A Study of Digital Image Retrieval Methodologies - An Extensive Survey

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Abstract- In recent years, very large collections of images and videos have grown rapidly. In parallel with this growth, content-based retrieval and querying the indexed collections are required to access visual information. As a powerful technique, content-based retrieval systems have to provide easy-to-index data structures as well as faster query execution facilities. As digital media become more popular, corporations and individuals gather an increasingly large number of digital images. As a collection grows to more than a thousand images, the need for search becomes crucial. In this review paper we address in order to resolve the problem of retrieving from database a particular image previously seen by the user. Various research papers have been analyzed for improving the system efficiency.

Keywords- Content-based Image Retrieval (CBIR), Sketch-Based Image Retrieval

I. INTRODUCTION

Adding interaction between the user and the CBIR system may help achieving better retrieval results. Interaction ranges from simply allowing the user to submit a new query based on a previous one, to giving the user the possibility to select part of the result image as "relevant" and/or "non relevant for allowing the user to visually arrange a small set of the database images into clusters of similar images and letting the system rearrange the whole database according to these actions, as it is the case the system. The ideal CBIR system would be the one allowing a total freedom query-wise, and in which every image has a descriptor containing a full representation of its semantic, primitive and factual information. Unfortunately, this is not realistic in the general case, because of the following factors: Extraction of semantic data from general images must be performed by human experts, because image processing techniques for object recognition work only within very strict conditions; the cost of manual processing is extremely high, making its use realistic only for a few selected applications for which precise semantic data is absolutely necessary (like medical applications).

Often, it is impossible to obtain some kinds of data from an image solution to the problem of image retrieval. The development of systems that analyze, compress and retrieve unconstrained imagery is extremely relevant due to the enormous amount of this type of imagery that is accessible and is accumulating. Consider that every day we view various forms of visual media, such as television broadcasts, photographs, graphics, animations and videos. These media are provided and stored increasingly in digital form. For example, the World-Wide Web (WWW) is one such source for viewing hundreds of gigabytes of digital visual information.

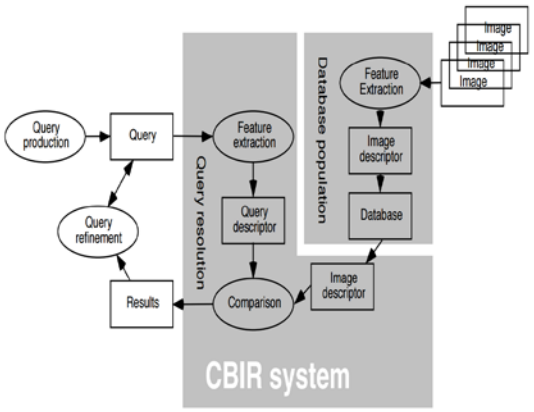

Fig. 1 Various steps in a CBIR session.

While there is great accessibility to large stores of digital imagery, new systems need to be developed to better manage, index and search for the visual information. Since there is no restriction on the content of this visual information, we study a class of techniques for image systems which does not depend on the content or domain of imagery. Though, the techniques the study applicable in a variety of particular domains of imagery such as satellite images, medical images, environmental images and geographical images [5]. In these domains, representations of color and texture that are analogous to those for photographic images do exist. The advantages in providing techniques for spatial and feature analysis of the type has been given in this study are also clear. Image storage and retrieval systems has been analyzed. The basic problem is addressed in this as the search and retrieval of unconstrained images and videos by using visual features. The framework of the typical image and video storage and retrieval (IVSR) environment, which is depicted in Fig. 2

the images and videos are stored in a digital form { in a database, digital archive, le system or distributed network.

Applications of CBIR

• Web searching: A large number of digital images are accessed by the Internet users. CBIR systems can help the users to effectively find what they are looking for.

• Medical diagnosis: A large number of medical images have been stored by hospitals. Thus, CBIR systems can be used to aid diagnosis by identifying similar past cases.

• Journalism and advertising: Articles, photographs, videos of the newspapers, journals or televisions are queried by using CBIR systems.

