Different Approaches of CBIR Techniques

ABSTRACT

Image retrieval has been one of the most interesting and vivid research areas in the field of computer vision. Content-based image retrieval (CBIR) systems are used in order to automatically index, search, retrieve and browse image databases. Colour and texture features are important properties in content-based image retrieval systems. In this paper we have mentioned detailed classification of CBIR system. We have discussed the efficiency of different techniques and the combination of them to improve the performance.

Keywords

CBIR, TBIR, Feature Extraction, Image Retrieval.

1. INTRODUCTION

Content-based image retrieval (CBIR) is a technique for retrieving images on the basis of automatically-derived features such as color, texture and shape. An image or some drawn user input serves as a query example and all similar images should be retrieved as result. In a typical CBIR, features related to visual content such as shape, color, and texture are first extracted from a query image, the similarity between the set of features of the query image and that of each target image in a DB is then computed, and target images are next retrieved which are most similar to the query image. Extraction of good features which compactly represent a query image is one of the important tasks in CBIR. Shape is a visual feature that describes the contours of objects in an image, which are usually extracted from segmenting the image into meaningful regions or objects. The problems of image retrieval are becoming widely recognized, and the search for solutions an increasingly active area for research and development. Problems with traditional methods of image indexing have led to the rise of interest in techniques for retrieving images on the basis of automatically-derived features such as colour, texture and shape – a technology now generally referred to as Content-Based Image Retrieval (CBIR). CBIR technology is now beginning to move out of the laboratory and into the marketplace, in the form of commercial products like QBIC and Virage. However, the technology still lacks maturity, and is not yet being used on a significant scale. In the absence of hard evidence on the effectiveness of CBIR techniques in practice, opinion is still sharply divided about their usefulness in handling real-life queries in large and diverse image collections.

2. CLASSIFICATION OF IMAGE RETRIEVAL SYSTEM

Current image retrieval techniques can be classified according to the type and the nature of the features used for indexing. Detailed classification of complete medical retrieval system is given in figure 1.

3. TEXT BASED IMAGE RETRIEVAL

In this system images are indexed by text, known as the metadata of the image, such as the patient’s id number, the date it was produced, the type of the image and annotated description on the content of the image itself. This kind of system, when used in image retrieval is known as text based image retrieval (TBIR). This is the current system used by most hospitals for organizing medical images known as picture archiving and communication system (PACS).

This approach can offer flexibility in query information, image retrieval based only on text information is not sufficient, since it cannot capture the visual content such as color, texture or shape etc. The amount of labour required to annotate every single image, as well as the difference in human perception when describing the images which lead to inaccuracies during the retrieval process. Hence there is need for a better system. Problems with text-based access to images have shifted the focus of the researchers to content based medical image retrieval.

4. CONTENT BASED IMAGE RETRIEVAL

A growing interest in the area of CBIR is found in recent years due to the hope that the above-mentioned problems might be solved. It is a central issue in CBIR to identify a set of salient image features for indexing and similarity evaluation. Color, shape, texture and spatial relationships among segmented objects are typical features employed for image indexing. Some researches combine two or more of these features to improve retrieval performance.

Content-Based Image Retrieval (CBIR) seems to describe experiments into automatic retrieval of images from a database, based on the colors and shapes present. Since then, the term has been used to describe the process of retrieving desired images from a large collection on the basis of syntactical image features. The techniques, tools and algorithms that are used originate from fields such as statistics, pattern recognition, signal processing, and computer vision.
The main goal in CBIR system is searching and finding similar images based on their content. To accomplish this, the content should first be described in an efficient way. When the query image is given to the system, the system will extract image features for this query. It will compare these features with that of other images in a database. Results will be displayed to the user. Fast and accurate retrievals among the data collections can be done according to the content description of the query image.

In this paper we have proposed a content-based image retrieval method based on an efficient combination of color and texture features. Both color and texture features of images are extracted and stored as feature vectors in a database. During the retrieval process, the color and texture feature vector of the query image is computed and matched against those features in the database.

