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Content Based Image

Retrieval Apllication

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**Abstract**: With the popularity of network and development of multimedia technology, the traditional information retrieval techniques are not working efficiently according to users demand in searching and retrieving images from database. Recently the content based image retrieval concept becomes the hot topic in information retrieval domain. Due to the demand of information retrieval technique for image retrieval research has focused on content based image retrieval

method. In today’s world there is increased need of content based image retrieval technique in number of different domains such as education, medical imaging, crime prevention, whether forecasting, remote sensing and management of earth

resources. Content based image retrieval (CBIR) deals with retrieval of relevant images from the large image database. It works on the features of images like color and texture. In our system we are proposing an enhancement to basic content

based image retrieval technique. The enhanced feature helps in retrieving images from large database fastly. During this process Z-Search uses features like texture, color, shape and wavelet based histogram method to find similarity among the images. Based on similarity value the images are divided into clusters, then the new image which is to be verified with database is compared with these clusters and based on its similarity corresponding images in cluster are retrieved.

**Keywords:** Image retrieval, color, texture, histogram, shape.

I. **INTRODUCTION**

Content based image retrieval is well known technology being used for the retrieval of images from large database. This image retrieval is a challenging topic that has been a research focus from many years. This has proven very much important because of its applications like face recognization, fingerprint recognization, pattern matching, verification and validation of images. The image retrieval is also called image classification in large database systems. In the past few years , there has been tremendous growth in database technology to store and retrieve large number of images. This requirement creates a demand for software systems for effective fast image retrieval from large database systems .The demand and use of multimedia applications in present world creates the need of content based image search and retrieval. The term content based image retrieval(CBIR) is originated by Kato from his work to retrieve images from database based on color and shape .Since then onwards the term CBIR is used for the process of searching and retrieving desired image from collection of database based on synthetical image features like color, texture and shape. The content based image retrieval is an important application in medical field which is used to permit radiologist to retrieve images of similar features for input image that lead to similar diagnosis.

The concept of CBIR (content based image retrieval) is explained using following diagram



Every CBIR system needs to have a module for feature extraction. This module is applied on query image and as well as on database of images. This module converts image into binary form and finds its features like shape, color, texture then it contains another module called similarity matching which is used to compare the input image features with features of database images. To find the features of image, the image is converted into wavelet histogram which is in binary matrix.

A. **Color spaces**

Color spaces are important component in representing images in digital form. Color is usually represented by color histogram, color coherence vector which are combinedly called as color space. The color histogram feature is most important in image retrieval. Here color histogram is a vector which is collection of element where each element represents no of pixels in a bin of

image.

B. **Texture**

It is another important feature generally used in similarity matching of images. Texture means

smoothness, coarseness and regularity. The texture features are analyzed using statistical approach. In our proposed system we proposed to implement content based image retrieval system with determining support.

**V. IMAGE RETRIEVAL TECHNIQUES**

**A. Image Content Descriptors**

Generally speaking, image content may include both visual and semantic content. Visual content can be very general or domain specific. General visual content include color, texture, shape, spatial relationship, etc.Domain specific visual content, like human faces, is application dependent and may involve domain knowledge. Semantic content is obtained either by textual annotation or by complex inference procedures based on visual content. This chapter concentrates on general visual contents descriptions. Later chapters discuss domain specific and semantic contents. A good visual content descriptor should be invariant to the accidental variance introduced by the imaging process (e.g., the variation of the illuminant of the scene).However, there is a tradeoff between the invariance and the discriminative power of visual features, since a very wide class of invariance loses the ability to discriminate between essential differences. Invariant description has been largely investigated in computer vision (like object recognition), but is relatively new in image retrieval. A visual content descriptor can be either global or local. A global descriptor uses the visual features of the whole image, whereas a local descriptor uses the visual features of regions or objects to describe the image content. To obtain the local visual descriptors, an image is often divided into parts first. The simplest way of dividing an image is to use a partition, which cuts the image into tiles of equal size and shape. A simple partition does not generate perceptually meaningful regions but is a way of representing the global features of the image at a finer resolution. A better method is to divide the image into homogenous regions according to some criterion using *region segmentation* algorithms that have been extensively investigated in computer vision. A more complex way of dividing an image, is to undertake a complete *object segmentation* to obtain semantically meaningful objects (like ball, car, horse). Currently, automatic object segmentation for broad domains of general images is unlikely to succeed. In this section, we will introduce some widely used techniques for extracting color, texture, shape and spatial relationship from images.

