International Journal of Electronics Engineering (ISSN: 0973-7383)
Volume 11 • Issue 1 pp. 1038-1040 Jan 2019-June 2019 www.csjournals.com

Content Based Image Retrieval Framework For Medical Images-A Review

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Abstract

Image retrieval from databases or from the Internet needs an efficient and effective technique due to the explosive growth of digital images. Image retrieval is considered as an area of extensive research, especially in content based image retrieval . CBIR retrieves similar images from large image database based on image features, which has been a very active research area recently. The content, that can be derived from image such as color, texture, shape…etc., are called features. This paper will present a survey and discuss the current literature of different types of image retrieval systems. An overview of the important techniques in image retrieval will be discussed. Finally, some urgent challenges in image retrieval, that have been raised recently, will be presented as well as possible directions for future research.

Keywords: Content–based image retrieval (CBIR), Digital Images, Medical Images.

INTRODUCTION

In recent years, collections of digital images are created and increased rapidly. In many areas of academia, commerce, government, medicine, and Internet, a huge amount of information is out there. However, we cannot access or make use of this information unless it isorganized to allow efficientbrowsing, searching, and retrieval. One of the main problems is the difficulty of locating a desired image in a large and varied collection. While it isperfectly feasible toidentify a desired image from a small collection simply by browsing, more effective techniques are needed with collections containing thousands of items. Image retrieval attracts interest amongresearchers in the fields of image processing, multimedia, digital libraries, remote sensing, astronomy, databaseapplications, and other related areas.

The rapid growth in the field of software and hardware for medical imaging (technique and process to create images of human body for clinical procedure), has made the medical science very high-tech. The continuous collaborative approaches of handling medical procedures have led to exponentially develop the large database of medical images.
The ultimate goal of medical imaging would succeed only if an intelligent, fast, and accurate medical image retrieval system could emerges out which should be adoptive in accordance to rapidly growing data size and semantically distinguishable as the features of various medical images are fuzzy in nature for different organs.

The medical images are distinguished in its characteristics as compared to the general purpose images (GPI). Thus the process adopted for searching GPI is not adoptable as it is in the case of medical image retrieval system.Recently, advances in ContentBased Image Retrieval prompted researchers towards new approaches in information retrieval for image databases. In medical applications it already met some degree of success in constrained problems. The generic framework is shown in Figure 1.

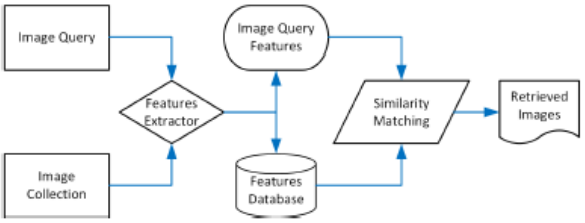

Fig1: Framework for content-based image retrieval system

Notwithstanding the progress already achieved in the few frameworks available here is still a lot of work to be done in order to develop a commercial system able to fulfill image retrieval/diagnosis comprehending a broader image domain.

I. LITERATURE REVIEW

Bridging the semantic gap for image retrieval still considered a big challenge. Even though there are a lot of efforts and works on image retrieval research, but it is not enough to provide satisfactory performance. However, there are still some spaces, which need to be improved besides the challenges that is associated with mapping low level to high-level concepts. Also overcome of the semantic gap in the broad domain database is complex because the images in broad domains can be described using various concepts.There are needto see better supportfor the image retrievalbased semantic concept with a focus on the retrieval by abstract attributes, involving a significant amount of high-levelreasoning about the meaning and purpose of the objects. In addition, the extracted semantic features should be applied for any kind of image collection. Moreover, there is need to effective ways retrieve of similar images that are conform to human perception and without human interference. Bin Zhang et al. [1] has discussed an adaptive image retrieval system using wavelets. They presented an adaptive content based image retrieval system (A-CBIRS) which dynamically selects the wavelet filter for feature computation depending on the query pattern. Future work would concentrate on using other features besides the Gabor ones to “guide” the search for the best texture and its attached wavelet. Antani et al. [2] Their research work is focused on developing techniques for hybrid text/image retrieval