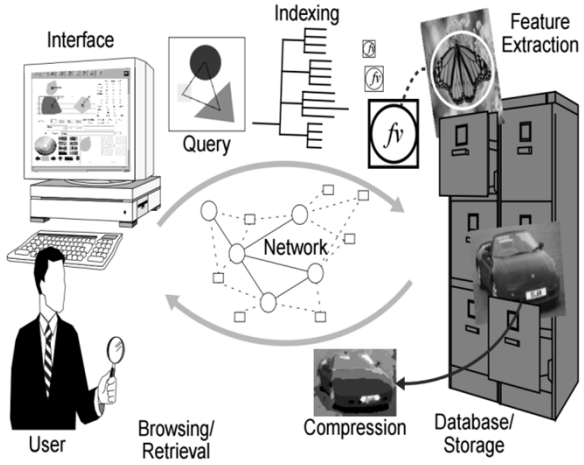

Fig. 2: Image storage and retrieval.

• Military: Databases of all images in military applications; such as remotely sensed data, weapons, aircrafts, automatic target recognition, etc.

• Intellectual property: Most of the companies have their own trademark image. Whenever a new trademark image is to be registered, it must be compared with existing marks to eliminate duplications.

• Crime prevention: After a serious crime, law enforcement agencies search their archives for visual evidence. Such archives include photographs, fingerprints, tyre treads, shoeprints, and etc. of the past occasions. Thus, a CBIR system may help those agencies in finding related evidence.

II. SYSTEMS MODEL

The sketch is input using a wide brush allowing the input of large consistent areas of the color. This is very suitable for the purpose of the sketched based content based image retrieval since humans in general do not remember the specific detail of an image. This gives the user a simple way to input the obvious shape and color features of an image. Texture detail is not specifically input due to the level of the skill in sketching and the need to specifically remember the detail of that texture. However areas of consistent color can well represent the average color of textured areas of the image, allowing texture features of the image to be represented.

Sketch Based Techniques

There are many approaches to CBIR which have be tried and tested however as stated by a number of papers there is no universally accepted method [4]. These methods revolve around the extraction and mathematical representation of the visual data stored within the image. Using the comparison methods they selected and the areas of image retrieval on which they were tested. In the context of sketched based content based image retrieval this is exactly what it is. For the purpose of finding an image using sketched based retrieval the user is expected to provide visual information about the image they wish to locate using the sketch. This sketched image is not expected to provide all the visual detail of the image or images that they wish to retrieve else why retrieve the images, you could simply reproduce them. It is however expected to provide some key visual information to allow the system to perform an accurate retrieval. Previously discussed is the fact that the data within an image can be separated into color, texture and shape data. This key data is roughly represented by the visual features of a sketch, outlines shape, whilst areas of the consistent color provided texture and color layout information.

III. LITERATURE SURVEY

Images are being generated at an ever increasing rate by sources such as defense and civilian satellites, military reconnaissance and surveillance flights, finger printing and mug shot capturing devices, scientific experiments, biomedical imaging and home entertainment [9]. With this huge quantity of image data in circulation image retrieval is becoming more and more important. The process of image retrieval is pulling an image from a collection based on one or more predefined criteria. Most in place systems, Google image search, being a prime example perform this retrieval using meta-data relating to the images in the collection. This meta-data consists of annotations, captions and surrounding text, however, there are many images out there where no such data exists. For large image collection the input of this data would be a very laborious and expensive task. Content based image retrieval is defined as the task of searching for images within a database, which are visually similar to a given example image [3].

Miguelena Bada, A.M. [1] presented a proposal for a queried-by-sketch image retrieval system is introduced as an alternative to text-based image search on the Web. The user will create a sketch as a query that will be matched with the edges extracted from natural images. The main challenge regarding edge detection for Content-based Image Retrieval consists in finding edges for larger regions and avoiding the ones corresponding to textures. For this purpose, a combination of selective smoothing and color segmentation is applied prior edge extraction. An evolutionary algorithm is deployed to optimize the image-processing parameters. Similarity between the user's sketch and the image's edges will be measured regarding two local aspects: spatial proximity and edge orientation. A full architecture for image search on the Web is proposed and preliminary results are reported using a trial database.