B. **COLOR**

Color is the most extensively used visual content for image retrieval ,Its three-dimensional values make its discrimination potentiality superior to the single dimensional gray values of images. Before selecting an appropriate color description, color space must be determined first.

B.1. **Color Space**

Each pixel of the image can be represented as a point in a 3D color space. Commonly used color space for image retrieval include *RGB*, *Munsell*, *CIE L\*a\*b\**, *CIE* *L\*u\*v\**, *HSV* (or *HSL*, *HSB*), and *opponent color* space. There is no agreement on which is the best. However, one of the desirable characteristics of an appropriate color space for image retrieval is its *uniformity* .

Uniformity means that two color pairs that are equal in similarity distance in a color space are perceived as equal by viewers. In other words, the measured proximity among the colors must be directly related to the psychological similarity among them.

B.2 **Color Moments**

Color moments have been successfully used in many retrieval systems (like *QBIC*), especially when the image contains just the object. The *first order* (*mean*), the *second* (*variance*) and the *third order* (*skewness*) color moments have been proved to be efficient and effective in representing color distributions of images.

B.3. **Color Histogram**

The color histogram serves as an effective representation of the color content of an image if the color pattern is unique compared with the rest of the data set. The color histogram is easy to compute and effective in characterizing both the global and local distribution of colors in an image. In addition, it is robust to translation and rotation about the view axis and changes only slowly with the scale, occlusion and viewing angle. Since any pixel in the image can be described by three components in a certain color space (for instance, red, green, and blue

components in RGB space, or hue, saturation, and value in HSV space), a *histogram*, i.e., the distribution of the number of pixels for each quantized bin, can be defined for each component. Clearly, the more bins a color histogram contains, the more discrimination power it has.

However, a histogram with a large number of bins will not only increase the computational cost, but will also be inappropriate for building efficient indexes for image databases.

B.4. **Color Correlogram**

The *color correlogram* was proposed to characterize not only the color distributions of pixels, but also the spatial correlation of pairs of colors. The first and the second dimension of the three-dimensional histogram are the colors of any pixel pair and the third dimension is their spatial distance. A color correlogram is a table indexed by color pairs, where the *k*-th entry for (*i*, *j*) specifies the probability of finding a pixel of color *j* at a distance *k* from a pixel of color *i* in the image.

C. **Image retrieval by texture similarity**

Our system of image retrieval by texture similarity. Image collection and image retrieval are the two types of major activities that occur in this system. Feature extraction is always required for both image collection and image retrieval. The features extracted from an image are represented by a CSG vector and an EDPstring. Notice that several different images can be mapped to the same EDP-string. Similarly, different images may also be mapped to the same CSG vector. To

collect an image, the EDP-string and the CSG vector are stored in the EDPS signature file and the CSGV signature file separately, and the corresponding image is stored in the image database. The relationships among EDP-strings, CSG vectors, and original images are related by the unique image numbers. To retrieve images, we adopt the “query-by-visual-example” method, which is a commonly used approach in CBIR systems, as the man-machine interface. To invoke image retrieval, the user must provide an example texture as the query for the system. Both CSG vector and EDP-string are then extracted from the query image. At the 4rst stage, a search is performed on the EDPS signature file to and the EDP-strings which are matched with the query EDPstring. At the second stage, the image numbers associated with the matched EDP-strings are employed to 4nd all

**Potential uses for CBIR include:**

* Architectural and engineering design
* [Art collections](https://en.wikipedia.org/wiki/Art_collections)
* [Crime prevention](https://en.wikipedia.org/wiki/Crime_prevention)
* [Geographical information](https://en.wikipedia.org/wiki/Geographic_information_systems) and [remote sensing](https://en.wikipedia.org/wiki/Remote_sensing) systems
* [Intellectual property](https://en.wikipedia.org/wiki/Intellectual_property)
* [Medical diagnosis](https://en.wikipedia.org/wiki/Medical_diagnosis)
* [Military](https://en.wikipedia.org/wiki/Military)
* Photograph archives
* [Face Finding](https://en.wikipedia.org/w/index.php?title=Face_Recognition&action=edit&redlink=1)

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