelet respectively and g min represents a class of self functions generated from dilation and rotation of pixels given by

$$gmin=1/2\prod\sigma x\sigma y(\exp[-1/2(x^2/\sigma x^2)+y^2/\sigma y^2]*\exp(j2\prod Wx))$$

After applying the Gabor filters on the image with different orientation at different scale, we obtain an array of magnitudes:

$$E(m,n) = \sum_{x}\sum_{y} \left| W_{MN\,(X,Y)} \right| \quad (2)$$

The magnitudes which we get represent the energy content at different scale and orientation of the image. The main purpose of texture-based image retrieval is to search images or regions with similar texture. The standard deviation σ of the magnitude of the transformed coefficients is:

$\sigma\ mn= x=\sqrt{\sum\sum}|Wmn(x,y)-\mu mn|^2$

where $\mu mn= E(M,N)/P*Q$

Is the mean of magnitude A feature vector **f** (texture representation) is created usingmmn as the feature components. M scales and N orientations are used and the feature vector is given by:

f=[σ00,σ01…..,Ó(m-1)(n-1)]

where µ is the mean and σ will be the standard deviation of f.

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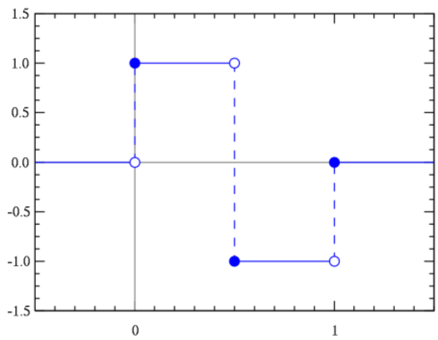
where µ is the mean and σ will be the standard deviation of f [1,4].

Texture is an innate property that describes visual pattern containing information about surface, fabric etc. it also describes relationship of surface with the surroundings. Texture can be modelled as quasi per with spatial/frequency representation. This allows effective image search and results.



Haar Wavelet Transform

According to this transform a function that represent a image i.e. a curve signal, can be described in terms of coarse level description in addition to others details and range from narrow to broad scales.

The texture similarity measurement of a query image *Q* and a target image *T* in the database is defined by:

$$D(Q,T) = \sum_{mn}\sum_{mn} d(Q,T)$$

where

$$d_{mn} = \sqrt{(\mu^{q}mn - \mu^{t}mn)^2 + (\sigma^{q}mn - \sigma^{t}mn)^2}$$

B. Experiments Results

When a query image was given the Gabor wavelet gave relevant results. Here, we have taken database of 150 images of different categories, like lotus, cat and dog. When the result is made on texture analysis we got different results as follows in table 1.

TABLE 1

Name of image		No. of images	Recall Rate	Precision	Search Time
Lotus	Baby pink	10	0.2	0.06	17.54
	White	0	0	0	22.52
	Yellow	0	0	0	19.09
Dog	White	3	0.06	0.02	17.24
	brown	3	0.06	0.02	23.01
	White small	3	0.06	0.02	17.09
Cat	Small cat	3	0.06	0.02	17.07
	Dark brown	3	0..06	0.02	19.13
	Big brown	3	0.06	0.02	21.01

To evaluate the performance we need to find precision and recall. Precision is the ability of the method to retrieve just images that are to the point. Recall is the capability of the method to recover all the images that are relevant.

We can calculate Precision by the formula:

Precision = Number of relevant images retrieved / total number of images in the collection.[5]

Or,

Precision = Relevant hits / All hits [4]

And, Recall can be measured by:

Recall = Number of relevant images retrieved / Total number of relevant images in the collection. [5]

Or,

Recall = Relevant hits / Expected hits[4]

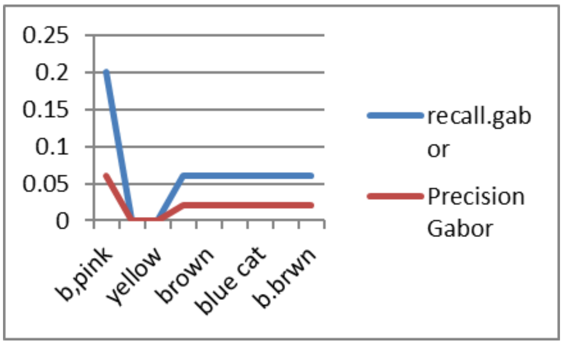


Fig1. Graph of recall and Precision

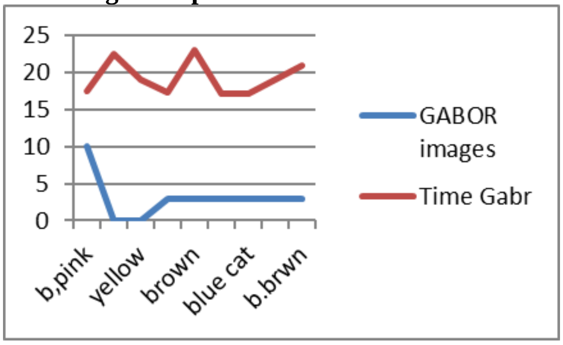


Fig2.Graph of time and number of images

II. CONCLUSION

In this paper a method for CBIR analysis on texture analysis has been described. Experimental results have been calculated and graphs have been plot, which give the conclusion that recall and precision depends upon the number of images retrieved by the system from the database. In further scope we can reduced the time and we can make the system work more efficiently by using more efficient methods.

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