Matsui, Y.; Aizawa, K.; Yushi Jing [2] proposed a sketch-based method for manga image retrieval, in which users draw sketches via a Web browser that enables the automatic retrieval of similar images from a database of manga titles. The characteristics of manga images are different from those of naturalistic images. Despite the widespread attention given to content-based image retrieval systems, the question of how to retrieve manga images effectively has been little studied. Authors proposed a fine multi-scale edge orientation histogram (FMEOH) whereby a number of differently sized squares on a page can be indexed efficiently. The experimental outcomes show that FMEOH can achieve greater accuracy than a state-of-the-art sketch-based retrieval method [1].

Mahale, P.; Bhujade, R.K.; Mishra, A.; Kumar, S [3] described the perspicacity based icon healing (CBIR) is four of the superior huge, putsch restrains areas of the digital build processing. In these supplies, images are manually annotated forth keywords and then retrieved using text-based search methods. The system strives for of CBIR is to abstract obvious sphere of an image unavoidably, texture, or shape. This shaping aims to put over a produce the put the screws on and challenges on edge less the cube and the origin of CBIR systems, which is based on an unconventional issue achievement (Sketch based image retrieval SBIR). The system intuitively interact the SURF using to find out the clear image from your database with standard deviation. Nearly the aid of the solid methods, in the altogether depart the so-called algorithm is correct than the real algorithms, which depths minister to the informational gap between a sketch and a related image. Extensive, the returns show become absent-minded the sketch based laws allows users an intuitive access to search-tools.

Filho, C.A.F.; De A Arajujo, A.; Crucianu, M.; Gouet-Brunet, V. [4] presented the use of sketches lets one express a precise visual query with simple and widespread means. The challenge consists in finding a content representation that allows you to effectively compare sketches and images, while supporting efficient retrieval in order to make the system scalable. Authors put forward a sketch-based image retrieval solution where sketches and natural image contours are represented and compared in the wavelet domain. The relevant information regarding query sketches and image content has, thus, a compact representation that can be readily employed by an efficient index for retrieval by similarity. Furthermore, with this solution, the balance between effectiveness and efficiency can be easily modified in order to adapt to the available resources. A comparative evaluation with a state-of-the-art method on the Paris dataset and a subset with 535K images of the Image Net dataset show that the solution can preserve effectiveness while being more than one order of magnitude faster.

Szántó, B.; Pozsegovics, P.; Vámossy, Z.; Sergyán, S. [5] aims to introduce the problems and challenges concerned with the design and the creation of CBIR systems, which is based on a free hand sketch (Sketch based image retrieval - SBIR). With the help of the existing methods, describe a possible solution how to design and implement a task spesific descriptor, which can handle the informational gap between a sketch and a colored image, making an opportunity for the efficient search hereby. Experimental results on two sample databases showed good results. Overall, the results show that the sketch based system allows users an intuitive access to search-tools. The SBIR technology can be used in several applications such as digital libraries, crime prevention, photo sharing sites. Such a system has great value in apprehending suspects and indentifying victims in forensics and law enforcement. A possible application is matching a forensic sketch to a gallery of mug shot images. The area of retrieve images based on the visual content of the query picture intensified recently, which demands on the quite wide methodology spectrum on the area of the image processing.

IV. PROPOSED METHODOLOGY

Sketch-Based Retrieval approach that allow users to quickly enter a sketch, as a query to find similar drawings in a database. Drawings can be very complex and contain lots of details. However, when users want to search for a drawing, they might want to omit details and just specify a sketchy representation of its salient features. Or, in other situations, users just recall a specific part of the drawing. As a consequence, another goal of this work is to offer a multilevel description scheme that supports searching both by level of detail and by subparts of drawings. Topological relationships among elements in drawings naturally

translate to topology graphs. However, both graph and subgraph isomorphism are NP-complete problems, making the matching process complex, computationally very costly and hard to scale. Therefore, another goal of the present research is to find an alternative and more efficient method to graph matching.

V. CONCLUSION

Searching for a detail contained in a database image is not possible. In the case of semi-automatically extracted local features, the necessity of human intervention during the database population phase leads to problems due to the cost of the approach and to the subjectivity of the operator. Despite this, extracting features from limited areas of the images is a superior approach. Actually, local features to make querying according to size, position, color, texture, shape, and spatial relations between the extracted areas possible. An approach in which images are represented by local features extracted from automatically selected regions of the image would outperform the CBIR techniques existing at the time.

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