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A Survey On Semantic Image Retrieval For Bigdata

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Abstract: *From last few years, there is an enormous growth in size of digital image collections. Every day, millions of images are being generated, in that semantic Image retrieval is the most complex process in the real time scenario where the similarity finding would be more difficult in case of larger homogeneous image contents. In Semantic based image retrieval, the weight adjustment scheme is used to give the high priority for the contents which are semantically more related. However, the weight adjustment scheme doesn't care about the user feedback which might reduce the user satisfaction level. In this survey, homogeneous image data is retrieved by the proposed fuzzy logic based feedback weight adjustment scheme which will increase the score of the class which is more preferred by the users.*

I. INTRODUCTION

In recent years, a large amount of digital images is created and increased rapidly. In many areas of academia, commerce, government, medicine, and Internet, a huge amount of information is out there. One of the main problems is the difficulty of locating a desired image in a huge and varied collection [1].While it is perfectly feasible to identify a desired image from a small collection simply by browsing, most effective techniques are needed and collecting the thousands of items. Image retrieval attracts interest among researchers in the fields of image processing, multimedia, digital libraries, remote sensing, astronomy, database applications, and other related areas [2].

Image retrieval has been a very active research area since 1970s, with the thrust of two major research communities: database management and computer vision[3]. Therefore, image retrieval can be defined as the task of searching for images in an image database. Image retrieval techniques can be classified into three divisions:

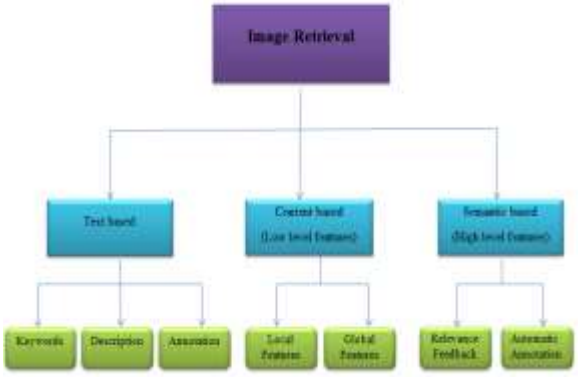

Fig.1. Image retrieval categories.

Fig 1 shows the image retrieval categories in general, TBIR is used to manually annotate the image with database annotations, keywords, or description. The term CBIR seems to have originated with the work of Kato [4] for the automatic retrieval of the images from a database based on the color and the shape. After that, the CBIR term has widely been used to describe the desired images retrieving process from a huge collection of database based on image visual contents, normally called as features (color, shape, texture…etc.)[5].

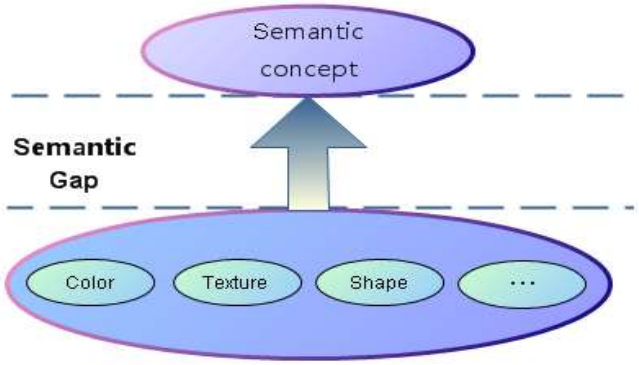

Fig.2. Semantic based image retrieval

Fig.2. Shows the semantic gap between the high-level image and the low-level image. This paper is structured as follows. The summary of the related work of image retrieval is elaborated in section II. This is followed by a detailed description of image retrieval statistics and it based on three image retrieval schemes in section III. Then the comparative analysis of three image retrieval schemes is provided in section IV. Section V concludes with suggesting the extension of proposed work.

