Survey on Content Based Image Retrieval Techniques

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Abstract-Image retrieval is the process of surfing, examining and retrieving images from a huge database of digital images. There are various areas in which digital images are used such as-crime prevention, commerce, finger print recognition, surveillance, hospitals, engineering, architecture, fashion, graphic design, academics, historical research, and government institutions etc. Because of this widespread demand we need to enhance in retrieval precision and minimized retrieval time. The prior methods were only dependent on text based searching instead of its visual feature. Many times just one keyword is redundantly used with more than one images, therefore it leads to erroneous outcomes. Consequently, Content Based Image Retrieval (CBIR) is evolved to defeat the restriction of text based retrieval. There are various methods for image retrieval proposed in literature based on the content (color, texture or shape) of images. In this paper, we will provide in depth survey on image retrieval techniques.

INTRODUCTION

Content based image retrieval is one of the utmost standard and growing research areas of the DIP (Digital Image Processing). Most of the offered image search tools, for instance Google Images and Yahoo! Image search, are centered on textual annotation of images. In these tools, images are manually annotated with keywords and then recovered with the help of text-based search approaches. The performances of these schemes are not acceptable. The objective of CBIR is to excerpt visual content of an image inevitably, like color, shape or texture. The CBIR tools can be utilized in numerous applications such as digital libraries, photo sharing sites and crime prevention. Such a scheme has great value in capturing suspects and recognizing victims in forensics and law enforcement. A probable application is matching a forensic sketch to a galleria of mug shot images. The part of recover images based on the visual content of the request picture intensified lately, which strains on the quite wide approach spectrum on the field of the image processing [1].

Lately, the content-based image retrieval has grown as hot topic and the methods of content-based image retrieval are recognized as a great development work [2]. In typical content based image retrieval (CBIR) system the visual content of the images in the database are extracted and descried by multidimensional future factors. Color features are usually utilized for image retrieval in an Image Retrieval System. Figure- 1 shows the content based image retrieval.
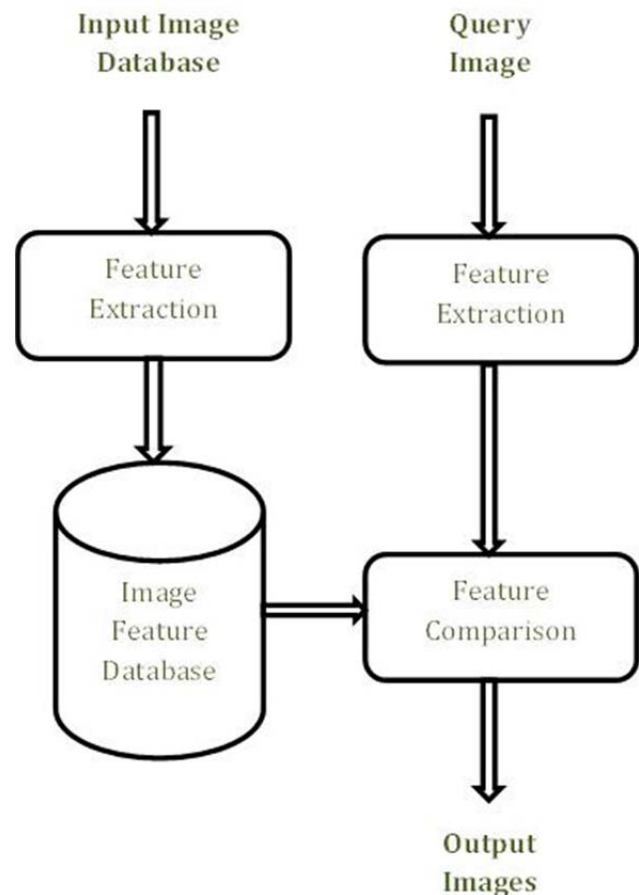

Figure- 1: Content Based Image Retrieval System

There are two essential principles of CBIR Systems for retrieving the images and they are- feature extraction and matching. When we gave the image as input to the image retrieval system, then it extorts the features of image and these features were compared with the features of images which are already stored in the database. After that image retrieval system figure out the distance between input image and further images which are already stored in the database and then images are shortlisted based upon their distance. At this time we have a list of the images that have smaller distance with input image or image to be searched and these images are considered as outcome of the image retrieval system. This searching process is depends on most identical image that are already stored in the database, instead of exact match of a searched image [3]. To describe the image through small number of descriptors, feature

extraction is one of the most essential steps in the image retrieval system. The fundamental visual features of the images comprise color and texture [4]. The color feature provides user an experience related to visual similafrity, however the texture doesn't provide much of visual experience, yet it helps in retrieving depending upon patterns / textures [5]. Second most important feature of images is texture. Whose representation is being utilized for pattern recognition and computer vision. There are various techniques for content based image retrieval is proposed in literature based on the content (color, texture or shape) of images, some of the content based image retrieval techniques are described in brief in next section.

