Different Types of CBIR Applications : A Survey

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ABSTRACT

Visual information in large digital databases has been grown abundantly in the recent years and content based image retrieval (CBIR) attracts the interest of image processing oriented research people. The CBIR systems are vital performance due to the usage of features such as color, texture and shape of the query image. Searching a collection of images that have similarities with input images and without knowing the name of the image, makes a search system that applies the concept of content-based image retrieval (CBIR), is very necessary. The successful of the CBIR system creates the intension to apply it on many real world fields such as search engine, web and human disease analysis etc., This paper surveys a lot of applications based on the CBIR systems and this paper concentrates on the four types of applications which are belongs with medical field, remote sense imaging, forensic, security applications. The recent papers which are written showed that the applications which are reviewed with the explanation about technologies used to enhance the study of CBIR based applications and the methods which are adopted for CBIR in recent period. This paper is more useful for the people who want to continue their research in content based image retrieval.

Keywords: Image Retrieval, Security, Sensing and Texture, CBIR

I. INTRODUCTION

The content based retrieval is a dominating research area in image processing because of its variety application possibilities in both academic and industry. The CBIR method is working based on the query image and the relevant images from database are ranked based on their similarity with query image. The CBIR applications can be implemented through cloud systems, mobile phones, peer to peer network, relational databases, social network and World Wide Web. The CBIR techniques can be applicable to variety of image types and variety of real world fields. These applications makes people's environment and life style with easy approaches which are related with image oriented applications. This paper is written as a survey

of the applications developed via CBIR techniques to understand the working method and usage of CBIR in different field of applications.

II. REAL WORLD APPLICATIONS USING CBIR

In the recommendation system, abusive content is checked and reported by the machine, not other users. Some disrespectful words/slang was flagged as abusive and users suggested this as well. The bullied user will then be prompted to indicate whether they want to block and report the abuser. If the user chooses to block others, this is done immediately; otherwise the case is considered a false positive. A dataset used to train a computer to recognize abuse and distinguish it from other texts.

The CBIR concept can be associated with large number of real world applications and the major applications are oriented with following types:

- Medical applications
- Remote sensing image retrieval
- Forensic applications
- Security applications

The figure 1 illustrates the different types of applications possible using CBIR.
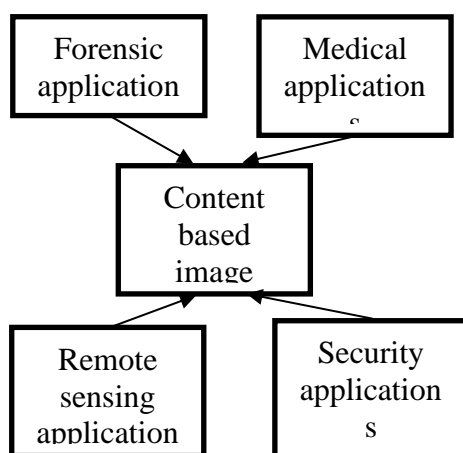

Fig.1 Block diagram of different CBIR applications

III.APPLICATIONS DISCUSSION

There are different image retrieval based applications are currently used.

A. Medical applications

This presents an application for retrieving 2D MRI (magnetic resonance images) slices from 3D brain volumes. This application accepts 2D MRI query image from user and it identifies the matched 3D volume according with the query slice related brain region. The matched slices are retrieved by further searched within the matched 3D volume. This CBIR system is working based on the support vector machine (SVM) method.

An application named I-Browse to search histological images from the medical database and it contains the facility of image retrieval by both iconic and semantic contents. It also generates textual annotations for the input images. This is a better image retrieval tool for physicians in the case of histological images.

A new CBIR method named Customized- queries approach (CQA) is used to retrieve the lung images for assisting physicians. A clustering algorithm called as feature subset selection using expectations maximization clustering (FSSEM) is used to get the accurate image retrieval. It works based on the two steps and one of them is query lung image classification based on disease class labels.

The other step is the retrieval of most similar images by the feature customization (as subclass) among the disease class.

A medical image retrieval scheme is designed to retrieve the medical images from the IRMA database which is available in internet. This CBIR application is designed by the Query independent multi-view features fusion (QDMFF) method. The QDMFF method applies linear approximation to reduce the implementation cast of multi-view learning. Then a relevance feedback system is applied iteratively to find the final relevance medical images.

Pathology image databases contain microscopic images and that microscopic images are utilized by pathologist to make medical diagnoses. The pathology image retrieval is one of best applications of CBIR. They built a methodology for pathological image retrieval. A Client server architecture is established in associated with the physicians desktop. The user query image is used for the retrieval from pathology database by the corresponding annotations and the image contents. The feature sets are derived by color histogram, image texture, Fourier coefficients and wavelet coefficients.

And also used in explores an application to retrieve lung images from the position emission tomography and computed tomography (PET-CT) volumes of patients. The graph based CBIR technique is adapted with this application. An offline process is used to embed each graph into a vector space in database side and the query feature graph is also embedded into the vector space. The distance between the two points in the embedded vector space decides the relevance lung images related with query lung image.

B. Applications in remote sensing images

Remote sensing images are very important for the territorial management. This presented a CBIR method for remote sensing images using the structure tensor Riemannian statistical models. In this application very high resolution (VHR) remote sensor images are used as input and the property of anisotropy is modeled by Local structure tensor (LST) to achieve the image retrieval of remote sensing images.

It yields image retrieval on remote sensing image (RSI) and this application has worked based on a grid system named RSIsGrid for semantic based RSI retrieval. This CBIR method provides better recall, precision and query time for retrieval. The Grid technology is applied in this application. This RSTsGrid framework has the capacity of dynamically sharing a large volume of distributed RSIs.