II RELATED WORK

Most of the image retrieval schemes are designed aiming at building a path to find the most familiar data in large homogeneous image retrieval.. It is an extreme fast to

perform the similarity search such a binary code.King-Ip Lin, Harpreet S. Sawhney and Kyuseok Shim proposed approach using binarised Laplacian eigen map (LAPEIG) and linear support vector machine (SVM) performs state-of-the-art techniques significantly, while it will maintain a high running speed [6]. When the system retrieves the system, the user checks the relevancy of returned an image. Then the machine learning algorithm is applied to get the user feedback. This process is repeated till the user is satisfied with the results [7].Ontologies in the sense of a formal, explicit specification of a shared conceptualization [8]. A tolerance for imprecision, by a positive use of Fuzzy Logic may be exploited to enhance the power of the Semantic Web [9, 10]. Indeed, there has been natural integration of Fuzzy Logic in Ontology term order to define a new theoretical paradigm called Fuzzy Ontology [11, 12, 13].The notion of Fuzzy Concept Network (FCN), introduced in [14], is extended to incorporate Database Objects so that, concepts and documents can same be represented in the network. It is then introduced and described an Information Retrieval algorithm using an Object-Fuzzy Concept Network (O-FCN).

III. IMAGE RETRIEVAL TECHNIQUES

An image retrieval system is a computer system for reading, scanning, browsing, searching and retrieving images from an immense database of digital images. In this section, we describe three image retrieval techniques, such as TBIR [1, 15], CBIR [2], and SBIR [3].

1. TBIR: Text Based Image Retrieval

TBIR can be traced back to the late 1970s [1]. A very popular framework of TBIR was first annotated the images with text and then it used by text-based database management systems to perform image retrieval [15]. Then, the user represents the textual or numeric queries to retrieve all images that are satisfying some of the criteria based on these annotations, as shown in Fig. 3.

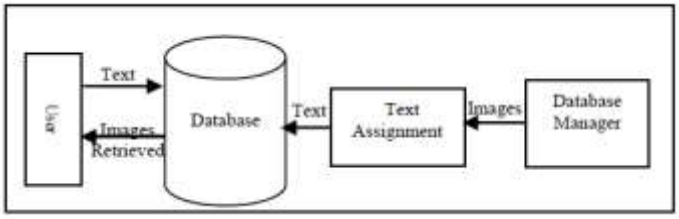

Fig.3.Text Based Image Retrieval

However, there are some drawbacks in TBIR [16]. The first drawback is that the maximum descriptive annotations must usually entered by non-automatic. The second drawback is that the most images are very rich in content and provide more details. The annotator may give the versatile descriptions to images with similar visual contents. Also, textual annotations are language-dependent [17].

2. CBIR: Content Based Image Retrieval

CBIR is considered as an active and a fast advancing research area. It is also called as query by image content (QBIC) and content-based visual information retrieval (CBVIR)[18]. The term CBIR seems to have originated with the work of Kato for the automatic retrieval of the images from a database based on the color, texture and shape. After that, the CBIR term has widely used to describe the desired images retrieving process from a huge collection of database based on image visual contents, normally called as features (color, shape, texture…etc.). Needs of formatting the force behind the emergence of CBIR techniques. The advances in CBIR researches mainly contributed by the computer vision community [3]. It covers different areas, such as image segmentation, image feature extraction, representation, mapping of features to semantics.

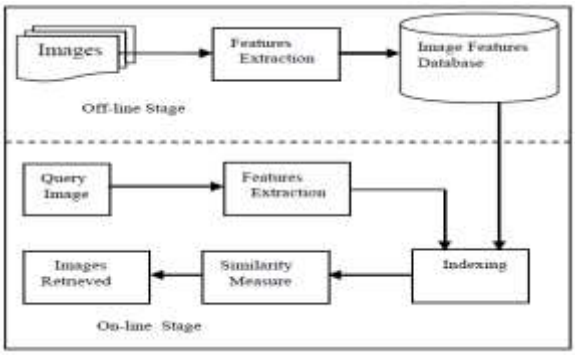

Fig.4.Content based image retrieval

As illustrated in Fig.4 CBIR is divided into off-line feature extraction and on-line image retrieval. In off-line stage, the system automatically extracts features of each image in the database and stores the features database. In on-line stage, the user gives the input an image query to the system. The features of the query images are extracted and represented. Finally, the system returns the images that are most similar to the query image [23]. Another technique for image retrieval is used to integrate the text and image content to enhance the retrieval accuracy. By combining them, as parts of their disadvantages can be overcome .