LITERATURE SURVEY

The objective of CBIR is to excerpt visual content of an image inevitably, like color, shape or texture. The CBIR tools can be utilized in numerous applications such as digital libraries, photo sharing sites and crime prevention. There are various techniques for content based image retrieval is presented in past, which are either based on extracting the individual image feature (color, texture or shape) or combination of these features. Some of the techniques are based on the same image feature extraction, but different in the method of extracting the particular image feature, like- Pooja Verma and Manish Mahajan [6] have utilized canny and sobel edge detection procedure for mining the shape features of a given image, Devyani Soni and K. J. Mathai [7] have utilized color histogram technique and color correlogram technique for mining texture and color feature of a given image, Sagar Soman, Mitali Ghorpade, Vrushali Sonone and Satish Chavan [8] used DCT (Discrete Cosine Transforms) method for mining texture and color feature of images to retrieve requested image etc. Now in this section we will depict some of the most important literature work based on Content Based Image Retrieval.

The authors of [9] have demonstrated that CBIR (Content Based Image Retrieval) technique has overwhelmed all the drawbacks of TBIR (Text Based Image Retrieval) technique in view of the content or feature of given images. Database comprises of diverse types of images and a requested image can easily be retrieved from a huge database of images. Different Features for instance- texture, color mean, histogram, color structure descriptor is taken into concern for mining analogous images from the database. It is shown by the experimental results that collective features can offer superior performance than the solitary feature. Thus, choice of feature is one of the vital matters in the image mining. The scheme is assumed to be effective if semantic gap is lowest. The suggested technique by the authors employed mixture of features therefore it requisite extra space to store the features of images, this is the foremost disadvantage of the offered technique. The outcomes can be upgraded in coming time by presenting user's choice and user's feedback in the scheme. The authors of [6] have utilized canny and sobel edge detection procedure for mining the shape features of a given image. Subsequently, the categorized images are labeled and indexed to make easy the process of applying

extraction scheme in order to mine the related images from given database. The extraction of images from the enormous database as requisite by the user can acquire perfectly with the help of canny edge detection procedure as the results shown by the authors. In this res0earch work authors equate the outcomes based only on the shape feature of images which is mined by utilizing canny and sobel edge detection procedure, but the outcomes have not any enhancement as equated to outcomes created when we take the color feature of given image. The authors of [10] have revealed a very simple idea for efficient extraction of images from a given database by utilizing most general features of Multimedia Content Description Interface- 7 (Mpeg-7). To represent a set of typical methods for indicating multimedia content is the primary aim of Mpeg-7 and furthermore it permits fast and effectual content recognition with a huge amount of application area. In this research work authors have utilized color structure descriptor for color feature retrieval and edge histogram descriptor is employed for texture feature retrieval. The performance of content based image retrieval system can also enhance by means of employing these two features. In this research work, authors used MPEG-7 descriptors to attain better outcomes but the implementation of MPEG-7 descriptors is very difficult and time consuming. The authors of [11] have determined that CBIR (content based image retrieval) system is not a substitute but somewhat it is a supportive constituent of text based image retrieval. Only the combination of the two can effect in acceptable retrieval performance. Authors were studied the main constituents of a CBIR (content based image retrieval) system, together with image feature exemplification, system design and indexing, while clarifying the previous and current technical accomplishments. The authors of [12] have offered the examination of the CBIR System with the machine and human organized relevance feedback, over diverse network topologies together with centralized, distributed, and clustered content examination. In this research work authors have introduced semi supervision to the nonlinear Gaussian shaped RBF relevance feedback scheme and they perceive greater retrieval correctness for their interactive relevance feedback system using RBF. The relevance feedback scheme suffers from some vital complications like- user interaction for offering feedback is very time consuming and laborious work. The authors of [13] have suggested a Content Based Image Retrieval System with color selection approach which offers abilities for query by color and which is supported by 11 color classes, exploited for color approach by every person. In this system images are mined by the use of low frequency DCT coefficients that are altered from YUV color space. Consequently system suggested by authors offers enhanced retrieval performance to assist users to elect from the dominant features of request images. This approach finally increases the effectiveness of retrieval of images based on user's preferences on the demanded image. The authors of [14] have offered the concerns from the viewpoint of real world system creation. They were also discoursed some of the most important feature extraction approaches used in present content based image retrieval systems, and analyze

some of the most important content based image retrieval system implementations. The authors of [15] have contributed their research work for the recognition of the difficulties existing in present Content Based Image Retrieval systems and Biometrics systems depicting image content and image feature retrieval. The authors have suggested a probable methodology for mapping the given image content into the lower level image features. They have also examined the usage of several different color, shape, and texture features for image extraction in Content Based Image Retrieval systems and Biometrics systems.

CONCLUSION

Content based image retrieval is one of the utmost standard and growing research areas of the DIP (Digital Image Processing). Most of the offered image search tools, for instance Google Images and Yahoo! Image search, are centered on textual annotation of images. The objective of CBIR is to excerpt visual content of an image inevitably, like color, shape or texture. The CBIR tools can be utilized in numerous applications such as digital libraries, photo sharing sites and crime prevention. Such a scheme has great value in capturing suspects and recognizing victims in forensics and law enforcement. A probable application is matching a forensic sketch to a galleria of mug shot images. In this paper, we have summarized some of the most important reviews of the past works based on the content based image retrieval techniques which we have studied and observed. In near future we will offer and implement such a system.

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