5. IMAGE RETRIEVAL USING COLOR AND TEXTURE FEATURES

Most of the early studies on CBIR have used only a single feature among various color and texture features. However, it is hard to attain satisfactory retrieval results by using a single feature because, in general, an image contains various visual characteristics. Recently, active researches in image retrieval using a combination of color and texture features have been performed. When an RGB query image enters the retrieval system, it is first transformed into HSV color image. Then color feature is extracted and formed the color feature vector. Similarly the texture feature is extracted and formed the texture feature vector. After the color and texture feature vectors are extracted, the retrieval system combines these feature vectors, calculates the similarity between the combined feature vector of the query image and that of each target image in an image database; and retrieves a given number of the most similar target images.

A. Color Features

Several methods for retrieving images on the basis of color similarity have been described in the literature, but most are variations on the same basic idea. Each image added to the collection is analysed to compute a colour histogram which shows the proportion of pixels of each colour within the image. The colour histogram for each image is then stored in the database. At search time, the user can either specify the desired proportion of each colour (75% olive green and 25% red, for example), or submit an example image from which a colour histogram is calculated. Either way, the matching process then retrieves those images whose colour histograms match those of the query most closely. The matching technique most commonly used, histogram intersection are now used in a high proportion of current CBIR systems.

B. Texture feature

In CBIR, texture features play a very important role in computer vision and pattern recognition, especially in describing the content of images. Texture features typically consist of contrast, uniformity, coarseness, and density. The ability to retrieve images on the basis of texture similarity may not seem very useful. But the ability to match on texture similarity can often be useful in distinguishing between areas of images with similar colour (such as sky and sea, or leaves and grass). There are two main approaches for texture representations, statistical method and transform method. These calculate the relative brightness of selected pairs of pixels from each image. From these it is possible to calculate measures of image texture such as the degree of contrast, coarseness, directionality and regularity or periodicity, directionality and randomness. Texture queries can be formulated in a similar manner to colour queries or by supplying an example query image. The system then retrieves images with texture measures most similar in value to the query.

6. APPLICATIONS OF CBIR

- Crime Prevention
- The Military
- Medical Diagnosis

Crime Prevention: The Law enforcement agencies typically maintain large archives of visual evidence, including past suspects’ facial photographs (generally known as mug shots), fin whenever a serious crime is committed, they can compare evidence from the scene of the crime for its similarity to records in their archives. Strictly speaking, this is an example of identity rather than similarity matching. Fingerprints, tyre treads and shoeprints. The systems designed for verifying the identity of a known individual and capable of searching an entire database to find the closest matching records The basic techniques for automatic fingerprint matching are now in routine use at the FBI in Washington, as well as a number of police forces around the world. A number of AFIS (automatic fingerprint identification systems) are now commercially available, including AFIX Tracker from the Phoenix Group. Face recognition is also a reasonably mature technology. Most current systems use either a version of the eigenface method. The former method is most successful with mug shots, where lighting and pose can be carefully controlled; the latter method, is more robust where faces may appear at any angle under a variety of lighting conditions, as in security videos.

The Military: Military applications of imaging technology are Recognition of enemy aircraft from radar screens, identification of targets from satellite photographs, and propulsion of guidance systems for cruise missiles. Many of the techniques used in crime prevention could also be relevant to the military field.

Medical diagnosis: The increasing reliance of modern medicine on diagnostic techniques such as radiology, histopathology, and computerized tomography has resulted in an explosion in the number and importance of medical images now stored by most hospitals. The prime requirement for medical imaging systems is to be able to display images relating to a named patient, there is increasing interest in the use of CBIR techniques to aid diagnosis by identifying similar past cases.

7. CONCLUSION

Here different methods are used for extracting color and texture features. And for similarity measurement 3 methods are used and compared there results. Here we conclude the DWT method gives us better precision and Canberra distance methods gives better performance than the other methods. The main Challenge in front of the CBIR system is time Complexity and to design the good, efficient GUI.

8. REFERENCES