3.SBIR:Semantic Based Image Retrieval

In general, the problem of CBIR is the semantic difference between the high-level image and the low-level image.. As shown in Fig.5, SBIR can be made by extraction of low-level features of images to represent the meaningful and interesting regions/objects based on the similar characteristics of the visual features.

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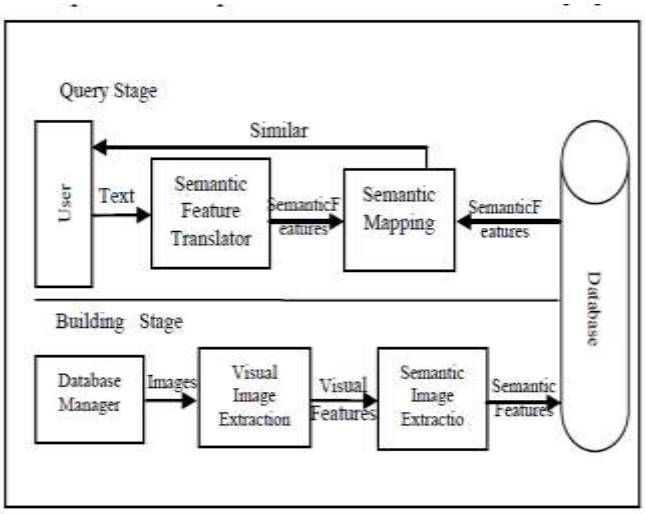

Fig.5.Semantic based image retrieval

This mapping will be over through supervised or unsupervised learning tools to associate the low-level features with object concept and will be annotated with the textual word through image annotation process [2]. Semantic content obtained either by textual annotation or by complex inference procedures based on visual content .

IV. THE ANALYSIS OF IMAGE RETRIEVAL TECHNIQUES

In this section, the image retrieval approaches (i.e., TBIR, CBIR and SBIR) are analyzed. Most of these images are stored in image databases . In general, text based image retrieval, applies traditional text techniques to image annotations. Text-based image retrieval that can be based on annotations that were manually added to disclosing the images (caption, keywords, descriptions), or on collateral text that is accidentally available with an image (captions, subtitles, nearby text).MapReduce computing model to extract features of images.

Fig.6.input image

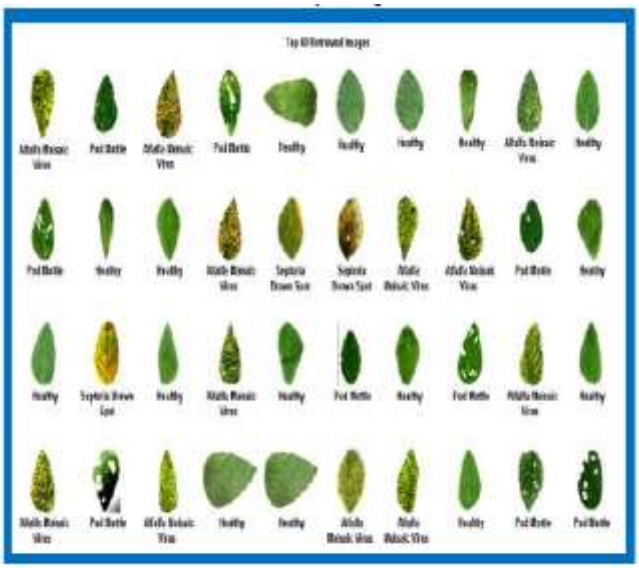

Fig.7 CBIR results of all Texture Features

In semantic based image retrieval, is based on hybrid approach and uses shape, color and texture .The user can give the concept / keyword as text input or can input the image itself.Semantic Image Retrieval (SIR) and built the ontology concepts using 900 images which contain pictures of 20 different mammals. Partial training dataset showninfig8.

Fig.8.Partial Training set

Fig.8a shows the accuracy comparison of color based shape based, texture based and our proposed approach with reference to four different test cases.

