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A Study on Image Indexing and Its Features

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Abstract

The visual information available in the form of images, effective management of image archives and storage systems is of great significance and an extremely challenging task indeed. Indexing such a huge amount of data by its contents, is a very challenging task.data representation and feature based content modeling are two basic components required by the management of any multimedia database. As far as the image database is concerned, the former is concerned with image storage while the latter is related to image indexing. And it is also used to the different features like color, shape and textures of images. The color and texture features are obtained by computing the mean and standard deviation on each color band of image and sub-band of different wavelets.

Keywords: *Feature Of Image Indexing, Image Indexing , Texture Extraction Of Image.*

I. INTRODUCTION

A database indexing is a data structure that improves the speed of data retrieval operations on a database table at the cost of slower writes and increased storage space and content modeling are two basic components required by the management of any multimedia database. [9] the image database is concerned, the former is concerned with image storage while the latter is related to image indexing. The image indexing is to retrieve similar images from an image database for a given query image . Each image has its unique feature. Hence image indexing can be implemented by comparing their features, which are extracted from the images.The criterion of similarity among images may be based texture, and above mentioned other image attributes.n the features such as color, intensity, shape, location and and texture, and above mentioned other image attribute.

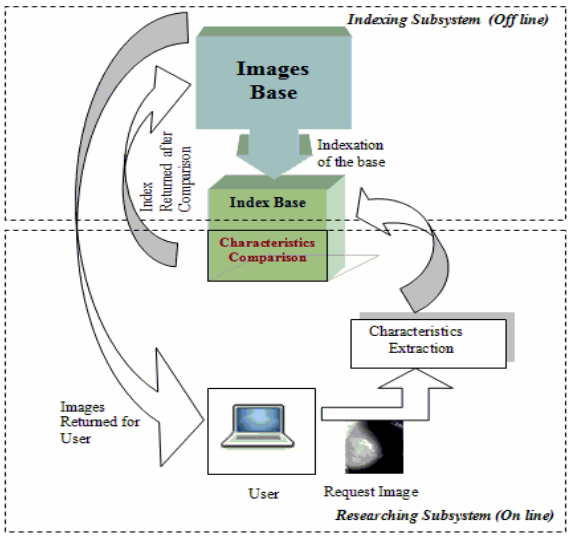

Figure1. Typical architecture of images indexing system [6]

In this paper we did literature survey of image indexing in database. The paper gives the overview of various features of image indexig. The various methods have also been discussed. The rest of the paper is organized as below. Section 2 presents the features , Section 3 represent the texture feature extraction .and Section 4 gives the conclusion.

II. FEATURES OF IMAGE INDEXING

2.1 Color

Color is one of the most widely used low-level features in the context of indexing It is relatively robust to background complication and independent of image size and orientation. the color of an image is represented through some color model. A color model is specified in terms of 3-D coordinate system and a subspace within that system where each color is represented by a single point. The more commonly used color models are RGB, HSV and YIQ (luminance and chrominance. [8] A method of compressing an image that enables 8 bits per pixel to look almost as good as 24 bits per pixel. The technique determines the 256 most frequently used colors in the image and creates a color lookup table, also called a "color map" that is stored with the image. Rather than each pixel in the image having all three RGB colors.the Major Problem When early computer screens were commonly limited to 256 colors, indexed color methods were essential. two indexed photos on screen at the same time with vastly different color schemes would overload the hardware's color capacity and display improperly. Today, computer hardware easily renders full 24-bit color, but 8-bit indexed images are still widely used to save bandwidth and storage space.[7]

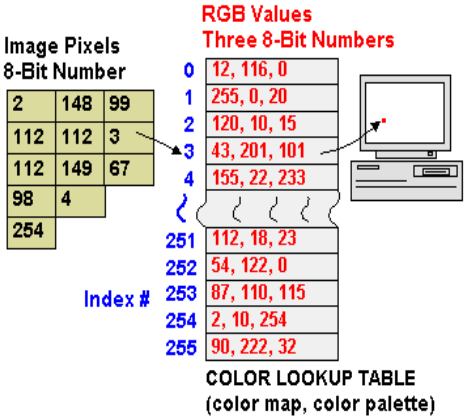

Figure 2:-RGBlookup table [7]

(i) RGB Color

It can be partially reliable even in presence of changes in lighting, view angle, and scale. In image retrieval, the color histogram is the most commonly used global color feature. It denotes the probability of the intensities of the three color channels. color composition is done by color histograms. which identifies the object using color histogram indexing. The color histogram is obtained by counting the number of times each color occurs in the image array. Histogram is invariant to translation and rotation of the image plane, and change only slowly under change of angle of view. RGB color space is used i.e. histogram for each color channel is used as feature for image database.[4]

(ii) HSV Color

The alternative to the RGB color space is the Hue-Saturation-Value (HSV) color space. Instead of looking at each value of red, green and blue individually, a metric is defined which creates a different continuum of colors, in terms of the different hues each color possesses. The hues are then differentiated based on the amount of saturation they have, that is, in terms of how little white they have mixed in, as well as on the magnitude, or value, of the hue. In the value range, large numbers denote bright colorations, and low numbers denote dim colorations.[4]

