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Image Content Analysis and Classification Using Fuzzy Set

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Abstract: Content-based image retrieval (CBIR) is the application of computer vision techniques to the image retrieval problem, that is, the problem of searching for digital images in large databases. "Content-based" means that the search analyses the contents of the image rather than the metadata such as keywords, tags, or descriptions associated with the image. The term "content" in this context might refer to colors, shapes, textures, or any other information that can be derived from the image itself. CBIR is desirable because searches that rely purely on metadata are dependent on annotation quality and completeness. Having humans manually annotate images by entering keywords or metadata in a large database can be time consuming and not capture the keywords desired to describe the image. The evaluation of the effectiveness of keyword image search is subjective and has not been well-defined. In the same regard, CBIR systems have similar challenges in defining success. In this project, retrieval images are carried out by certain feature extraction methods such as Color Feature extraction, Texture feature Extraction and Shape Feature Extraction has been performed. In Color Feature extraction, Color Histogram, Color Moments and Color Auto Correlogram have been proposed. For Texture Feature Extraction Gabor wavelet and Haar Wavelet process have been implemented. Finally, for Shape Feature Extraction, Fourier Descriptor, Circularity features have been proposed. The extracted features are then optimized by Co-occurrence matrix, where features are optimized and approximated to relevant features. These features are finally classified with similarity computation Euclidian distance to retrieve the relevant images from the databases.

Keywords: CBIR, Fuzzy-Rule Based Classifiers, Haar wavelet, Classification.

1. INTRODUCTION

Presentation image is uniquely suited to automatic indexing for retrieval. Often, presentations are delivered with the aid of slides that express the author's topical structuring of the content. Shots in which an individual slide appears or is discussed correspond to natural units for temporal image segmentation. Slides contain text describing the image content that is not available in other genres. The spoken text of presentations typically complements the slide text, but is the product of a combination of carefully authored scripts and spontaneous improvisation. Spoken text is more abundant, but can be less distinctive and descriptive in comparison to slide text. The frame grabber output (slide stream) can be synchronized with the image camera automatically during the recording. Image processing is any form of signal processing for which the input is an image, such as a photograph. The output of image processing may be either an image or a set of characteristics or parameters related to the image. Most image-processing techniques involve treating the image as a two-dimensional signal and applying standard signal-processing techniques to it. Image processing usually refers to digital image processing, but optical and analog image processing also are possible. Image processing is closely related to computer graphics and computer vision. Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like photograph and output may be image or characteristics associated with that image. Usually Image Processing system includes treating images as two dimensional signals while applying already set signal processing methods to them.

The interest in CBIR has grown because of the limitations inherent in metadata-based systems, as well as the large range of possible uses for efficient image retrieval. Textual information about images can be easily searched using existing technology, but this requires humans to manually describe each image in the database. This can be impractical for very large databases or for images that are generated automatically, e.g. those from surveillance cameras. It is also possible to miss images that use different synonyms in their descriptions. Systems based on categorizing images in semantic classes like "cat" as a subclass of "animal" can avoid the miscategorization problem, but will require more effort by a user to find images that might be "cats", but are only classified as an "animal". Many standards have been developed to categorize images, but all still face scaling and miscategorization issues.

Colour

Computing distance measures based on color similarity is achieved by computing a color histogram for each image that identifies the proportion of pixels within an image holding specific values. Examining images based on the colors they contain is one of the most widely used techniques because it can be completed without regard to image size or orientation. However, research has also attempted to segment color proportion by region and by spatial relationship among several colour regions.

Texture

Texture measures look for visual patterns in images and how they are spatially defined. Textures are represented by texels which are then placed into a number of sets, depending on how many textures are detected in the image. These sets not only define the texture, but also where in the image the texture is located.

Texture is a difficult concept to represent. The identification of specific textures in an image is achieved primarily by modelling texture as a two-dimensional grey level variation. The relative brightness of pairs of pixels is computed such that degree of contrast, regularity, coarseness and directionality may be estimated. The problem is in identifying patterns of co-pixel variation and associating them with particular classes of textures such as silky, or rough.

Shape

Shape does not refer to the shape of an image but to the shape of a particular region that is being sought out. Shapes will often be determined first applying segmentation or edge detection to an image. Other methods use shape filters to identify given shapes of an image. Shape descriptors may also need to be invariant to translation, rotation, and scale.

2 EXISTING SYSTEM

In the existing approach, CBIR has been implemented by graph ranking algorithm to unify the feedbacks and the similarity measure together, In Graph Ranking which unify the refined label vector and the updated distance metric to perform the graph ranking. Use the feedbacks to update the initial label vector yn+1. Combine the feedbacks with the updated label vector to learn a desired distance metric.

Implemented two boundaries to discriminate the three types of implicit feedbacks quantitatively. One is the “tolerable precision”, which denotes the lowest tolerable precision of current search results for the user. The other is the “acceptable precision”, which denotes the lowest acceptable precision of current search results. Next indicates that a lower quality has been achieved for current search results compared with previous results. This is possibly because too biased relevance judgments or certain unsuitable distance metric are provided in the prior retrieval process. Finally Distance Metric Learning algorithm has been proposed with the refined label vector.

