"Analysis Of Various Cbir Techniques For Retriving Forensically Viable Information From The Images"

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***Abstract* - Image retrieval has been one of the most interesting and vivid research areas in the field of computer vision .When the images are geo-tagged the information contained in them constitute an important factor in digital forensics. There are various techniques through which the information stored in an image can be retrieved for forensic evidences. Content-based image retrieval (CBIR) systems are used in order to automatically index, search, retrieve and browse image databases. Color and texture features are important properties in content-based image retrieval systems. In this paper we have mentioned detailed analysis of CBIR system.**

Keywords - CBIR, TBIR, Image Retrieval, Feature Extraction

I. INTRODUCTION

Digital forensic is playing an important role considering the availability of the storage media such as Clouds, increase in the use of social networking sites wherein people are uploading their personal information. Use of mobile phones, smart phones for uploading geo-tagged images is also increased. These images constitute as an important evidence for forensics.

Human judge similarity of image and sounds according to their semantic contents, for instance the searching for a politician's picture is based on his facial characters or other contents.

Content-based image retrieval (CBIR) is a technique for retrieving images on the basis of automatically derived features such as color, texture and shape. Users in many professional fields are exploiting the opportunities offered by the ability to access and manipulate remotely-stored images in all kinds of new and exciting ways [1] [2]

After a decade of intensive research, CBIR technology is now beginning to move out of the laboratory and into the marketplace, in the form of commercial products like QBIC [3] and Virage [4].

The history of the content-based image retrieval can be divided into three phases:

- The retrieval based on artificial notes.
- The retrieval based on vision character of image contents.
- The retrieval based on image semantic features.

The Image Retrieval based on artificial notes using traditional keywords having two problems. First it brings heavy workload and second it still remains uncertainty and subjectivity. As image retrieval based on artificial notes still remains insufficiency, the image feature extraction has been come up. The accuracy of image is depends on the extracted features. So the research based on feature extraction is now focused. The feature of vision can be classified by semantic hierarchy into middle level feature and low- level feature. Low-level feature includes color, texture and inflexion. Middle level involves shape description and object feature [5, 6, 7, 8, 9].

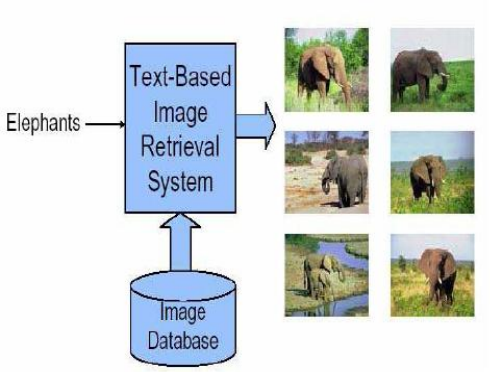

Fig 1: Text Based Image Retrieval (TBIR) [5]

A. Text-Based Image Retrieval

The TBIR technique is easy to implement as input is text only. The retrieval of images is very fast and useful for searching web images (surrounding text). As shown in fig 1, the input is text which gives collection of images as output.

On the other hand it has several disadvantages –
– Manual annotation is not always available
– Manual annotation is impossible for a large DB
– Manual annotation is not accurate
– A picture is worth a thousand words
– Surrounding text may not describe the image

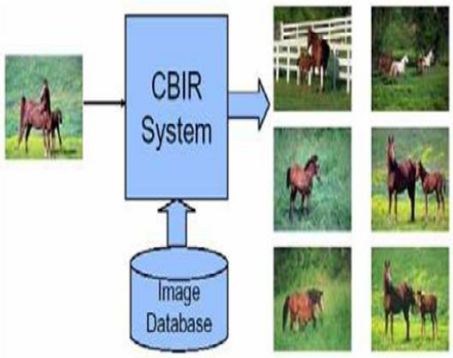

Fig 2: Content Based Image Retrieval (CBIR) [5]

B. Content-Based Image Retrieval

The CBIR technique is helpful to overcome the flaws in TBIR technique using image as input for searching. The retrieval is based on visual features of image such as color, texture and shape which are extracted automatically.

II. IMAGE RETRIEVAL USING COLOR AND TEXTURE FEATURES

CBIR has used single feature among various color and texture features in its early studies. As an image contains various visual characteristics, it is hard to attain satisfactory results by using a single feature. 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 [10].

A. Color Features

On the basis of color similarity, several methods for retrieving images have been discovered. The color histogram computed for each image added to collection. This histogram shows the proportion of pixels of each color within the image. The color histogram for each image is then stored in the database.

There are two techniques for retrieval of images either the user can specify the desired proportion of each color (for e.g. 70% green and 30% red) or input an image from which a color histogram is calculated. The matching process then retrieves those images whose color histograms match those of the query most closely. This matching technique is most commonly used, histogram intersection are now used in a high proportion of current CBIR systems.

B. Texture feature

In CBIR, to describe the content of images, texture feature is analyzed. Texture features typically consist of contrast, uniformity, coarseness, and density. It may not seems very useful but the ability to match on texture similarity can often be useful in distinguishing between areas of images with similar color (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.

C. QBIC (Query by Image Content)

It was developed by IBM, Almaden Research Center [11, 12] to allow users to graphically pose and refine queries based on multiple visual properties such as color, texture and shape. It supports queries based on input images, user-constructed sketches and selected color and texture patterns.

D. MARS (Multimedia Analysis and Retrieved System)

It was developed by the Beckman Institute for Advanced Science and Technology, University of Illinois. It supports color, spatial layout, texture and shape matching.

E. VIPER (Visual Information Processing for Enhanced Retrieval)

It was developed at the Computer Vision Group, University of Geneva. It supports color and texture matching.

III. RETRIEVAL BASED ON HIGH LEVEL SEMANTIC FEATURES

A. Retrieval by high level color properties

The spatial arrangement of chromatic contents in the image is obtained using the theory formulated by Johannes Itten in 1960 [14]. In this theory, seven types of contrast are defined:

1. Contrast of hue
2. Light-dark contract
3. Cold-warm contrast (Yellow through red–purple give the filing of ‘‘warm’’, yellow–green through purple is find as ‘‘cold’’)
4. Complementary contrast
5. Simultaneous contrast
6. Contrast of saturation
7. Contrast of extension

Harmony is defined as a combination of colors resulting in a gray mix that generates stability effect onto the human eyes. Non-harmonic combinations are called expressive. Itten’s model is adopted for defining fuzzy production rules that are used to translate the low level semantic features into sentences qualifying warmth degree, and contrasts among colors [13].

B. Retrieval by high level texture properties

Transforming the low level texture characteristics into high level semantic features such as texture of wood, rock, wall-paper, etc. is made by calculation the low level texture characteristic of a typical set of corresponding textures and finding the "cluster center" values which is used in the fuzzy production rules [13].

C. Retrieval by high level shape properties

A set of typical shapes characterizing the domain specific objects are defined. Fuzzy production rules are used for calculation similarity between the search shape and given object shape. They are obtained after image mining.

D. Retrieval by high level semantic features

A set of high level semantic features which are defining in the image mining process are used. They combine high level color, texture and shape properties and high level semantic features defined by the expert during the image mining.

IV. APPLICATIONS OF CBIR

- Medical Diagnosis
- The Military
- Crime Prevention

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.

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

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.

V. CONCLUSION

Here different methods are used for extracting color and texture features. It is widely recognized that most current content based image retrieval system work with low level features (color, texture and shape).

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