Image retrieval for optical images (Satellite images) is generalized and which is packed with the supervised classification procedure. This supervised classification

is strengthened by extraction of texture features through the learning in database. Wavelet based multivariate model is applied in this application to retrieve VHR panchromatic data. This application can be used with the searching of forest area images, vegetation area images and building area.

Change detection is the estimation of changes (in land cover) occurred in a specific interval on the same land cover space. The detection and estimation of variation of two satellite images can be found using the application. This paper deals with the change detection using relevance feedback method and target is achieved by two steps. The first step asks the user about the relevance information about the target change and the second step make updating on change detection results.

Geographical images are commonly acquired by the satellites or aircrafts. The implementation of CBIR on the geographical image database can be used to organize the geographical images of a specified area and this application is much needed for military applications. This contributes an application to make searches geographic images from satellite imagery. The power in performance is due to the bag-of-words (BOW) approach and the vector of locally aggregated descriptors (VLAD).

Enteromorpha Prolifera is a green alga intensively in a specific area on the sea surface in the floating state. The flood of the enteromorpha prolifera contains large quantity of nutrious ingredients in the sea water. The large area occupation of the alga makes unwanted disturbances in the natural sea oriented human life. This disaster can be prevented by detecting this alga and so it is very crucial one for safety of human life. And CBIR presents a scheme for the detection of this alga. This task is achieved by the RGB to NTSC color space conversion and the k-means segmentation algorithm.

C. CBIR applications on forensic

The main part of human life habit is connected with digital images and these images are growing vulnerable

to digital forgery. The photo editing software's are the main factor for this issue. The traditional method available for examining and authentication of each image in a large database is practically not possible. If an automatic system is developed to detect or trace a special characteristic in digital images of database, then the valuable time of forensic people can be saved much. CBIR presents an application for this purpose and it finds glare property in the image. This method retrieves the glared images from a large database using Benford's law. This application can be much useful for forensic people to search photos with specified light source.

Forensic people need an application to search the specified images taken by a specified type of camera which are used among internet web pages to maintain lawful actions against child pornography and others. CBIR develops an application for these criteria by an image retrieval system to retrieve images based on compressed camera identification.

Forensic department people need the identification of tattoo images from human bodies to detect the culprits who may contains tattoo images in their body parts. The traditional ways are not suitable for this usage, so there is a need of applications to search the tattoo images. The CBIR describes an idea for this type of forensic requirement by the concept of tattoo image matching and retrieval. This retrieval is achieved by the Tattoo-ID based matching system. The image features are derived using Scale invariant feature transform (SIFT).

D. CBIR Applications on Security Issues

Physician or a diagnosis aid system can search medical images into a distance server using a query image and that server retrieves that relevance images and share that health records with the physician or diagnosis aid system. In this case security issues raised to maintain the confidentiality and data privacy. Due to this reason, there is a need of CBIR systems with security which should support retrieval of encrypted images. CBIR develops a method to support this type of applications using homomorphic encrypted images. The wavelet based image features are used in this method and the encrypted images can be retrieved by physicians using client server architecture with secured way.

The Scientists provides a CBIR method to support the encrypted image retrieval application. This method uses encrypted jpeg images for secured retrieval of medical images. The AC coefficients of markov process are used to maintain security. In client side, the encrypted images (returned by the server) are decrypted to original image using encryption key. Biometric security systems have been attracting researchers because of its unique power in security systems. Biometric security systems are deals with human's unique physical or behavioral characteristics to help the identification system. To tune the speed of identification into fast mode, the CBIR systems can help to the development of biometric security system. It is a method to image retrieval for biometric security system by using three features such as color, texture and shape. This method not only fastens the biometric system speed and it reaches better accuracy level in image retrieval.

TABLE I

COMPARATIVE SURVEY OF CBIR APPLICATIONS AND METHODS

S.No	CBIR Applications	Areas	Methods
1.	Medical applications	MRI Image analysis	SVM
		Brain tumour image retrieval	SVM
		Lungs image retrieval	CQA and FSSEM
		Histological image retrieval	QDMFF, I-Browse
		Pathological image retrieval [5]	Graph based CBIR
2.	Remote sensing image retrieval	Remote sensing image retrieval	structure tensor Riemannian statistical

		model, RSIsGrid
	Satellite image retrieval	Wavelet based multivariate model
	Geographical image retrieval	Chance detection using RF, VLAD
	Aerial image retrieval	K-means segmentation in NTSC color space
3.	Forensic applications	Glare based image retrieval	Using Benford's law
		Camera identification based image retrieval	compressed camera identification
		Tattoo image retrieval	SIFT, SIFT and LSS
4.	Security applications	Encrypted image retrieval	Wavelet based feature AC coefficients of markov process

The increase of airports and latest monitor equipment hikes the quantity of monitoring data (or images) too large to handling. To improve this airport video monitoring system, the CBIR methods can able to help to improve the security level. The airport security can be further accelerated by the CBIR method which is described in the paper [26] using Distributed indexing Schema D-MVP.

IV.CONCLUSION

The real world needs CBIR idea in many fields such as medical image retrieval, natural image retrieval and remote sense image retrieval etc. This paper presents some latest application developed based on CBIR to assist the fields such as image retrieval in medical, natural and remote sense images. This paper also illustrates the latest papers which are handled the applications with related to business, security, forensic and miscellaneous fields. The papers listed in this review-of-CBIR-application provide data about how CBIR can be utilized for the above mentioned four types of applications? This paper concludes that CBIR can be used too many real world application with the benefit to users. The readers who read this paper can easily understand and study the different type of applications using CBIR.

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