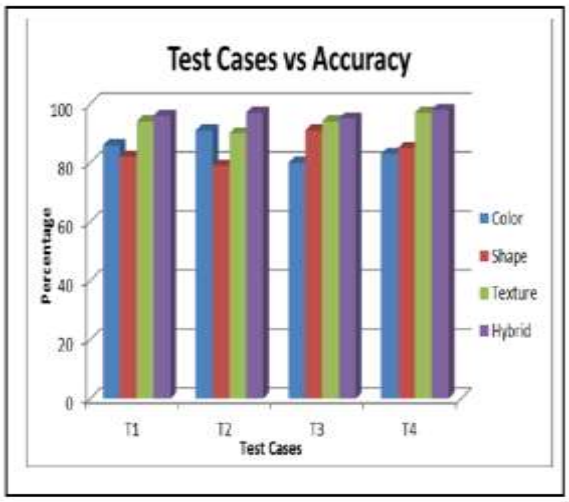

Fig..8a. Test Cases vs. Accuracy

Fig8b shows the percentage improvement of proposed hybrid technique over number of test cases; as shown in figure 7 the proposed solution improvement percentage varies over number of test cases.

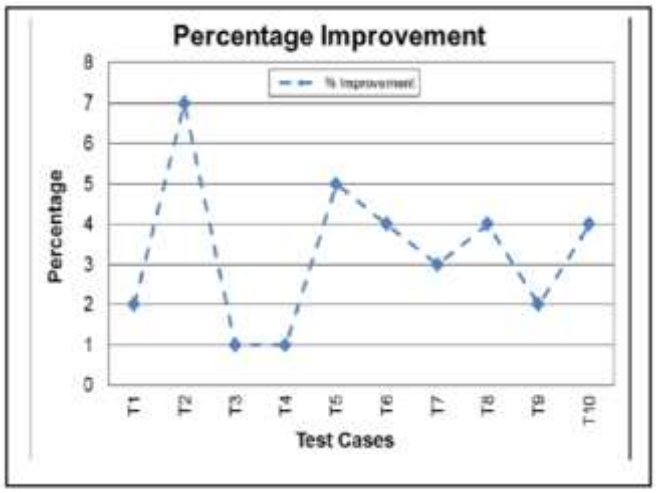

Fig.8b. Percentage Improvement vs. Test Cases

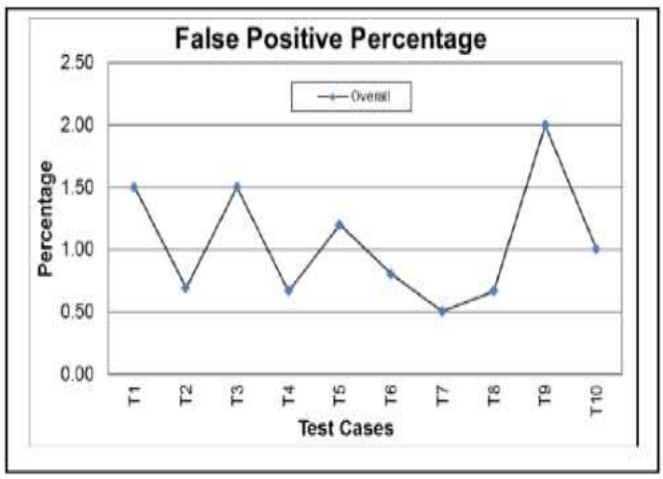

Fig.8c.False Positive Percentage vs. Test Cases

Fig 8c shows false positive percentage over number of test cases, the proposed solution false positive percentage ranges from 0.60 to 2 percent of the test cases which shows the result accuracy of the proposed solution.

Fig.8d. Test Case1

As shown in fig.8d.the user used a cheetah image as input. The resultant images are found in the knowledge base, therefore web image search, image filtration and ontology updating steps are skipped in this test case.

Fig.8e. Test Case 2

Fig.8e and are similar to the first test case1 where the user enters an image and relevant images are returned to the user.

V. CONCLUSION

Semantic image retrieval is one of the important techniques that help the user to find the most similar data .Thus this paper explained three image retrieval techniques and provide the many methods for searching and retrieving the information. In future, using the fuzzy logic based feedback weight adjustment scheme which will increase the score of the class which is more preferred by the users and it will increase the user satisfaction level with more privacy.

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