(iii) Color Histogram

colour histograms contain highly correlated information and so they can be effectively compressed. they can be represented by a few numbers. As such, colour histogram comparison is no slower than any other colour-based indexing method. Colour histograms are created by partitioning colour space into equi-area regions and counting the number of pixels falling in each region, then allocating that total to the related histogram bin (each histogram has the same number of bins as there are equi-area regions). the RGBs falling in the ith region of colour space.The smaller the distance, the closer the similarity of the images.In considering how colour histograms might be most effciently encoded.[5]

2. 2 Shape

Shape is an important criterion for matching objects based on their profile and physical structure.All shapes are assumed to be non occluded planar shape allowing for each shape to be represented as a binary image. shape representation is boundary-based and region-based. The former uses only outer boundary of the shape while the latter uses entire shape of the region. Fourier Descriptors and Moment invariants are the most widely used shape representation schemes. The main idea of Fourier Descriptor is to use the Fourier transformed boundary as the shape feature. Moment invariant technique uses region-based moments, which are invariant to transformations, as the shape feature. This set of moments is invariant to translation, rotation and scale changes. Finite Element Method (FEM) has also been used as shape representation tool.In shape can be classified into global and local features.[8]

(i) Global :- Global features are the properties derived from the entire shape such as roundness, circularity, central moments, and eccentricity.[8]

(ii) Local :- it is derived by partial processing of a shape including size and orientation consecutive boundary segments, points of curvature, corners and turning angle.[8]

2.3 Texture

In the case of low level texture feature, we apply Gabor filters on the image with scales and orientations and we obtain an array of magnitudes[1]. the image features associated with these regions can be used for search and retrieval. Although no formal definition of texture exists, intuitively this descriptor provides measures of properties such as smoothness, coarseness, and regularity. These properties can generally not be attributed to the presence of any particular color or intensity. Texture corresponds to repetition of basic texture elements called texels. A texel consists of several pixels and can be periodic, or random in nature. Texture is an innate property of virtually all surfaces, including clouds, trees, bricks, hair, fabric, etc. It contains important information about the structural arrangement of surfaces and their relationship to the surrounding environment.[8] And texture feature are extract with the help of entropy, local range, standard deviation. [3]

The three principal approaches used in practice to describe the texture.Statistical approaches yield characterization of textures as smooth, coarse, grainy and so on. Structural techniques deal with the arrangement of image primitives, such as description of texture based on regularly spaced parallel lines. Spectral techniques are based on properties of Fourier spectrum and are used primarily to detect global periodicity in an image by identifying high-energy, narrow peaks in the spectrum.[8]

(i) Standard Wavelet

The wavelet transform provides a multi-resolution approach to texture analysis and classification. Studies of human visual system support a multi-scale texture analysis approach, since researchers have found that the visual cortex can be modelled as a set of independent channels, each tuned to a particular orientation and spatial frequency band. That is why wavelet transforms are found to be useful for texture feature extraction.[4]

(ii) Gabor Wavelet

A Gabor function is a Gaussian modulated by a complex sinusoid. It can be specified by the frequency of the sinusoid and the standard deviations and the Gaussian It has been demonstrated that the 2D Gabor functions are local spatial band pass filters that achieve the theoretical limit for conjoint resolution on information in the 2D spatial and 2D Fourier domains. The Gabor wavelets are obtained by dilation and rotation of the generating function.[4]

III. TEXTURE FEATURE EXTRACTION

3.1 Gabor Function

Gabor functions do not result in an orthogonal decomposition Expanding a signal using this basis provides a localized frequency description. A class of self-similar functions,, which means that a wavelet transform based upon the Gabor wavelet is redundant.it proposed a design strategy to project the filters so as to ensure that the half-peak magnitude supports of the filter responses in the frequency spectrum touch one another. it can be ensured that the filters will capture the maximum information with minimum redundancy. [1]

3.2 Gabor Filter Design

The nonorthogonality of the Gabor wavelets implies that there is redundant information in the filtered images, and the strategy is used to reduce this redundancy. Then the design strategy is to ensure that the half-peak magnitude support of the filter responses in the frequency spectrum touch each other. In order to eliminate sensitivity of the filter response to absolute intensity values, the real (even) components of the 2D Gabor filters are biased by adding a constant to make them zero mean.[1]

3.3 Gabor Wavelet Transform

After applying Gabor filters on the image with different orientation at different scale. The main purpose of texture-based retrieval is to find images or regions with similar texture. It is assumed that we are interested in images or regions that have homogenous texture, therefore the following mean and standard deviation of the magnitude of the transformed coefficients are used to represent the homogenous texture feature of the region and it is used for remove the noise of different images.[4]

IV. CONCLUSION AND FUTURE WORK

In this paper proposed a various feature for image indexing using color histogram and texture analysis of image. The color image in gray level images to check the color histogram values after extract the color feature. And texture feature are also used to the Gabor wavelet transform and HSV color histogram presented. Simulation the higher performance of the proposed method compared to the RGB Color Histogram + Standard Wavelet Transform in terms of average precision and recall. In future work the performance of the proposed method can be improved by applying the same low level features on texture based image indexing.

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