DISADVANTAGES

- Feedback results are not comparable with the original ranking. This is because the residual collection has fewer images, and fewer relevant images, than the original collection.
- Each successive iteration of feedback a higher proportion of relevant images are frozen.

3. PROPOSED SYSTEM

In this proposed work, the images are retrieved by conventional content based image retrieval system. Features has been extracted from the input image. There are color, texture and shape features have been extracted. In color features are computing distance measures based on color similarity is achieved by computing a color histogram for each image that identifies the proportion of pixels within an image holding specific values. The goal of color indexing is to retrieve all the images whose color compositions are similar to the color composition of the query image. Histograms are useful because they are relatively insensitive to position and orientation changes and they are sufficiently accurate. Color correlogram can combine the spatial correlation of color regions as well as the global distribution of local spatial correlation of colors. Color moments have been successfully used in content based image retrieval systems. Texture Features has been performed by Gabor Wavelet and Haar wavelet approaches. Gabor wavelet is widely adopted to extract texture from the images for retrieval and has been shown to be very efficient. Basically, Gabor filters are a group of wavelets, with each wavelet capturing energy at a specific frequency and specific orientation. The scale and orientation tuneable property of Gabor filter makes it especially useful for texture analysis. The Haar wavelet is a certain sequence of rescaled "square-shaped" functions which together form a wavelet family or basis. Wavelet analysis is similar to Fourier analysis in that it allows a target function over an interval to be represented in terms of an orthonormal function basis. The Haar sequence is now recognized as the first known wavelet basis and extensively used as a teaching example in the theory of wavelets. Shape Features has been implemented such as Fourier descriptors are a classical method to shape recognition and they have grown into a general method to encode various shape signatures. Circularity Descriptors are the similar to a circle, which are defined by area of the shape and perimeter of the shape. In the optimization method, these features are optimized by co-occurrence matrix, the obtained features are optimized in order to get relevant features information. Then the obtained optimized value is being classified by calculating similarity computation Euclidean distance. Finally, the relevant images have been retrieved from database.

ADVANTAGES

- One is that color information is faster to compute compared to other invariants. It has been shown in some cases that color can be an efficient method for identifying objects of known location and appearance.
- This method has been found to yield distortion tolerance space for pattern recognition tasks.

- Fourier-transform simultaneously results in reduction of noise as well as of the dimensionality of the feature vector.
- Image retrieval is performed effectively.

SYSTEM ARCHITECTURE

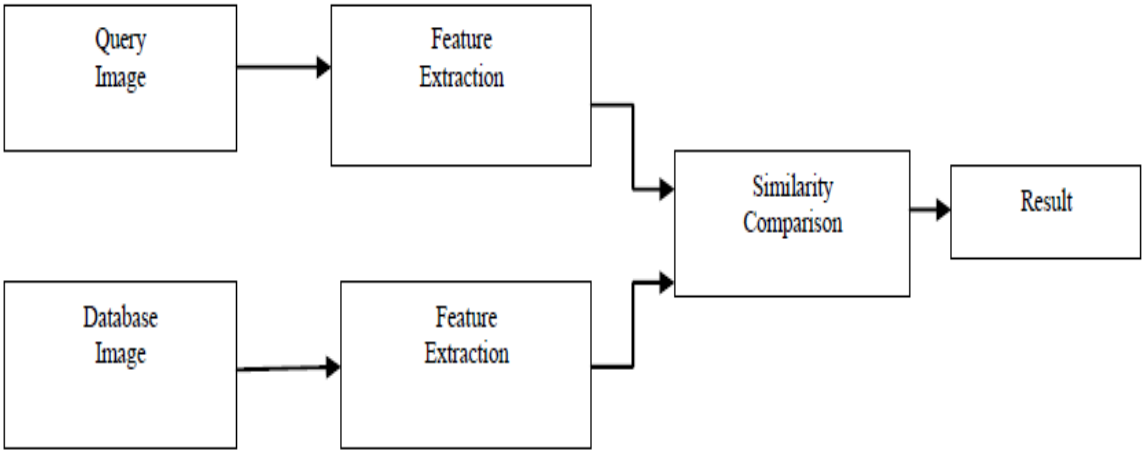

Fig: Block diagram of Content Based Image Retrieval

CONCLUSION

General visual features most widely used in content-based image retrieval are color, texture, shape, and spatial information. Color is usually represented by the color histogram, color correlogram and color moment under a certain color space. Texture can be represented by Gabor Wavelet transformation and HAAR wavelet. Shape can be represented by Fourier descriptors and circularity. The spatial relationship between regions or objects is usually represented by a 2D string. In addition, the general visual features on each pixel can be used to segment each image into homogenous regions or objects. Local features of these regions or objects can be extracted to facilitate region-based image retrieval. Finally, the relevant image from databases have been retrieved.