from the survey of text and image data. Their research also shows various challenges that come into existence, when a particular CBIR system is developed especially for the biomedical images. Ramos et al. [3] In their proposed work in radiology, reports are done whichsupervise the CBIR. Inferring the relationship between the patients and subsequently applying them to supervise the metric learning algorithms are the main phases of the proposed work. Their research work calculates the text distances between exam reports in the exam image space to supervise a metric learning algorithm. Using this method, there is a consistent increase in the CBIR performance. Varish et al. [4] proposed a model in which they have extracted the statistical features based on the color feature. They have calculated the probability histogram from the color histograms by using RGB color space of an image. They have used Precision and Recall as performance parameter and that CBIR model using statistical features shown efficient results. Shinde et al. [5] proposed a system which performs classification based on the color feature. They have extracted the color features and those features then have applied to two classifiers: Naïve Bayes and OneR classifier, which classify the various images. Patil et al. [6] have also used three features for the better result. In this paper, they have extracted texture, shape and color features from the soybean leaf and this has given the good retrieval results. Sugamya et al. [7] proposed a CBIR system which uses the Support Vector Machine classifier for the CBIR classification. In this paper, researchers have also extracted three features i.e. texture, shape, and color from the image. BhavneetKaur et al. [8] proposed a system which uses three classifiers KNN, Naïve Bayes and SVM for the classification of images with the relevance feedback approach. They have calculated Precision and Recall also and shown good results. Deole et al. [9], the authors have used the K-nearest Neighbour Algorithm (KNN) for classification along with the colour feature extraction for the image retrieval. The classification of images based on KNN and the use of relative standard deviation showed an improvement in the performance of the CBIR system. . Sundaresan SM et al.[10], the authors have proposed a novel method known as Navigation Patterned based Relevant Feedback (NPRF), for high efficiency and the effectiveness of CBIR, to cope with the large-scale image data. Thisalgorithm makes the use of the discovered navigation patterns and the query refinement strategies, Query Point Movement (QPM), Query Reweighting (QR) and Query Expansion (QEX) to converge the search space towards the user's intention efficiency. The new method proposed by authors showed higher retrieval accuracy than other methods. However, the feasibility of the implementation of this method is a problem and the use of three query refinement strategies increases the retrieval time which is not desirable after a limit. Deepa Rani et al. [11], a CBIR system based on SVM (Support Vector Method) is proposed. The modified support vector method used in this paper to retrieve images is fast and efficient. The reported work in this paper can be further extended for the development of a CBIR system for the automated image processing suitable for real-time applications. This method can beused specifically for the retrieval of astronomical images (images of stars, comets, nebulae, star clusters and galaxies). Singh et al. [12], the authors have proposed a new method for the retrieval of images in which, to improve the discriminating power of the techniques for colour indexing: a minimal amount of spatial information is encoded within the colour index. The method combines the colour moments and text features based on global features. The experimental results showed that this method has higher retrieval accuracy than other methods. . Katare, et al. [13], the author has proposed a new CBIR system for the retrieval of multi object images. The method used consists of a GVF active contour for the efficient shape segmentation in a multi object scenarioThe author has also proposed a new method in addition to the automatic initialization of active contour. The experimental results of this method were very encouraging. Vimina E. R. et.al, [14], the authors have presented a CBIR system using local colour and text features of the image sub-blocks and global colour and shape features. For this purpose, Edge Histogram Descriptor (EHD) was used. The experimental results showed that the method gives better results. Hou, Gang, et al. [15], the authors have proposed a novel feature descriptor known as Texture Structure Histogram (THS) for the content-based image retrieval. The method proposed uses the colour and the edge orientation information. The quantization scheme used is based on the non-equal levels of quantization due to which the information is conveyed effectively. Thus, the literature survey shows that there is an appreciable progress in the field of CBIR. The researchers have found different techniques and implemented the algorithms based on them for the improved performance and have achieved better results. This paper presents a CBIR system based on the extraction of colour feature using the equivalent HSV model of image, and texture feature extracted using the statistical approach.

CONCLUSION

The purpose of this proposed study with Review is mostly concerned with developing a novel framework intended for efficient content based image retrieval. The study mostly emphasized on overcoming the image similarity issues.The framework for biomedical image retrieval and classification has been introduced for obtaining high efficient CBIR such as visual descriptors,SVM,Image filtering process.The performance is found to be quite higher during the similarity measurements as compared to the conventional baselines. In future, there is a need to work more and more with available techniques to deal with the semantic gap to enhance image retrieval.As a survey, it is very difficult to include each and every aspect of all works. However, this paper focused to give overview of the most common traditional and modern types of image retrieval approaches.

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